Sri Lakshmi Narayana Institute of Medical Sciences

Date: 03.05.2019

From
Head Of Department Incharge
Department of Anaesthesia
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research
Puducherry

To
The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Puducherry

Sub: Request for Permission to conduct value-added course: Comprehensive Trauma Life Support

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: Comprehensive Trauma Life Support for undergraduates from July -Dec 2019. We solicit your kind permission for the same.

Kind Regards

Dr. M KALASREE

Head of Department
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry- 605 502

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: Dr JAYALAKSHMI

The HOD: Dr. M KALASREE

The Expert: Dr. CHANDRASEKAR

The committee has discussed about the course and is approved.

Dean

Subject Expert

HOD

Dr. G. JAYALAKSHMI, BSC.,MBBS.,DTCD.,M.D.
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Ageram Kudapakkam, Post,
Villanur Commune Puducherry-605 502.

DEPARTMENT OF ANAESTHESIOLOGY
SRI LAKSHMI NARAYANA INSTITUTE
OF MEDICAL SCIENCES
OSUDU, KUDAPAKKAM, PUDUCHERRY-605 502

Head of Department
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry- 605 502

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affliated to Bharath University, Chennai - TN]

Circular

07.06.2019

Sub: Organizing Value-added Courses: Comprehensive Trauma Life Support - reg

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research**, is organizing **"_Comprehensive Trauma Life Support"** course in July- Dec 2019. The course content is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before 15/06/2019. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

Dr. G. JAYALAKSHMI, BSC.,MBBS.,DTCD.,M.D.
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Ageram Kudapakkam, Post,
Villanur Commune Puducherry-605 502.

Encl: Copy of Course content

COURSE PROPOSAL

Course Title: **COMPREHENSIVE TRAUMA LIFE SUPPORT**

Course Objective:

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1. To enable the students to learn about primary and secondary management of trauma patients.

2. To be familiar with recent advances in trauma care including use of USG in management of trauma patients

Course Outcome:

On successful completion of the course the students will have skill in basic management of trauma car.

Course Audience: CRRI

Course Coordinator: Dr Kalasree M

Course Faculties with Qualification and Designation:

1. Dr. Kalasree M-Associate Professor
2. Dr Chandrasekar – Assistant Professor

Course Curriculum/Topics with schedule (Min of 30 hours)

S.No	Date	Topic	Time	Hours	Faculty
1	13.07.2019	Introduction to course	2-4PM	2	Dr Chandrasekar
2	20.07.2019	objectives	2-4PM	2	Dr. Kalasree
3	27.07.2019	Definition of trauma	2-4PM	2	Dr Chandrasekar
4	03.08.2019	Polytrauma	2-4PM	2	Dr. Kalasree
5	10.08.2019	Pre hospital care	2-4PM	2	Dr Chandrasekar
6	17.08.2019	Triage of trauma patients	2-4PM	2	Dr. Kalasree-
7	24.08.2019	Primary and secondary assessment	2-4PM	2	Dr Chandrasekar
8	31.08.2019	Golden hour and platinum hour	2-4PM	2	Dr. Kalasree
9	07.09.2019	Stabilization and optimization	2-4PM	2	Dr Chandrasekar
10	14.09.2019	Trauma team	2-4PM	2	Dr. Kalasree
11	21.09.2019	Damage control surgery	2-4PM	2	Dr Chandrasekar
12	28.09.2019	Lethal triad of death	2-4PM	2	Dr. Kalasree
13	05.10.2019	Massive blood transfusion	2-4PM	2	Dr Chandrasekar
14	12.10.2019	Training of healthcare providers	2-4PM	2	Dr. Kalasree
15	19.10.2019	Final assessment	2-4PM	2	Dr Chandrasekar

REFERENCES:

1) Hoyt DB, Coimbra R. Trauma systems. Surg Clin North Am. 2007.

2. Celso B, Tepas J, Langland-Orban B, Pracht E, Papa L, Lottenberg L, Flint L. A systematic review and meta-analysis comparing outcome of severely injured patients treated in trauma centers following the establishment of trauma systems. J Trauma. 2006.

3. Abu-Zidan FM, Dittrich K, Czechowski JJ, Kazzam EE. Establishment of a course for Focused Assessment Sonography for Trauma. Saudi Med J. 2005

VALUE ADDED COURSE

1. Name of the program & Code

COMPREHENSIVE TRAUMA LIFE SUPPORT, ANAES 10

2. Duration & Period

30 hrs: July 2019- December 2019

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled:

Enclosed as Annexure- II

5. Assessment procedures:

Multiple choice questions- *Enclosed as Annexure- III*

6. Certificate of Participation:

Enclosed as Annexure- IV

7. No. of times offered during the same year:

1 Time JULY 2019-DEC 2019

8. Year of discontinuation: 2019

9. Summary report of each program year-wise

Value Added Course- JULY 2019-DEC 2019					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	ANAES 10	COMPREHENSIVE TRAUMA LIFE SUPPORT	DR. M KALASREE	CRRI	20

10. Course Feed Back

Enclosed as Annexure- V

RESOURCE PERSON

DR. CHANDRASEKAR

DEPARTMENT OF ANAESTHESIOLOGY
SRI LAKSHMI NARAYANA INSTITUTE
OF MEDICAL SCIENCES
OSUDU, KUDAPAKKAM, PUDUCHERRY-605 502

COORDINATOR

DR. M KALASREE

Annexure I

INTRODUCTION

Every day, there are any numbers of events that can result in serious injury and cause a person to stop breathing. These occurrences require fast action and people who are knowledgeable and capable enough to provide helpful assistance.

BLS or Basic Life Support as it implies is the basic aid provided to an individual who suddenly loses consciousness and suddenly stops breathing. Basic life support is a first aid measure to maintain the ABCs which stand for airway, breathing and circulation without auxiliary equipment. This is done while waiting for the ambulance or while waiting for medical and professional help.

This is not only advantageous for health care personnel but it is also advantageous for their family as well. This will make health care personnel prepared for any life threatening situation that require basic life support.

When treating injured patients, clinicians rapidly assess injuries and institute lifepreserving therapy. Because timing is crucial, a systematic approach that can be rapidly and accurately applied is essential. This approach, termed the "initial assessment," includes the following elements:

- Preparation
- Triage

• Primary survey (ABCDEs) with immediate resuscitation of patients with life-threatening injuries

• Adjuncts to the primary survey and resuscitation

• Consideration of the need for patient transfer

• Secondary survey (head-to-toe evaluation and patient history)

• Adjuncts to the secondary survey

• Continued post resuscitation monitoring and reevaluation

• Definitive care

The primary and secondary surveys are repeated frequently to identify any change in the patient's status that indicates the need for additional intervention. The assessment sequence presented in this chapter reflects a linear, or longitudinal, progression of events.

In an actual clinical situation, however, many of these activities occur simultaneously. The longitudinal progression of the assessment process allows clinicians an opportunity to mentally review the progress of actual trauma resuscitation.

Objective

Basic life support is needed when:

The individual is unconscious ∑

There is no presence of breathing (observe if there is the rise and fall of chest or feel the victim's nose or mouth for air) ∑

Abnormal pulse rate (thready or very fast)

The **primary objective** in basic life support is to establish and maintain an open airway to restore breathing and to correct respiratory acidosis (the carbon dioxide levels are higher than the oxygen levels).

An open airway is achieved by removing the object that impedes with the victim's breathing. If there is no object that is blocking the airway, this might involve a heart condition so chest compressions are required. This is applying pressure on to the victim's chest (with proper positioning of the hands on the correct location) to maintain the normal transport of oxygen to the brain and vital organs.

Oxygen deprivation is fatal especially when 6 minutes or more has passed since irreversible brain damage has occurred already and the chances of survival slim down. Importance of BLS Training: Current studies show that there is a significant lack of knowledge regarding the typical signs and risk factors associated with serious medical conditions among medical students and laypersons.

Basic life support consists of a number of medical procedures provided to patients with life threatening conditions of the body that cause pain or dysfunction to the person. Understanding BLS courses and more than that, practicing these techniques is by far the most challenging task confronting first aid. Taking everything into consideration, we believe that an adequate education in first aid and basic life support should be considered an essential aspect of the medical curriculum. CPR is a life-saving technique that is used when someone’s heart has stopped. Some medical conditions, such as a severe heart attack, can cause the heart to stop. Other causes include drowning, electric shock, poisoning, overdose and serious injury. For CPR to be successful, it needs to be started as soon as possible after a person's heart stops.

Objective: on completive course the student will be able to: ∑

know when and how to apply CPR for an adult, child and baby ∑ know what to do if someone is choking ∑

manage serious bleeding until medical help arrives ∑

how to do primary assessment for CPR ∑

how to meet the health & safety structures.

BLS includes psychomotor skills for performing high-quality cardiopulmonary resuscitation (CPR), using an automated external defibrillator (AED) and relieving an obstructed airway for patients of all ages. BLS does not include the use of drugs or invasive skills, and can be contrasted with the provision of Advanced Life Support (ALS). Firefighter, lifeguards, and police officers are often required to be BLS certified. BLS skills are also appropriate for many other professions, such as daycare providers, teachers and security personnel and social workers especially working in the hospitals and ambulance drivers. CPR provided in the field increases the time available for higher medical responders to arrive and provide ALS care. An important advance in providing BLS is the availability of the automated external defibrillator or AED.

This improves survival outcomes in cardiac arrest cases.

[1] Basic life support promotes adequate blood circulation in addition to breathing through a clear airway: ∑

Circulation: providing an adequate blood supply to tissue, especially critical organs, so as to deliver oxygen to all cells and remove metabolic waste, via the perfusion of blood throughout the body. ∑

Airway: the protection and maintenance of a clear passageway for gases (principally oxygen and carbon dioxide) to pass between the lungs and the atmosphere. ∑

Breathing: inflation and deflation of the lungs (respiration) via the airway

These goals are codified in mnemonics such as ABC and CAB. The American Heart Association (AHA) endorses CAB in order to emphasize the primary importance of chest compressions in cardiopulmonary resuscitation.

Healthy people maintain the CABs by themselves. In an emergency situation, due to illness (medical emergency) or trauma, BLS helps the patient ensure his or her own CABs, or assists in maintaining for the patient who is unable to do so.

For airways, this will include manually opening the patients airway (Head tilt/Chin lift or jaw thrust) or possible insertion of oral (Oropharyngeal airway) or nasal (Nasopharyngeal airway) adjuncts, to keep the airway unblocked (patent).

For breathing, this may include artificial respiration, often assisted by emergency oxygen.

For circulation, this may include bleeding control or cardiopulmonary resuscitation (CPR) techniques to manually stimulate the heart and assist its pumping action.

TRAUMA DEFINITION

The longer we live, the more inevitable it is that we will experience trauma.

Trauma is the response to a deeply distressing or disturbing event that overwhelms an individual's ability to cope, causes feelings of helplessness, diminishes their sense of self and their ability to feel the full range of emotions and experiences.

POLYTRAUMA

Polytrauma (multitrauma) is a short verbal equivalent used for severely injured patients usually with associated injury (i.e. two or more severe injuries in at least two areas of the body), less often with a multiple injury (i.e. two or more severe injuries in one body area).

An important condition for the use of the term polytrauma is the incidence of the traumatic shock and/or hemorrhagichypotensis and a serious endangering of one or more vital functions of the organism.

At least one out of two or more injuries or the sum total of all injuries endangers the life of the injured person with polytrauma. For its variable and non-homogeneous content the term polytrauma cannot be used as a final diagnosis without an objective quantification of the extent of the severity of the injury.

Therefore recommends to use this term to express a severe injury endangering the life as a general term which must be necessarily specified by the actual morphological and functional diagnoses. The term "polytraumatism" used in practice is not exactly a synonym of polytrauma, however, it has a direct generalizing relation to it.

Polytraumatism embraces the broad health care and general societal problem area relating to severe associated and multiple injuries (i.e. to polytrauma).

the actual classification of polytraumas according to their severity into four, three or two groups. This classification is based on the principles of general quantification of the severity of the injury (from the viewpoint of individual injuries and at the same time from the viewpoint of all concurrent injuries) divided into five or six grades.

PRE-HOSPITAL CARE

1.1. Airway management

1.1.1 Consider using a supraglottic device*

if the patient's airway reflexes are absent. Use basic airway manoeuvres like inserting a Guedel's airway**

bag and mask ventilation if required or if supraglottic device placement is not possible.

*supraglottic device - Laryngeal mask airway, proseal, i-gel etc. **Guedels airway = Oropharyngeal airway/oral airway

1.2 Chest Trauma

1.2.1 Use clinical assessment to diagnose pneumothorax for the purpose of triage or intervention

1.2.2 In patients with an open pneumothorax: Cover the open pneumothorax with a three sided occlusive dressing and Observe for the development of a tension pneumothorax

1.3 Haemorrhage

1.3.1 Use simple dressings (sterile gauze pads) with direct pressure to control external haemorrhage.

1.3.2 In patients with major limb trauma use a tourniquet* if direct pressure has failed to control life threatening haemorrhage. (*Tourniquet can be a bandage roll, rubber tubing , crepe bandage etc.)

1.3.3 If active bleeding is suspected from a pelvic fracture after blunt high-energy trauma: Apply a pelvic binder

1.3.4 Use intravenous tranexamic acid as soon as possible in patients with major trauma and active or suspected active bleeding. (*Dose of Tranexamic acid - 1 gmi.v. over 10 min followed by 1 gmI.v. over 8 hrs)

1.3.5 Do not use intravenous tranexamic acid more than 3 hours after injury in patients with major trauma

1.3.6 For circulatory access in patients with major trauma in pre-hospital settings: Use peripheral intravenous access.

1.3.7 In pre-hospital settings, titrate volume resuscitation to maintain a palpable central pulse(carotid or femoral).

1.3.8 In pre-hospital settings only use crystalloids (Ringer's lactate or Normal saline) to replace fluid volume in patients with active bleeding

1.3.9 Minimise ongoing heat loss in patients with major trauma. *Blankets can be used for reducing heat loss

1.4 Pain Management

1.4.1 Assess pain regularly in patients with major trauma using a pain assessment scale

1.4.2 For patients with major trauma, use intravenous morphine/strong opioids as the first line analgesic and adjust the dose as needed to achieve adequate pain relief *

1.5 Spine Trauma

1.5.1 Carry out full in-line* spinal immobilisation

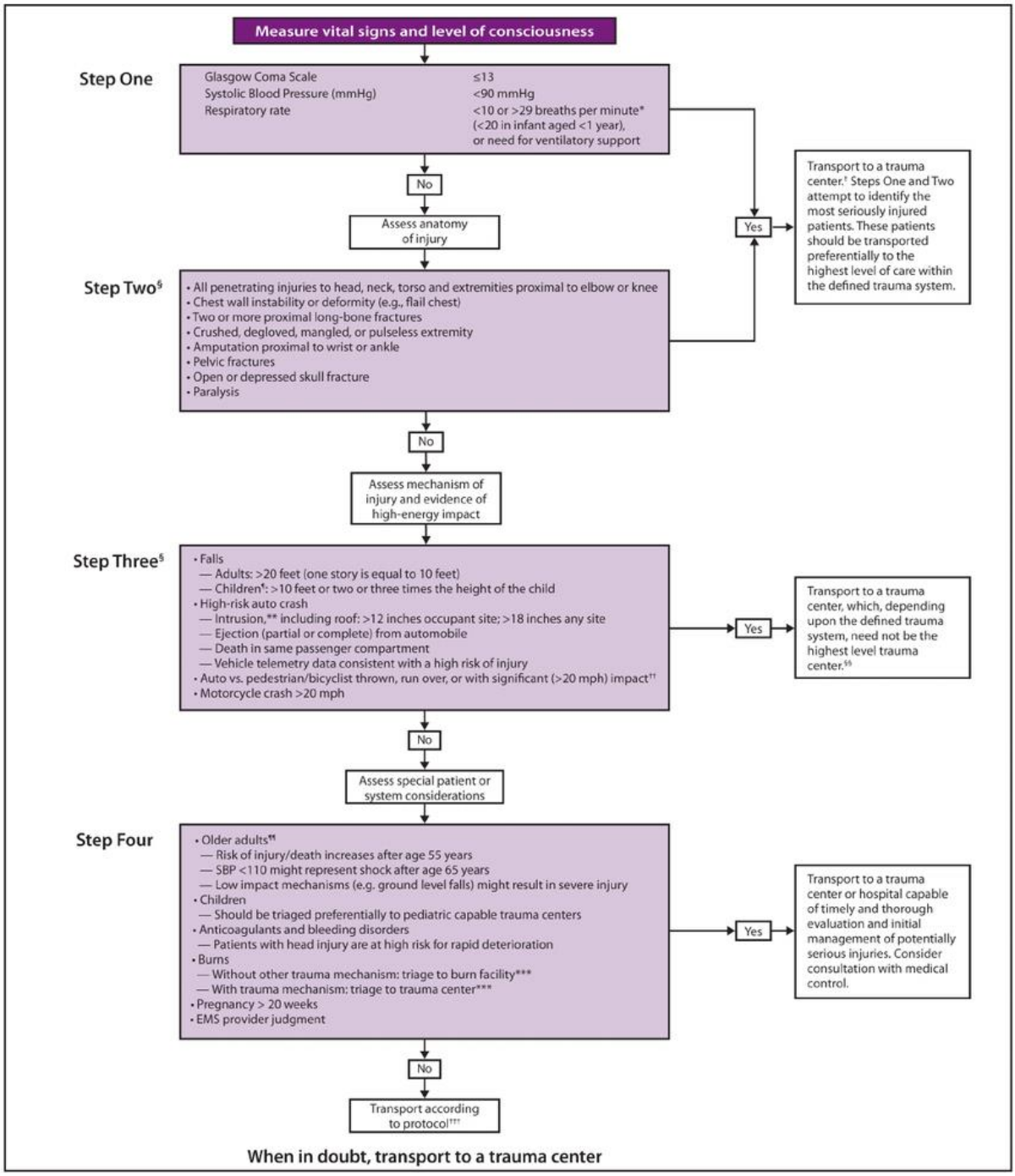
*By placing two blocks on either side of the head. Intravenous fluid bottles can also be used to prevent movement.

1.6 Fractures

1.6.1 Do not irrigate open fractures of the long bones, hindfoot or midfoot in pre-hospital settings

1.6.2 Consider a saline soaked dressing covered with an occlusive layer for open fractures in prehospital settings.

1.6.3 In the pre-hospital setting, consider the following for people with suspected long bone fractures of the legs: A rigid or malleable splint or adjacent leg as a splint if the suspected fracture is above the knee



2011 Field Triage Guideline Recommendations

Modifications to the previously published Guidelines (*1*) have been summarized (Box 2). The sections that follow discuss the changes made and provide the rationale of the Panel for making these changes.

The 2011 Guidelines have been endorsed by multiple professional organizations and federal government agencies. ¶ The national Highway Traffic Safety Administration concurs with these Guidelines. An updated list of endorsing organizations is available at http://www.cdc.gov/fieldtriage.

Name of the Guidelines

The name of the Guidelines remains unchanged. The Panel recognized that many different names have been attached to the Guidelines, creating potential confusion for persons, communities, and states attempting to implement the Guidelines. In addition, the Panel reviewed feedback that indicated that confusion exists as to whether this represents mass casualty triage or "routine" daily triage of injured patients. The Guidelines apply to "routine" daily triage of injured patients. After deliberations, the Panel decided not to change or modify the name of the decision scheme because creating a new and different name would likely only add to or increase any confusion or misunderstanding that exists, many states and locales have begun implementation of the decision scheme based on its name as given and to change it at this point might unduly burden those systems; and even if a new name was added, end-users might attach a different name to it, and the problem would remain unresolved. The Panel recommended that CDC continue to provide educational materials that describe the purpose of the Guidelines and that the decision scheme be called either the "field triage decision scheme" or the "guidelines for field triage of injured patients." The Panel also recommended that the Guidelines not be referred to as a "national protocol" because using the term "protocol" has an unintended proscriptive inference for the end-user that could restrict local adaptation required for optimal implementation.

Step One: Physiologic Criteria

In Step One, the Glasgow Coma Scale, and Respiratory Rate criteria were modified. Step One is intended to allow for rapid identification of critically injured patients by assessing level of consciousness (Glasgow Coma Scale [GCS]) and measuring vital signs (systolic blood pressure [SBP] and respiratory rate). Vital sign criteria have been used since the 1987 version of the ACS Field Triage Decision Protocol (*8*). These criteria demonstrate high predictive value for severe injury. Of 289 references identified from the structured literature review, 82 (28%) were relevant to Step One. SBP <90 and respiratory rate <10 or >29 remain significant predictors of severe injury and the need for a high level of trauma care. Multiple peer-reviewed articles published since 2006 support this threshold (*25–28*).

The Panel recommended transport to a facility that provides the highest level of care within the defined trauma system if any of the following are identified:

- Glasgow Coma Scale ≤13, or
- SBP of <90 mmHg, or
- respiratory rate of <10 or >29 breaths per minute (<20 in infant aged <1 year), or need for ventilatory support.

Glasgow Coma Scale: Criterion Clarified

Experience with the 2006 Guidelines has indicated that many readers and end-users perceived that the criterion of GCS <14 recommended taking patients with a GCS of ≤14 to trauma centers. To reduce any future confusion, the Panel voted unanimously to rewrite the criterion as GCS ≤13.

Need for Ventilatory Support: Criterion Added

The need for ventilatory support (including both bag-mask ventilation and intubation) was added to "respiratory rate of <10 or >29 breaths per minute (<20 in an infant aged <1 year). Although it has been assumed that patients requiring ventilatory support would meet the respiratory rate criterion, three studies suggest that this is not necessarily the case and demonstrate the importance of considering ventilatory support, in addition to respiratory rate, in identifying seriously injured patients. Among 6,259 adults meeting Step One criteria across 11 sites in North America, an advanced airway attempt (i.e., intubation or supraglottic airway placement) was the strongest predictor of death or prolonged hospital stay among all physiologic measures **(***29*). Among 955 injured children meeting Step One criteria from the same sites, little difference was reported in the proportion of children with abnormal respiratory rates who were seriously injured compared with those whose injuries were not serious (44% and 47%, respectively); however, the need for ventilatory assistance was highly discriminating between the two groups (46% and 3%, respectively) and again was determined to be the strongest physiologic predictor of serious injury (*30*). Another study involving 3,877 injured children had similar findings, with field intubation attempt being second only to GCS in identifying children in need of trauma center care (*31*). Therefore, after reviewing the literature and considering the evidence, the Panel added "or need for ventilatory support" to the respiratory rate criterion, recognizing that adults and children requiring advanced airway interventions represent a very high-risk group, whether or not other physiologic abnormalities (including specific respiratory rate values) are present and to ensure that patients requiring airway support receive the highest level of trauma care within the defined trauma system.

Additional Physiologic Concerns Discussed by the Expert Panel

The following sections describe additional physiologic criteria topics that were discussed by the Panel and for which no changes were recommended.

Glasgow Coma Scale Motor

Although the Panel considered adding the motor portion of the Glasgow Coma Score (GCS_m) as an alternative to the GCS total (GCS_t), which includes verbal, eye opening, and motor components, no change was made. The motor score has been demonstrated to be associated with the need for lifesaving interventions (*32,33*). Debate occurred as to whether using only the motor score would be easier for EMS personnel than the GCS_t; however, because of the lack of confirmatory evidence, the long standing use of the GCS_t and its familiarity among current EMS practitioners, the inclusion of the motor score within the GCS_t, and complications because of the difficulty of comparative scoring systems, the Panel recommended no change at this time.

Systolic Blood Pressure in Older Adults and Children

The Panel discussed including a systolic blood pressure (SBP) threshold of <110 for patients aged >65 years. After deliberation, the Panel decided to account for physiologic differences in older adults in Step Four under "Older Adults"; the rationale and clinical evidence are discussed in that section. The Panel maintained the decision to retain the SBP<90mmHg threshold in children. Because of the substantial proportion of young children with no field measurement of blood pressure (*31*), the Panel believed this decision would have minimal impact on overtriage.

Shock Index

A retrospective chart review of 2,445 patients admitted over a 5-year period at an urban Level I trauma center determined that shock index (heart rate divided by systolic blood pressure) is an accurate prehospital predictor of mortality (*34*). However, the Panel identified no evidence to suggest that shock index improves field identification of seriously injured patients beyond the existing physiologic measures, and noted that utilization of the shock index requires a calculation in the field, and its value during field triage remains unclear. The Panel noted that the use of shock index for triage decisions might be more applicable in the future as vital signs and triage criteria become routinely recorded and collected on mobile devices

Step Two: Anatomic Criteria

In Step Two, the criteria pertaining to chest and extremity injuries were modified. Step Two of the Guidelines recognizes that certain patients, on initial presentation to EMS providers, have normal physiology but have an anatomic injury that might require the highest level of care within the defined trauma system. Of the 289 references identified from the structured literature review, 57 (20%) were relevant to Step Two. Most of the literature supported Step Two of the 2006 Guidelines, and the majority of Step Two criteria therefore remain unchanged.

The Panel recommended transport to a facility that provides the highest level of care within the defined trauma system if any of the following are identified:

- all penetrating injuries to head, neck, torso, and extremities proximal to elbow or knee;
- chest wall instability or deformity (e.g. flail chest);
- two or more proximal long-bone fractures;
- rushed, degloved, mangled, or pulseless extremity;
- amputation proximal to wrist or ankle;
- pelvic fractures;
- open or depressed skull fractures; or
- paralysis.

Crushed, Degloved, Mangled, or Pulseless Extremity: Criterion Modified

This criterion was modified to include "pulseless" extremities. Several published articles highlighted vascular injury as an important injury requiring specialized care (*35–40*). In a retrospective analysis of

73 patients with arterial injuries, 37 patients (51%) had associated injuries (e.g., bone and nerve), and five patients (7%) required amputation (*37*). In a 5-year retrospective review of 52 patients with upper extremity vascular injury, 41 patients (79%) had associated nerve or bone injury, 14 patients (27%) required fasciotomies, and seven patients (13%) required amputation. In addition, the patients in this study were severely injured, with a mean ISS of 17.52 (*40*). After review of the evidence, the Panel decided to add "pulseless" to the criterion for crushed, degloved, or mangled extremity because vascular injury of the extremity might lead to significant morbidity and mortality, require a high level of specialized trauma care involving multiple medical specialties, and be present in the absence of a crushed, degloved, or mangled extremity (*37*).

Chest Wall Instability or Deformity (e.g., Flail Chest): Criterion Modified

This criterion was modified to read "Chest wall instability or deformity (e.g., flail chest)." The Panel identified no new evidence that specifically addressed the field triage of patients with flail chest. The Panel recognized that the field diagnosis of a flail chest is rare and that this criterion might be overly restrictive. In a 5-year retrospective study of the Israel National Trauma Registry, flail chest was identified in 262 (0.002%) of 118,211 patients and in only 262 (0.02%) of 11,966 chest injuries (*41*). Flail chest occurs in approximately 75 (0.002%) per 50,000 patients (*42*). In this context, the Panel thought that as written, "flail chest" might fail to identify all of the chest injuries that require that the patient be transported to a facility that provides the highest level of care within the defined trauma system. The Panel decided that the criterion should be changed to "chest wall instability or deformity (e.g., flail chest)" because "flail chest" rarely is diagnosed by EMS providers; the terminology "chest wall instability or deformity" more accurately describes what EMS providers are asked to identify in the field environment, and the broader terminology ensures that additional blunt trauma to the chest (e.g., multiple rib fractures) will be identified and the patient transported to the appropriate facility.

All Penetrating Injuries to Head, Neck, Torso, and Extremities Proximal to Elbow or Knee: Criterion Modified

This criterion was modified to read "elbow or knee." During its discussions, the Panel noted that penetrating injuries to the extremities proximal to the elbow or knee might signify severe injuries requiring surgical intervention or intensive care unit (ICU) admission. Therefore, the Panel modified the wording of this criterion from "elbow and knee" to "elbow or knee" to recognize that these types of injuries generally occur separately and that each can represent a severe injury.

Amputation Proximal to Wrist or Ankle: Criterion Modified

This criterion was modified to read "wrist or ankle." During its discussions, the Panel noted that amputations proximal to the wrist or ankle might signify severe injuries requiring the patient to be taken to an operating theater or admitted to an ICU. Therefore, the Panel modified the wording of this criterion from "wrist and ankle" to "wrist or ankle" to recognize that these types of injuries most commonly occur separately and that each can represent a severe injury.

Additional Anatomic Concerns Reviewed by the Panel

The following sections describe additional anatomic criteria topics that were discussed by the Panel and for which no changes were recommended.

Tourniquet Use

Successful medical treatment of soldiers on the battlefield prompted researchers to explore the potential use of tourniquets for the rapid treatment of vascular injuries seen in the civilian population. Recent battlefield experiences indicate that tourniquet use reduces mortality by limiting exsanguinations (*43,44*). A retrospective review of 75,000 trauma visits at two Level 1 trauma centers in Texas identified 14 patients with penetrating extremity injuries who arrived at the hospital dead, required emergency thoracotomy, or underwent cardiopulmonary resuscitation. Eight decedents (57%) were identified as having extremity injuries that might have been amenable to application of a tourniquet in the prehospital environment (*45*).

After review of the literature and subsequent discussion, the Panel elected not to include tourniquet use as an independent Step Two criteria because evidence is limited regarding the use of tourniquets in the civilian population; use of tourniquets among EMS systems varies; inclusion of tourniquet use as a criterion could lead to overuse of tourniquets instead of basic hemorrhage control methods and thus potentially result in overtriage; and the "crushed, degloved, mangled, or pulseless extremity," "all penetrating injuries to head, neck, torso, and extremities proximal to elbow or knee," and "amputation proximal to wrist or ankle" criteria were as likely to identify severely injured patients regardless of tourniquet use. The Panel recommended further study of the use of this intervention.

Pelvic Fractures

Patients with pelvic fractures should receive rapid and specialized care because of the possibility of internal hemorrhage and other associated injuries. The Panel discussed whether the term "pelvic fracture" was the most appropriate term for the Guidelines to use to aid EMS professionals in identifying patients in need of trauma center care, recognizing that certain states and communities have changed this terminology to read "unstable pelvic fracture," "suspected pelvic fracture," or "pelvic instability." After extensive discussion, the Panel decided to retain the term "pelvic fractures" as written because no compelling evidence exists that a different name would identify the patients in need of trauma center care more accurately, for the sake of simplicity, and because adding "suspected" or "tenderness" to this criterion might increase overtriage unnecessarily.

Step Three: Mechanism of Injury

In Step Three, the intrusion criterion was modified to include roof intrusion. An injured patient who does not meet Step One or Step Two criteria should be evaluated in terms of mechanism of injury (MOI) to determine if the injury might be severe but occult. Evaluation of MOI will help to determine if the patient should be transported to a trauma center. Although different outcomes have been used, recent studies have demonstrated the usefulness of MOI for field triage decisions. A retrospective study of approximately 1 million trauma patients indicated that using physiologic and anatomic criteria alone for triage of patients resulted in undertriage, implying that using MOI for determining trauma center need helped reduce the problem of undertriage (*46*). Another study of approximately one half

million patients determined that MOI was an independent predictor of mortality and functional impairment of blunt trauma patients (*47*). Among 89,441 injured patients evaluated by EMS providers at six sites, physiologic and anatomic criteria identified only 2,600 (45.5%) of 5,720 patients with an ISS >15, whereas MOI criteria identified an additional 1,449 (25.3%) seriously injured patients with a modest (10%) incremental increase in overtriage (from 14.0% to 25.3%) (*48*).

Of the 289 references identified from the structured literature review, 85 (29%) were relevant to Step Three. Articles that were considered to provide either compelling evidence for change to the Guidelines or articles that provided insight into specific mechanisms are discussed below.

The Panel recommended transport to a trauma center if any of the following are identified:

- falls
    - adults: >20 feet (one story = 10 feet)
    - children: >10 feet or two to three times the height of the child
- high-risk auto crash
    - intrusion, including roof: >12 inches occupant site; >18 inches any site
    - ejection (partial or complete) from automobile
    - death in same passenger compartment
    - vehicle telemetry data consistent with a high risk for injury;
- automobile versus pedestrian/bicyclist thrown, run over, or with significant (>20 mph) impact; or
- motorcycle crash >20 mph

High-Risk Automobile Crash: Intrusion, Including Roof >12 Inches to the Occupant Site; >18 Inches to Any Site: Criterion Modified

This criterion was modified to include roof intrusion. In a study of 880 children ≤15 years, intrusion, independent of other factors such as age, restraint use, seating row and direction of impact was a significant and strong predictor of a severe injury measured by an Abbreviated Injury Scores (AIS) >2 or >3. Furthermore, these analyses demonstrated that each additional centimeter of intrusion increased the odds of an AIS >2 or >3 by 2.9% (*49*). Another study identified similar results indicating that drivers whose vehicles suffered side impact collisions had nearly four times (OR = 3.81; 95% CI = 1.26–11.5) the odds of suffering an AIS >3 or have severe head injury compared with drivers whose vehicles had different collision characteristics; these results further suggested that drivers who had intrusion into the passenger compartment at the driver's position were significantly more likely to have severe injury regardless of damage distribution across the frontal plane of the vehicle (*50*).

Data from CIREN and NASS-CDS suggest that intrusion of >12 inches at an occupant site or intrusion of >18 inches at any site is a significant predictor of severe injury requiring trauma care. These data also indicate that roof intrusion is predictive of the need for trauma care (*51*).

After deliberations, the Panel decided to add "including roof" to the intrusion category because the 2006 guidelines did not convey clearly that vertical roof intrusion has the same implication for increased injury severity as horizontal intrusion into the vehicle occupant space, and a review of the literature confirms that intrusion, including vertical roof intrusion, is an important predictor of trauma center need.

Additional Mechanism-of-Injury Concerns Discussed by the Panel

The following sections describe additional MOI criteria topics that were discussed by the Panel and for which no changes were recommended.

Extrication

Prolonged extrication has been reported to be an independent predictor (OR = 2.3; 95% CI = 1.2–4.6) of emergency surgery need in hypotensive (SBP <90 mmHg) trauma patients (*52*). An earlier Australian study, reviewed by the Panel in 2005, determined that prolonged extrication time was associated with major injury (*53*). However, neither of these studies used ISS >15 as a threshold, nor did they examine whether prolonged extrication was an independent predictor of serious injury after Steps 1 and 2. During the 2006 revision, the Panel considered poor standardization in the literature regarding the definition of extrication time as well as its dependence on local resources, scene conditions, and extrication expertise in its decision to eliminate prolonged extrication. The Panel concluded at that time that the vehicle intrusion criterion should be an adequate surrogate for prolonged extrication. During this latest revision, examination of CIREN data confirmed that the current intrusion criterion was more specific for ISS >15 injury than need for physical extrication of the vehicle occupant (length of extrication unknown) (*51*).

Recent data collected over a 2-year period from 11,892 interviews with EMS personnel regarding transport of injured patients to a regional trauma center indicated that of the 9,483 patients who did not meet the anatomic or physiologic criteria, extrication time >20 minutes (as estimated by the EMS provider) suggested that occupants of motor-vehicle crashes had a significantly greater likelihood of being admitted to an ICU, needing nonorthopedic surgery in the first 24 hours after injury, or dying (sensitivity: 11%; specificity: 98%; positive likelihood ratio: 5.0) (*54*).

Although these data would appear to support the inclusion of "prolonged extrication time" as a mechanism criterion for identifying a major trauma patient, the Panel concluded that this was not an independent predictor in that the intrusion criterion addressed this mechanism event adequately, and the imprecise nature of this data was difficult to interpret reliably and include. The Panel concluded that no compelling evidence exists to reinstitute prolonged extrication time as a criterion in MOI.

Rollover

Rollover vehicle crash events are less common than planar crashes of vehicles into other vehicles or fixed objects, but they are more dangerous overall (*51,55*). In 2004, NHTSA reported 11,728,411 motor-vehicle crashes. Of these, the 275,637 (2.4%) rollover crashes were associated with one third of all occupant deaths (*56,57*). Two recent studies highlight the importance of rollover as a predictor of severe injury (*49,57*). However, both studies were limited because they did not control for Step One and Step Two criteria when determining the need for transport to a trauma center. A study was

conducted that used 11,892 EMS provider interviews regarding transport of injured patients to identify injured patients who did not meet the physiologic or anatomic criteria to determine if rollover was a predictor of trauma center need. A total of 523 rollover cases occurred, and the sensitivity for trauma center need (defined as death, admission to ICU, or nonorthopedic surgery within 24 hours of arrival) was 13% (range: 8.2%–18.0%) and the specificity was 87% (range: 86.2%–88.3%). When the data were analyzed by the number of quarter turns, only minimal improvement in positive likelihood ratios was reported, and none was >1.7 (*54*).

The Panel reexamined other data from rollover crashes to determine whether subsets of rollover crashes might warrant inclusion as a criterion in MOI. NASS-CDS rollover crash data were analyzed to determine the effect of the number of quarter turns, the final position of the vehicle, the extent of roof intrusion as well as partial and full ejection of the occupant from the vehicle. Rollover crashes with roof intrusion of 24 inches were associated with a 19.3% risk of ISS >15 injury. Any ejection (partial or full) was associated with a 21.5% risk of ISS >15 injury, and complete occupant ejection was associated with a 27.4% risk of ISS >15 injury (*51*).

The Panel thought that the existing ejection and intrusion criterion, and the previously discussed modification to include roof intrusion, adequately addressed field triage of this subset of severe rollover crashes. The Panel concluded that rollover event, as a standalone criterion, has <9% PPV for ISS >9 and is insufficient to meet the 20% PPV for ISS >15 targeted as a threshold for inclusion in Step Three.

As a crash mechanism, rollover might result in one or more occupants sustaining severe injuries. The Panel reiterated its opinion that patients involved in rollover crashes should be evaluated by EMS personnel to determine if they have injuries that meet Step One, Step Two, or other Step Three criteria. Patients involved in rollover crashes who meet Step One or Step Two criteria should be transported preferentially to the highest level of care within the defined trauma system. Patients involved in rollover crashes who meet only Step Three (but not Step One or Step Two) criteria should be transported to a trauma center that, depending on the defined trauma system, need not be the highest-level trauma center. The Panel noted that the increased injury severity associated with rollover crashes results from an occupant being ejected either partially or completely from the vehicle, and partial or complete ejection is already a criterion for transport to a trauma center. Therefore, the previous decision to remove rollover from the 2006 Guidelines was reaffirmed, and no changes were made regarding rollover. In addition, the Panel noted that adding "including roof" under the intrusion criterion will identify rollover crashes with significant roof intrusion.

Vehicle Telemetry

Several studies have indicated that mechanical aspects of collisions can be predictors of injury in motor vehicle crashes. A study that used 10 years of NASS-CDS data determined that seat belt use, direction of impact, and Delta V (i.e., a change in velocity) were the most important predictors of an ISS >15 (*58*). The study also concluded that an event data recorder (EDR) system could provide emergency personnel with good estimates of injury status based solely on data such as seat belt use, direction of impact, and Delta V, which can be collected from the vehicle. Other research has

suggested that factors that can be recorded by a vehicle EDR system such as Delta V (*59,60*), high speed velocity (*61*), location of impact (*62*), and vehicle weight and type (*63*) are predictors of severe injury. The Panel recognized the increasing availability of vehicle telemetry in newer vehicles and reaffirmed its position that vehicle telemetry might have an important role in the triage of injured patients as the crash technology, data transmission, and telemetry availability continue to expand. An explanation of how vehicle telematics could be used in field triage has been published previously (*64*).

Falls

Research conducted on falls is limited because of the inability to study the impact of measured fall height directly. However, three studies were identified that added insight into this mechanism. One study of 63 cases of falls indicated that among children aged <2 years, height of fall >2 meters (>6.6 feet) is a predictor of injury (*65*). A similar study of 72 children aged 4 months–5 years indicated that falls from <1 meter (3.3 feet) could cause a skull fracture if the fall occurred on a hard surface (*66*). Furthermore, another study conducted in France of 287 victims of falls from height indicated that height of fall, hard impact surface, and having the head being the first body part to touch the ground were independent predictors of mortality (*67*). On the basis of these three studies with limited sample sizes and the overall limited data on falls, no changes were made to this section.

Step Four: Special Considerations

In Step Four, the criteria for older adults and anticoagulation were modified, and the criteria for end stage renal disease requiring dialysis and time-sensitive extremity injury were removed. In Step Four, EMS personnel must determine whether persons who have not met physiologic, anatomic, or mechanism steps have underlying conditions or comorbid factors that place them at higher risk of injury or that aid in identifying the seriously injured patient. Persons who meet Step Four criteria might require trauma center care. A retrospective study of approximately 1 million trauma patients indicated that using physiologic (Step One) and anatomic (Step Two) criteria alone for triage of patients resulted in a high degree of under triage, implying that using special considerations for determining trauma center need helped reduce the problem of under triage (*46*). Among 89,441 injured patients evaluated by EMS providers at six sites, physiologic, anatomic, and mechanism of injury criteria identified 4,049 (70.8%) patients with an ISS >15; Step Four of the Guidelines identified another 956 (16.7%) of seriously injured patients, with increase in overtriage from 25.3% to 37.3%. (*48*).

Of the 289 references identified from the structured literature review, 77 (27%) were relevant to Step Four. No changes were made to the Step Four criteria for burns, pregnancy, and EMS provider judgment. The Panel recommended transport to a trauma center or hospital capable of timely and thorough evaluation and initial management of potentially serious injuries for patients who meet the following criteria:

- older adults
    - risk for injury/death increases after age 55 years
    - SBP <110 might represent shock after age 65 years

    - low impact mechanisms (e.g., ground-level falls) might result in severe injury
- children
    - should be triaged preferentially to pediatric capable trauma centers
- anticoagulants and bleeding disorders
    - patients with head injury are at high risk for rapid deterioration
- burns
    - without other trauma mechanism: triage to burn facility
    - with trauma mechanism: triage to trauma center
- pregnancy >20 weeks
- EMS provider judgment

Older Adults: Criterion Modified

This criterion was modified to include statements that recognize that a SBP <110 might represent shock after age 65 years and that low-impact mechanisms (e.g., ground-level falls) might result in severe injury. The Panel recognized that adults aged >65 years are not transported consistently to the hospital best equipped to manage their injuries (high rates of undertriage relative to other age groups). A retrospective analysis of 10 years of prospectively collected data in the Maryland Ambulance Information System identified a higher undertriage rate for patients aged ≥65 years compared with those aged <65 years (49.9% and 17.8%, respectively; p<0.001) (*68*). On subsequent multivariate analysis, the authors noted a decrease in transport to trauma centers for older patients beginning at age 50 years (OR = 0.67; 95% CI = 0.57–0.77), with a second decrease at age 70 years (OR = 0.45; 95% CI = 0.39–0.53) compared with those patients aged <50 years. In a 4-year retrospective study of 13,820 patients in the Washington State Trauma Registry, those patients aged >65 years were less likely than those aged ≤65 years to have had the prehospital system or the trauma team activated. In addition, use of multivariate logistic regression indicated that physiologic triage variables (e.g., blood pressure and heart rate) were unreliable predictors of mortality or interventions in the hospital (*69*).

Several studies suggest that differences in the physiologic response to injury and high-risk mechanisms in older adults might partly explain undertriage rates in this age group. In a retrospective chart review of 2,194 geriatric patients (aged ≥65 years) at a Level 1 trauma center, mortality was noted to increase at a SBP of <110 mmHg (*70*). A retrospective review of 106 patients aged >65 years at a Level II trauma center indicated that occult hypotension (i.e., decreased perfusion that is not evident by standard vital sign criteria) was present in 42% of patients with "normal" vital signs (*71*).

In addition, the Panel reviewed literature that indicated that older adults might be severely injured in low-energy events (e.g., ground-level falls). An analysis of deaths reported by the King County Medical Examiner's Office (King County, Washington) indicated that ground level falls accounted for 237 (34.6%) of all deaths (684) in patients aged ≥65 years (*72*). A study of 57,302 patients with

ground-level falls demonstrated higher rates of intracranial injury and in-hospital mortality among adults aged ≥70 years (*73*).

On the basis of its review, the Panel elected to strengthen the criterion regarding older adults in Step Four. "SBP <110 might represent shock after age 65" and "low-impact mechanisms (e.g., ground-level falls) might result in severe injury" were added under "Older Adults" in Step Four because undertriage of the older adult population is a substantial problem, the evidence reviewed suggests that the physiologic parameters used in younger patients might not apply to older adults, occult injury is likely to be greater among older adults, low-energy transfers (e.g., ground-level falls) might result in serious injuries in this population, and field identification of serious injury among older adults must be more proactive.

Anticoagulation and Bleeding Disorders: Patients with Head Injury Are at High Risk for Rapid Deterioration: Criterion Modified

The Panel modified this criterion to highlight the potential for rapid deterioration in anticoagulated patients with head injuries. Anticoagulation use has been associated with an increased risk for intracranial hemorrhage following head injury (*72,73–77*) and longer hospital stays (*72,78*). A retrospective review of 141 Level II trauma center patients who were taking warfarin or clopidogrel, had minor head injuries, and had a GCS of 15 indicated that 41 (29%) had intracranial hemorrhage (*74*). A study of 237 patients who died following ground-level falls indicated that 71 (30%) patients were anticoagulated with aspirin, warfarin, clopidogrel, heparin, or multiple anticoagulants (*72*). Preinjury use of warfarin has been associated with higher mortality among adults aged >65 years with mild head injuries using a GCS measure of 14 or 15 (*74*). In a retrospective, case-controlled study of 131 patients with traumatic intracranial hemorrhage who were taking aspirin, clopidogrel, or warfarin before they were injured, anticoagulated patients taking clopidogrel had higher mortality rates (OR = 14.7; 95% CI = 2.3–93.6) and were more likely to be discharged to a long-term facility (OR = 3.25; 95% CI = 1.06–9.96) (*78*).

After reviewing this literature, the Panel elected to strengthen this criterion, underscoring the potential for anticoagulated patients who do not meet Step One, Step Two, or Step Three criteria but who have evidence of head injury to undergo rapid decompensation and deterioration. The panel recognized that patients who meet this criterion should be transported preferentially to a hospital capable of rapid evaluation and imaging of these patients and initiation of reversal of anticoagulation if necessary.

End-Stage Renal Disease Requiring Dialysis: Criterion Removed

The panel reviewed this specific criterion, which was added to the 2006 Guidelines because of the potential risk of anticoagulation in these patients and the need for special resources (e.g., dialysis) to be used in this patient population. However, in 2011, the Panel elected to remove this criterion, noting that research demonstrating the value of dialysis as a triage criterion for identifying patients with serious injury is lacking and that concerns regarding anticoagulation in this population are addressed under the anticoagulation and bleeding disorders criterion. The Panel thought that transport decisions

regarding patients requiring dialysis are best made in consultation with medical control or based on local transport protocols for such patients.

Time-Sensitive Extremity Injury: Criterion Removed

With the addition of "pulseless" to Step Two criteria, the panel thought this criterion was redundant, and removed it from the 2011 Guidelines.

Transition Boxes and Flow of the 2011 Schematic: Format Modified

The transition boxes in the schematic (Figures 1 and 2) provide destination guidance to the prehospital provider for patients meeting criteria outlined in the preceding Step. After reviewing input from providers, states, and local EMS agencies, the Panel recognized the need to simplify the appearance of the Guidelines, modify the transition boxes, clarify the intent of the Guidelines, and simplify communication of action steps in the Guidelines across a variety of providers and systems. To do this, the Panel took action both to improve the layout of the decision scheme and to modify specific wording within the boxes. To improve the layout of the transition boxes, the Panel took two steps. First, because the transition boxes between Step One and Step Two communicate the exact same information and thus were thought to be redundant, they were consolidated into one box. Second, all action steps were moved to the right side of the page for easier readability and determination of outputs for patients meeting different steps in the Guideline (Figure 2).

Next, the Panel modified the language within the boxes to ensure consistency between transitions in the Guideline. The first word in all transition boxes was changed to "transport" to ensure consistency between all boxes. Next, to emphasize the need for state, regional, and local trauma systems to define the parameters of their trauma systems (including the "highest level of care"), the word "defined" was added in front of "trauma system" for transition boxes following Steps One, Two, and Three. This change recognizes that the highest level of trauma care should be determined by the regional/state trauma system design and authority. In most systems, this is a Level I center, but in given circumstances, the highest level of care available might be a Level II, III, or IV facility or a local, critical access hospital serving the region. Third, in the transition box following Step Three, the words "closest appropriate'' were removed. This change, with the addition of "defined" as above, makes this transition box consistent with the wording in the remainder of the Guidelines. Finally, regarding the transition box following Step Four in the 2006 Guidelines, the Panel recognized that many EMS systems operate via indirect (off-line) medical control (using medical director–approved protocols in a sanctioned, algorithmic process) and not direct (online) medical control (in which direct communication can take place between a physician and an EMS provider via radio or telephone for a specific patient interaction). Therefore, the Panel removed mandatory contact with medical control and emphasized that online control with verbal consultation might be appropriate. The wording of this box also was modified to emphasize that these patients need to go to a facility at which they can be evaluated readily with appropriate initial management for injury, whether or not this is a trauma center.

Future Research for Field Triage

The Panel noted an increase in the peer-reviewed published literature regarding field triage from the 2006 Guideline to this current revision. The current revision process identified and reviewed 289 articles during 2006–2011 (~48 articles/year) directly relevant to field triage, 24 times the annual number of articles during 1966–2005 (~2/year) cited in the 2006 Guidelines (*1*). Despite this increase in the number of articles, the Panel concluded that ensuring that the Guidelines are based on the best clinical evidence requires expanded surveillance (Box 3), focused research using robust study designs, and consistent outcome measures. The preponderance of existing triage studies reviewed by the Panel used retrospective data, trauma registry samples, single EMS agencies, and single trauma centers, all of which can result in biased estimates and reduced generalizability. Prospective triage research is needed that includes multiple sites, multiple EMS agencies, trauma and nontrauma hospitals, and population-based study designs that reduce selection bias and increase the generalizability of study findings. In addition, relatively little triage literature exists that evaluates the Guidelines in their entirety (as opposed to an individual criterion or component steps of the decision scheme) and the contribution of each step to the full Guidelines. Prospective studies evaluating the full Guidelines among the broad injury population served by EMS are needed to assess the accuracy of the Guidelines appropriately and to better identify targets for improvement. Further, the process of field triage in rural settings, including the impact of geography on triage, issues regarding proximity to trauma centers, use of air medical services, integration of local hospitals for initial stabilization, and secondary triage at nontrauma hospitals, is poorly understood. As a substantive portion of the U.S. population lives >60 minutes from the closest major trauma center, and 28% of U.S. residents are only able to access specialized trauma care within this time window by helicopter (*79*), field triage in nonurban environments needs to be understood better.

Current peer-reviewed triage literature has described multiple outcome measures, including injury severity, clinical outcomes, need for trauma center resources (with or without a measure of timeliness), or a combination of these metrics. The most common clinical outcome measure is ISS >15, although the AIS ≥3 has also been used. Trauma center need has been measured by use of blood products, interventional radiology, major nonorthopedic surgery, or ICU stay. This variability in outcome measures limits comparability among studies and is not always consistent with literature identifying the subgroup of patients most likely to benefit from trauma center care. Future research should address these issues and attempt to match triage evaluation to patients most likely to benefit from trauma center care and clearly define the standard of measure.

Ongoing collaboration among local, state, and regional EMS agencies with governmental, non-governmental, academia, and public health agencies and institutions will allow the continuing analysis and evaluation of the 2011 Guidelines and its impact on the care of acutely injured patients. Statewide EMS and trauma databases provide opportunities for statewide quality improvement of field triage, research, and adaptation of the Guidelines to meet state specific circumstances. Large, nationally representative databases (e.g., the National EMS Information Systems database, the National Trauma Data Bank–National Sample Program, the Healthcare Cost and Utilization Project–National Inpatient

Sample, the National Hospital Ambulatory Medical Care Survey, and NASS-CDS) could be utilized for future triage research if advances are made to link these data files across phases of care (i.e., prehospital to in-hospital). Finally, uniform definitions of prehospital variables (including triage criteria) with a standardized data dictionary and data standards (e.g., HL7 messaging) could provide comparable data across study sites and assist with linking data files from the prehospital to the hospital setting.

Areas for Specific Research Using the 2011 Field Triage Guidelines

Several new technologies, which emerge from research in the remote noninvasive monitoring of casualties in austere environments, will likely be commercially available in the near future. Of these innovations, the noninvasive monitoring of heart rate complexity and variability (*80–83*), respiratory rate (*84*), tissue oxygenation, and point-of-care lactate testing (*85*) appear promising for future field triage, but require more research.

The GCS_m of the GCS_t is used in state triage guidelines (e.g., Colorado) and has some support in peer-reviewed literature, as noted in the preceding sections. However, additional research is needed to evaluate the use of GCS_m in the context of field triage and the practical implications of changing this Step One criterion.

Advanced automatic collision notification shows promise in improving accuracy of field triage of patients involved in motor-vehicle crashes. Further effort is required to integrate this technology into trauma and EMS systems and evaluate its effectiveness.

The issue of undertriage in older adults was viewed by the Panel as a major priority for future research. There is a need to understand the basis for undertriage in this age group and how the Guidelines might be modified to reduce this problem. Related topics include the role of age in predicting serious injury, different physiologic responses to injury among older adults, different injury-producing mechanisms in older adults, emergency and trauma care providers' attitudes and behaviors regarding triage in older adults, older adults' health-care preferences for injury care, end-of-life issues and their relevance to triage, new criteria to identify serious injury in older adults, the role of trauma centers in caring for older injured adults, and other aspects of better matching patient need with hospital capability for this population. How systems respond to patient and/or family preferences regarding hospital destinations that differ from the recommendations in these Guidelines should be explored in the context of patient's rights and the moral imperative to provide the optimal chance for improved outcomes from trauma.

Finally, the cost of trauma care, the implications of field triage on cost, and the cost-efficiency of different approaches to field triage require more research. Even after accounting for injury severity and important confounders, the cost of care is notably higher in trauma centers (*86,87*). Though the cost effectiveness of trauma center care has been demonstrated among seriously injured patients (AIS $\geq$ 4) (*87*), it is possible that modest shifts in overtriage might have substantial financial consequences. For example, a recent study that compared the 2006 and 1999 Guidelines identified a potential $568 million cost savings at an assumed overtriage rate of 40% (*21*). However, further

studies are needed to discover new ways to maximize the efficiency and cost-effectiveness of trauma systems and ensure that patients are receiving optimal injury care while considering the importance of the research, education, and outreach mission of trauma centers.

Conclusion

The Guidelines provided in this report are based on current medical literature, the experience of multiple states and communities working to improve field triage, and the expert opinion of the Panel members. This guidance is intended to assist EMS and trauma systems, medical directors, and providers with the information necessary to make critical decisions that have been demonstrated to increase the likelihood of improved outcomes in severely injured trauma patients (*5*).

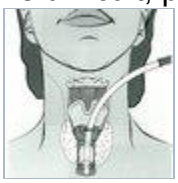
Improved field triage of injured patients can have a profound impact on the structure, organization, and use of EMS and trauma systems, the costs associated with trauma care, and most importantly, on the lives of the millions of persons injured every year in the United States. As is noted throughout this report, improved research is needed to assess the impact of field triage on resource allocation, health-care financing and funding, and, most importantly, patient outcomes.

Primary survey (Advanced Trauma Life Support)

The management of trauma patients begins with the primary survey (also commonly referred to as Advanced Trauma Life Support, or ATLS). The primary survey consists of 5 steps (**ABCDE** approach) that are performed in order.

1. **A**irway assessment (and cervical spine stabilization)
   - If appropriately answering questions, patient has a patent airway (at least for the moment)
   - Observe patient for signs of respiratory distress
   - Inspect mouth and larynx for injury or obstruction
   - Assume cervical spine injury in blunt trauma patients until proven otherwise
   - If patient is unconscious (and therefore unable to protect their airway) or in respiratory distress, the threshold for **intubation** is very low.
     - Patients may be intubated or ventilated with the anterior portion of the cervical collar removed, or with their neck manually stabilized.
   - Patients with burn injuries; and evidence of respiratory involvement are often intubated out of precaution.

- If orotracheal intubation is difficult, perform a cricothyrotomy.



2. **B**reathing
   - Assess oxygenation status with pulse oximetry .
   - Inspect and auscultate chest wall for injuries.
   - In unstable patients, do not delay treatment of tension pneumothorax or hemothorax infavor of imaging.
3. **C**irculation (and hemorrhage control)
   - Assess circulatory status by palpation of central and peripheral pulses
     - Blood pressure should be measured if it can be done expediently, but it can be skipped if it would delay the rest of the primary survey .
   - Place two large-bore intravenous lines (at least 16 gauge) for blood typing and crossmatch, and resuscitation (if needed).
     - If intravenous line placement is not possible or difficult, intraosseus line should be used instead.
   - Control on-going hemorrhage with manual pressure or tourniquets.
   - Emergency thoracotomy ; may be performed in patients with recent loss of pulses (especially in patients with stab wounds to the chest).
   - If patient is hypotensive, administer a bolus of intravenous saline.
     - If history of hemorrhage or on-going hemorrhage, **transfuse type O blood**.

- If significant hemorrhage and persistent hemodynamic instability, transfuse plasma, platelets and red blood cells at 1:1:1 ratio.

- Focused Assessment with Sonography for Trauma (FAST) exam; is usually performed, especially for hemodynamically unstable patients
  - May be performed during the secondary survey in hemodynamically stable patients
- Some patients may require emergent reversal of anticoagulation
- Remember hypovolemic shock due to hemorrhage requires loss of ~ 1.5 L of blood. Keep in mind the compartments where large amounts of blood may go:
  - Outside (external hemorrhage)
  - Thoracic cavity
  - Pelvic cavity
  - Abdominal cavity
  - Thighs (e.g., multiple femur fractures)
  - See Shock LC

4. **D**isability (and neurological evaluation)
   - Assess patient's Glasgow Coma Scale score
     - See Glasgow Coma Scale (GCS)
     - A **GCS score < 8** is an indication for intubation
   - Assess pupillary size

- If patient is interactive, assess motor function and light touch sensation.

5. **E**xposure (and environmental control)
   - Undress patient completely.
   - Examine body for signs of occult injury, including patient's back.
   - If patient is hypothermic, cover with warm blankets and warm intravenous fluids.
   - Palpate for vertebral tenderness and rectal tone.

References:
[1]
[2]

Diagnostic tests

The specific choice of imaging modality depends on clinical judgment and mechanism of injury; . The decision to perform any diagnostic test must be based on the patient's hemodynamic stability and must be weighed against the need for urgent transfer or operative intervention.

1. Portable
   x-rays

   - Typically acquired after the
     primary survey

   - Screening
     x-rays
     of the
     cervical spine
     , chest, and pelvis are usually performed but may be skipped if a
     CT-scan
     will be performed.
     - An exception is patients with penetrating injuries to the thorax or abdomen; , in which a
       chest x-ray
       should always be acquired even if a
       CT-scan
       will be performed.
   - Good for detection of fractures, subdiaphragmatic free air, foreign bodies,
     pneumothorax
     ,
     hemothorax

2. Focused Assessment with Sonography for Trauma (
   FAST
) exam
   - Typically acquired during the
     primary survey
     (especially for hemodynamically unstable patients)

- An extended version (E-FAST); may alternatively be performed, which allows for detection of pneumothorax and hemothorax.

3. CT scans
   - Typically performed after the primary survey if the patient is hemodynamically stable (otherwise the patient may decompensate inside the scanner, which could be catastrophic)
   - Ideal imaging modality given speed and high sensitivity for injury
   - In high-energy trauma (e.g., motor vehicle collisions) or severe injuries with altered mental status, a “pan scan” of the entire body is commonly performed.
4. Diagnostic peritoneal lavage (DPL): a diagnostic test used to assess for bleeding or viscus perforation in abdominal trauma. Highly sensitive, but invasive. Performed by placing a catheter into the abdomen, aspirating, then instilling a liter of warm saline. If fecal matter or significant blood are detected, this constitutes a positive test and emergent laparotomy is indicated.
   - Typically performed after the primary survey if hemoperitoneum is suspected and FAST exam is unavailable or equivocal
   - Rarely performed given the greater sensitivity of the FAST exam
5. Laboratory tests include, but are not limited to
   - CBC
   - Basic chemistries
   - Prothrombin time (given the high prevalence of patients anticoagulated on

warfarin
)
- Urinalysis
  - Gross hematuria ; should always be investigated as it may indicate urethral, bladder, or kidney injury .
  - Microscopic hematuria after trauma is normal in adults, but should be investigated in pediatric populations.
- Urine pregnancy test (on all women of child-bearing age)
- Blood glucose
- Lactate (associated with hypovolemic shock)

References:
[1]
[3]

Secondary and tertiary surveys

- Secondary survey
  - Performed after the primary survey has been completed and the patient is deemed stable
  - Complete history and thorough physical examination
  - Additional diagnostic tests are tailored to remaining symptoms, mechanism of injury, and patient comorbidities.
  - Main goal is to minimize the risk of missed injuries.
- Tertiary survey
  - Delayed re-examination of the patient (usually ~ 24 hours after admission)
  - Main goal is to detect changes due to previously undetected injuries.

References:
[1]

Special cases

Certain clinical manifestations warrant immediate intervention or specific tests. Some common scenarios are:

- Penetrating wounds to the abdomen with hypovolemic shock (hypotension, pale, cold, barely detectable pulses)
  - Perform exploratory laparotomy for control of hemorrhage, then fluid resuscitation.
  - **Any penetrating wound below the nipple requires an exploratory laparotomy.**
  - **Do not delay transfer of patient to the operating room (or to a traumacenter) in favor of fluid resuscitation.**
  - See Approach to penetrating abdominal trauma.
- Gunshot wounds and signs of cardiac tamponade (hypotension, barely detectable pulses, distended neck veins)
  - Perform pericardial window, thoracotomy, and then exploratory laparotomy.
  - See Pericardial effusion and cardiac tamponade and Penetrating trauma.
- Gunshot wounds to the chest and abdomen with signs of tension pneumothorax (hypotension, distended neck veins, tracheal deviation, absent breath sounds over hemithorax)
  - Place chest tube; (or perform needle thoracostomy if

chest tube
is not available).
- See Approach to penetrating chest trauma.

- Allergic reaction
(
hypotension
,
tachycardia
, respiratory distress, warm and swollen)
  - Administer
epinephrine
.
  - See
Anaphylactic shock
.
- High-energy trauma of the lower extremities (e.g., calcaneus fracture following a fall from a height)
  - Perform thoracolumbar spine
x-rays
to look for additional injuries
- High-energy trauma with widened
mediastinum
on
x-ray

  - Perform CT
Angiography
for diagnosis of aortic injury and then perform surgical repair.
  - See Approach to blunt chest trauma.
- Blunt trauma with
subcutaneous emphysema

  - Perform
bronchoscopy
for diagnosis of injury to the trachea and then perform surgical repair.
  - See Approach to blunt chest trauma .
- Blunt trauma with concern for
cervical spine
injury
  - Obtain
cervical spine

CT scan
in patients with distracting injury (e.g., femoral fracture), altered mental status/intoxication,

focal neurologic deficit
, midline neck tenderness, or neck pain

- Signs of peritonitis
  (abdominal tenderness, rebound, guarding, rigid abdomen)
  - Perform exploratory
    laparotomy
    as it indicates perforated
    viscus
    .
  - See Approach to penetrating abdominal trauma.
  - See Approach to blunt abdominal trauma.
- Blood in the urinary meatus
  - Perform retrograde urethrogram (may be a bladder injury, but need to rule out urethral injury first).
  - See Traumatic injuries of the kidney and bladder.
- No blood in the urinary meatus, but
  hematuria
  through
  Foley catheter
  - Perform
    retrograde cystogram
    for diagnosis of bladder injury.
  - See Traumatic injuries of the kidney and bladder.
- Hematuria
  through
  Foley catheter
  , but normal
  retrograde cystogram
  - Perform
    CT scan
    for diagnosis of
    kidney injury
    .
  - See Traumatic injuries of the kidney and bladder.
- Large
  hematoma
  over the shaft of the
  penis
  - Perform emergent surgical repair of
    penile fracture
    .
- Human bite

- Surgical exploration and debridement
- See Bite wounds.

- Trauma during pregnancy
  - Examine mother in left lateral position to minimize inferior vena cava compression
  - Perform cesarean delivery if fetus > 24 weeks of gestation shows worsening signs of distress, or if mother is not responding to cardiopulmonary resuscitation

Cardiopulmonary resuscitation

Abbreviation: CPR

An emergency procedure that maintains circulation in patients with cardiac arrest until cardiac function can be restored. Most commonly refers to Basic Life Support (BLS) or Advanced Cardiac Life Support (ACLS) algorithms. Consists of chest compression, rescue breathing, and defibrillation.

Cardiopulmonary resuscitation

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Tactical combat casualty care (TCCC)

Trauma care guidelines used during combat and established in three phases. The aim is to reduce preventable deaths in military personnel during tactical missions.
[10]
[11]

Phase 1: care under fire (CUF)

- Implemented during active fire
- Continue tactical mission, return suppression fire, and take cover.
- Assist/direct casualties to control active bleeding with manual pressure or combat tourniquets.

Phase 2: tactical field care (TFC)

- Implemented when no longer under active fire
- Disarm casualties with altered mental status and/or recent

ketamine
or
fentanyl
therapy.

- First responders (soldiers or medical personnel) should treat casualties using the **MARCH** algorithm:
  - **M**assive hemorrhage: Reassess and control all sources of bleeding using a tourniquet and/or combat gauze.
  - **A**irway management: Assess airway patency; insert nasopharyngeal airway (NPA) or perform
    surgicalcricothyroidotomy
    , if necessary.
  - **R**espiration: Insert a vented chest seal in case of open chest wounds, decompress a suspected
    tension pneumothorax
    , and consider ventilation/oxygen therapy.
  - **C**irculation: Establish IV or
    IO access
    when
    fluid resuscitation
    and/or IV drug administration is required.
  - **H**ead injury/
    hypothermia
    prevention: Assess for
    concussion
    , remove wet clothes, and apply a ready-heat blanket.
- Additional measures should be considered at the Casualty Collection Point (CCP), using the **PAWS** algorithm:
  - **P**ain management: Administer
    analgesics
    .
  - **A**ntibiotics: 1 g IV
    ertapenem
    or 2 g IV
    cefotetan
    or 400 mg oral
    moxifloxacin
  - **W**ound management: Address open wounds, burns, and
    open fractures
    .

- **S**plinting: Stabilize pelvic fractures and shield eye injuries.

Phase 3: tactical evacuation care (
TEC
)

- Evacuate casualties via air or ground ambulance to the nearest medical facility.
- Continue interventions initiated during the TFC phase.
- Assess and document additional life-threatening injuries, pain control, fluid resuscitation, and appropriate therapy.

INTRODUCTION

The term “golden hour” is a well-known part of the lexicon of trauma surgeons and emergency medical service (EMS) providers who take care of injured patients on a daily basis. The underlying tenet is that an injured patient has 60 minutes from the time of injury to receive definitive care, after which morbidity and mortality increase significantly. Teleologically this seems to make great sense, as no one would argue that we should leave an injured patient bleeding on the streets for longer periods of time. Nevertheless, like many holy shrines in medicine, once exposed to the light of an evidencedbased review, it is found to lack conclusive evidence in the literature to support our biases. This article will briefly unpack the origins of the golden hour and look at evidence to refute or support it.

HISTORICAL BACKGROUND

The vernacular term “golden hour” is widely attributed to R. Adams Cowley, founder of Baltimore’s famous Shock Trauma Institute. In a 1975 article, he stated, “the first hour after injury will largely determine a critically-injured person’s chances for survival.”1 However, no references or data

were provided to support this statement. The foundation for this statement is a bit unclear, but it is widely believed that at the time he stated this, Cowley was trying to win support for a shock trauma hospital and a helicopter program that would fly any trauma victim in the state of Maryland to a trauma hospital in Baltimore within 60 minutes (the golden hour). A companion to the golden hour has arisen in pre-hospital lore called the "platinum 10 minutes." This is based on the concept that seriously injured patients should have no more than 10 minutes of scene-time stabilization by emergency medical personnel prior to transport to definitive care at a trauma center. This dogma likely arose from the military, as many battlefield fatalities occur within the first minutes post-injury.2 The idea that definitive trauma care must be initiated within 60 minutes has spawned a billion dollar industry of trauma systems, trauma centers, aeromedical rescue, and advanced pre-hospital life support. It has subjected the general public to significant potential risk from well-intentioned ambulance crews careening rapidly through busy streets, transporting injured patients in crowded driving conditions, or air ambulances flying in less than ideal weather. However, this concept is established on a less than rigorous scientific foundation. The fact of the matter is that there is a paucity of data to support the golden hour and even some data that refute it.

EVIDENCE IN FAVOR OF THE GOLDEN HOUR

Two of the most significant studies that found a significant correlation between reduced out-of hospital times and decreased mortality rates were from Quebec in the 1990's.3,4 The 1993 study by Sampalis et al3 found

that total pre-hospital time over 60 minutes was associated with a significant increase in the odds of mortality. The 1999 study by the same group4 found that reduced pre-hospital time was associated with reduced odds of dying, when outcomes were controlled for the severity of injury and age of the patient. Additionally, reduced pre-hospital time has been found to be beneficial in specific patient populations, including severe head injuries,5,6 intra-abdominal bleeds,7 severe thoracic injuries,8-10 and rural trauma patients with long EMS transport times.11 Two EMS studies from the United States12,13 further supported the importance of shorter pre-hospital time periods: a 2002 study by Blackwell et al12 found that EMS response times of less than 5 minutes were associated with improved survival in a cohort of both life-threatening and non-life-threatening EMS calls, and a 2005 study by Pons et al13 found that EMS response times within 4 minutes resulted in a significant survival benefit for patients with intermediate and high risk of mortality. It is important to note that these studies12,13 included mixed populations, including patients with non-traumatic cardiac arrest.

NEGATIVE OR INCONCLUSIVE EVIDENCE FOR THE GOLDEN HOUR

The validity of the golden hour and the link between pre-hospital time and outcome are far from conclusive. With the exception of patients with non-traumatic cardiac arrest,14,15 no field-based population has consistently demonstrated a significant association between response interval and survival. One of the most comprehensive investigations of time-to-definitive care in trauma was a 2010 prospective cohort study by Newgardet al16 of

146 EMS agencies that transported patients to 51 trauma centers in North America. These investigators identified no relationship between EMS intervals and in-hospital mortality among injured patients with physiologic abnormalities. This finding persisted across several subgroups, including injury type, age, and mode of transport.16 A 2012 German study by Kleberet al17 found similar results, identifying no significant survival advantage for trauma patients with shorter pre-hospital rescue times. This finding is supported by studies conducted in Canada,18 the United States,19-22 and Italy.23 Despite the conflicting evidence regarding the golden hour, rapid EMS transport to medical facilities remains the standard of trauma care. Yet, in the aggregate, there is significant evidence indicating that many trauma patients do not need to be rushed to the hospital.16-23 Some research even indicates that a slower, smoother transport to the hospital would be beneficial to both patients and pre-hospital providers. A 2010 study by Chung et al24 found that increased ambulance speed negatively affects the quality of chest compression during transport. EMS workers have a documented fatality rate of 12.7 per 100,000 workers, more than twice the national average of 5.0 per 100,000.25 By some estimates, the risk of transportation-related injury to EMS workers and their patients may be five times the national average risk of transit injury.26 These deaths and injuries are largely attributed to helicopter and ambulance crashes that result from the emphasis on shorter pre-hospital time frames.27,28

PERSPECTIVES

There are limitations to the evaluations of the significance of the golden hour. For example, there are multiple time periods that may be evaluated, including time between the event and notification of 911 (discovery time), 911 notification to hospital arrival (EMS transport time), and hospital arrival to treatment. As a result, there are many different contexts in which the golden hour can be evaluated. Also, determining precise time periods can be quite difficult. For instance, the time of injury and death may be inconsistently recorded. The exact time of injury and death may be unknown if unobserved. Further, declaration of death may be delayed until after resuscitative efforts have been judged futile. This inexactness results in difficulty evaluating time to definitive care and time to death.29 Certainly there are significant potential negative effects of discrediting the golden hour. Misinterpretation of literature questioning the significance of time to definitive care could have unfortunate consequences for patient care if health administrators begin to use recent research studies as proof that they no longer need to invest in timely care of trauma patients. They may cut transport services and reduce staff and funding of trauma centers. This would be a great misfortune for trauma patients, as a 2006 study by MacKenzieet al30 demonstrated a 25% reduction in mortality with designation as a trauma center. The implications of the literature refuting the golden hour must be carefully examined before any hasty changes are made to current trauma and EMS care models.

CONCLUSIONS

This article is not an attempt to totally disregard the importance of the golden hour dictum. True, there is an aspect of trauma care that is very time dependent, but it is wrong to apply an arbitrary time limit such as one hour to a patient in need of definitive care. Every patient coming through the ED doors to the trauma resuscitation area is unique. For a patient who has a gunshot wound to the heart with rupture of the left ventricle, the difference between life and death may be a golden 5 minutes, not a golden hour. Conversely, for a patient who is in a car accident and has an isolated tibia fracture, it may be a golden day or two. In the year 2014, it is important to look at the evidence-based medicine that either supports or refutes our widely held beliefs. In this way, we can begin to more intelligently design a trauma care system that begins to address the needs of each patient.

STABILIZATION AND OPTIMIZATION

2.0 Airway and Chest trauma Management

2.1 Airway Assessment 2.1.1 A clinical examination of the thorax and respiratory function must be carried out. 2.1.2 The examination should include as a minimum the measurement of the respiratory rate and auscultation of the lungs. The examination should be repeated. 2.1.3 The following can be helpful: inspection (bilaterally unequal in respiratory excursion, unilateral bulging, paradoxical respiration), palpation (pain, crepitations, subcutaneous emphysema, instability) and percussion (hyperresonant percussion) of the thorax together with pulse oxymetry and, in ventilated patients, monitoring ventilation pressure(if available). 2.2 Securing Airway 2.2.1 Manual in-line stabilization should be carried out for endotracheal intubation with the cervical spine immobilization device

temporarily removed. 2.2.2 A difficult airway must be anticipated when endotracheally intubating a trauma patient. 2.2.3 The multiply injured patient must be preoxygenated before anesthesia. 2.2.4 Use drug-assisted rapid sequence induction (RSI) of anaesthesia and intubation as the definitive method of securing the airway in patients with major trauma who cannot maintain their airway and/or ventilation. 2.2.5 If RSI fails, use basic airway manoeuvres and adjuncts and/or a supraglottic device until a surgical airway or assisted tracheal placement is performed. Standard Treatment Guidelines-Major Trauma 9 2.2.6 If difficult anesthetization and/or endotracheal intubation are expected, an anesthesiologist must carry out or supervise this procedure in-hospital provided this does not cause delay in an emergency life-saving measure. Suitable measures must be in place to ensure that an anesthesiologist is normally on site in time 2.2.7 After more than 3 intubation attempts, alternative methods must be considered for ventilation and securing an airway. 2.2.8 Alternative methods for securing an airway must be provided when anesthetizing and endotracheally intubating a multiply injured patient. *Alternatives like emergency cricothyroidotomy or surgical airway 2.2.9 Etomidate should be avoided as an induction agent due to the associated side effects on adrenal function . *Ketamine can be used as a safe alternative as an induction agent. Dose- 1-2 mg/kg, time to effect of 45-60 seconds. 2.2.10 ECG, blood pressure measurement, pulse oxymetry and capnography(if available) must be used to monitor the patient for anesthesia induction, endotracheal intubation and emergency anesthesia. 2.2.11 Normoventilation must be carried out in endotracheally intubated and anesthetized trauma patients. 2.2.12 Ventilation must be monitored and controlled by frequent arterial blood gas analyses(if available) in the

hospital. If ABG analysis not available, then keep a check clinically by observing the chest rise & four point auscultation of the chest. 2.2.13 In mandible and maxillofacial injuries, primary securing of the airways and hemostasis in the oral and maxillofacial region must be carried out. 2.3 Chest Trauma Diagnosis and Management 2.3.1 A suspected diagnosis of pneumothorax and/or hemothorax must be made if breath sounds are weaker or absent on one side (after checking correct placement of the tube). Absence of such auscultation findings largely rules out a larger pneumothorax, especially if the patient is normopneic and has no chest pain. 2.3.2 A suspected diagnosis of tension pneumothorax should be made if auscultation of the lung reveals no breath sounds unilaterally (after checking correct placement of the tube) and, in addition, typical symptoms are present, particularly severe respiratory disorder or upper inflow congestion combined with arterial hypotension. 2.3.3 Clinically suspected tension pneumothorax must be decompressed* immediately. *Chest decompression mainly refers to tube thoracostomy/ Chest drain placement. 2.3.4 Use open thoracostomy instead of needle decompression if the expertise is available, followed by a chest drain via the thoracostomy in patients who are breathing spontaneously. *Open method of chest drain insertion to be preferred over trocar method. Needle decompression should not be attempted unless absolutely indicated. 2.3.5 Observe patients after chest decompression for signs of recurrence of the tension pneumothorax. Standard Treatment Guidelines-Major Trauma 10 2.3.6 In patients with an open pneumothorax: cover the open pneumothorax with a simple occlusive dressing and observe for the development of a tension pneumothorax. 2.3.7 Pneumothorax diagnosed on the basis of an auscultation finding in a patient on positive pressure ventilation should be decompressed. 2.3.8

Pneumothorax diagnosed on the basis of an auscultation finding in patients not on ventilation should usually be managed by close clinical observation. 2.3.9 Pneumothorax should be treated with a chest drain provided the indication exists. 2.3.10 If there are perforating chest injuries, embedded foreign bodies should only be removed during surgery under controlled conditions after opening up the chest. 2.3.11 A penetrating chest injury, which is the cause of hemodynamic instability in the patient, must undergo an immediate exploratory thoracotomy. 2.3.12 A thoracotomy can be performed if there is an initial blood loss of > 1,500 ml from the chest drain or if there is persistent blood loss of > 250 ml/h over more than 4 hours. 2.4 Imaging in Chest Trauma 2.4.1 Imaging for chest trauma in patients with suspected chest trauma should be performed urgently, and the images should be interpreted immediately by a healthcare professional with training and skills in this area. 2.4.2 Consider immediate chest X-ray and/or eFAST (extended focused assessment with sonography for trauma) as part of the primary survey to assess chest trauma with severe respiratory compromise. 2.4.3 Consider immediate CT for those with suspected chest trauma without severe respiratory compromise who are responding to resuscitation or whose haemodynamic status is normal. 3.0 Haemorrhage and Shock 3.1 Dressings and tourniquets in hospital settings 3.1.1 Use simple dressings* with direct pressure to control external haemorrhage. *sterile gauze pads 3.1.2 In patients with major limb trauma use a tourniquet* if direct pressure has failed to control life-threatening haemorrhage. *a bandage,a strip of cloth,a band of rubber,etc.,that checks bleeding or blood flow by compressing the blood vessels 3.2 Haemostatic agents in hospital settings 3.2.1 Use intravenous tranexamic acid as soon as possible in patients with major trauma and active or suspected active

bleeding. Dosage as German guidelines Tranexamic acid initially 1 g i.v. as saturation over 10 minutes + 1 g over 8 hours (CRASH 2 Trials) * Or 2 g (15–30 mg/kg) 3.2.2. Do not use intravenous tranexamic acid more than 3 hours after injury in patients with major trauma. Standard Treatment Guidelines-Major Trauma 11 3.3 Anticoagulant reversal in hospital settings 3.3.1 Rapidly reverse anticoagulation in patients who have major trauma with haemorrhage. 3.3.2 FFP (10-15ml/kg body weight)is recommended when there is bleeding associated with clotting factors deficiency and if no alternative processed products or specific factor concentrates are available. If immediate reversal of warfarin effect is required. Intravenous vitamin K 5mg should be concurrently given for sustained reversal of warfarin effect *Management of bleeding following major trauma: an updated European guideline Rolf Rossaint et al. 3.3.3 Consult a physician immediately for advice on adults (18 or over) who have active bleeding and need reversal of any anticoagulant agent other than a vitamin K antagonist. 3.3.4 Do not reverse anticoagulation in patients who do not have active or suspected bleeding. 3.4 Trauma induced coagulopathy 3.4.1 Trauma-induced coagulopathy is an autonomous clinical picture with clear influences on survival. For this reason, coagulation diagnostic tests* and therapy must be started immediately in the emergency room. *Coagulation diagnostic tests - Platelets, PT/INR, APTT and Fibrinogen (if available) 3.5 Activating major haemorrhage protocols in hospital settings 3.5.1 Use physiological criteria that include the patient's haemodynamic status and their response to immediate volume resuscitation to activate the major haemorrhage protocol. 3.5.2 Do not rely on a haemorrhagic risk tool* applied at a single time point to determine the need for major haemorrhage protocol activation. *For example: ABC score, TASH score, PWH score, McLaughlin score,

Emergency transfusion score, Shock Index etc These measure variables at a single point in time. 3.6 Circulatory access in hospital settings 3.6.1 For circulatory access in patients with major trauma in hospital settings: use peripheral intravenous access (14 or 16 gauge intravenous cannula) or if peripheral intravenous access fails, a venous cutdown should be done. 3.7 Volume resuscitation in hospital settings 3.7.1 For patients with active bleeding use a restrictive*/balanced approach to volume resuscitation until definitive early control of bleeding has been achieved, *Restrictive resuscitation - in order to keep the circulation at a low stable level (Systolic BP: 90 mmHg or palpable central pulse) and not exacerbate the bleeding. (from the german guidelines) 3.7.2 In hospital settings, titrate volume resuscitation to maintain a palpable central pulse (carotid or femoral). 3.7.3 For patients who have haemorrhagic shock and a traumatic brain injury: if haemorrhagic shock is the dominant condition, continue restrictive volume resuscitation or if traumatic brain injury is the dominant condition, use a less restrictive volume resuscitation approach to maintain cerebral perfusion. Standard Treatment Guidelines-Major Trauma 12 3.7.4 Damage Control resuscitation: ● In patients who are actively bleeding, the goal can be set at mean arterial pressure ~ 65 mmHg and systolic arterial pressure ~ 90 mmHg until surgical hemostasis. ● Suitable measures should be taken and treatment given to avoid hypothermia. ● Acidemia should be avoided and treated by suitable treatment. 3.8 Fluid replacement in hospital settings 3.8.1 In hospital settings, only use crystalloids* to replace fluid volume in patients with active bleeding if blood components are not available. * preferably Normal saline,Ringers lactate. Glucose containing fluid should be avoided in (a head injury) patients, during initial resuscitation. 3.8.2 Human albumin must not be used in hospital volume replacement. 3.8.3

Colloidal solutions can be used in hypotensive trauma patients, if available and preference should be given to HES 130/0.4. 3.9 Haemorrhage protocols in hospital settings 3.9.1 Hospital should have specific major haemorrhage protocols for adults. 3.9.2. For patients with active bleeding, start with a fixed-ratio protocol (1:1:1 FFP: platelets: RBC) for blood components and change to a protocol guided by laboratory coagulation results at the earliest opportunity. In patients with Grade 3 and 4 hemorrhagic shock with imminent threat to life and if components are not available then whole blood can be given to stabilize the patient before transferring to a higher centre[MK5] . 3.9.3 In an actively bleeding patient, the indication for transfusion can be made at hemoglobin levels below 10 g/dL, and the hematocrit value maintained at 30%. 3.9.4 In critically ill trauma patients, transfusion strategy to be employed ● Hb concentration 9 g/dL, RBC transfusion is generally unnecessary. 3.9.5 Red blood cell (RBC) transfusion should not be dictated by a haemoglobin (Hb) concentration alone, but should also be based on assessment of the patient's clinical status 3.9.6 Replacement of fibrinogen should be carried out, if test provisions are available, at levels < 1.5 g/l (150 mg/dl). 3.10 Haemorrhage imaging in hospital settings 3.10.1 Imaging for haemorrhage in patients with suspected haemorrhage should be performed urgently, using FAST, and a CT if required, and the images should be interpreted immediately by a healthcare professional with training and skills in this area. Standard Treatment Guidelines-Major Trauma 13 3.10.2 Limit diagnostic imaging (such as chest and pelvis X-rays or FAST [focused assessment with sonography for trauma]) to the minimum needed to direct intervention in patients with suspected haemorrhage and haemodynamic instability who are not responding to volume resuscitation. 3.10.3 Be aware

that a negative FAST does not exclude intraperitoneal or retroperitoneal haemorrhage. *To repeat a FAST examination if clinical index of suspicion for intraperitonealhemorrhage. 3.10.4 Consider immediate CT for patients with suspected haemorrhage only if they are responding to resuscitation or if their haemodynamic status is normal. 3.11 Damage control surgery 3.11.1 Use damage control surgery in patients with haemodynamic instability who are not responding to volume resuscitation. 3.12 Resuscitation (Criteria for Cardiac arrest after trauma) 3.12.1 In the case of definitive cardiac arrest or uncertainties in detecting a pulse or other clinical signs that make cardiac arrest likely, resuscitation must be started immediately 3.12.2 During resuscitation, trauma-specific reversible causes of cardiac arrest ., airway obstruction, esophageal intubation, hypovolemia, tension pneumothorax or pericardial tamponade) should be diagnosed and treated. 3.12.3 If resuscitation is unsuccessful after eliminating possible causes of cardiac arrest, cardiopulmonary resuscitation must be stopped. 3.13 Role of Emergency Thoracotomy 3.13.1 If expertise is available, emergency thoracotomy should be performed in the case of penetrating injuries, particularly if the onset of cardiac arrest is recent and vital signs are initially present. 4.0 Head Injury initial management 4.1.1State of consciousness with pupil function and Glasgow Coma Scale (bilateral motor function) must be recorded and documented at repeated intervals. 4.1.2 The goals are normoxia*, normocapnia**, and normotension***. A fall in arterial oxygen saturation below 90% must be avoided. *Normoxia- sPO2>90% **Normocapnia - paCO2 = 35 -40 mmHg{4.7kPa} ***Normotension - SBP ≥90 mmHg 4.1.3 Intubation with adequate ventilation (with capnometry and blood gas analysis if available) must be carried out in unconscious patients (reference value GCS ≤ 8). Standard

Treatment Guidelines-Major Trauma 14 4.1.4 A Cranial Computed Tomography scan must be performed in the case of polytrauma after stabilization with suspected traumatic brain injury. 4.1.5 A (monitoring) CT scan must be performed in the case of neurologic deterioration. 4.1.6 Glucocorticoids must not be administered in the treatment of TBI. 4.1.7 If severely elevated intracranial pressure is suspected, particularly with signs of transtentorial herniation (pupil widening, decerebrate rigidity, extensor reaction to painful stimulus, progressive clouded consciousness), the following treatments can be given: ● Hyperventilation where ABG analysis is available* ● Mannitol** * 20 breaths per minute to maintain paCO2 at 30-35 mm of Hg **20% solution at 0.5-2 gm/kg over 30 to 60 minutes 5.0 Spinal Injury Management 5.1 Assessment for spinal injury 5.1.1 On arrival at the hospital, use a prioritising sequence to assess people with suspected trauma, for example ABCDE: ● Airway with in-line spinal immobilisation ● Breathing ● Circulation ● Disability (neurological) ● Exposure and environment. 5.1.2 At all stages of the assessment: ● protect the person's cervical spine with manual in-line spinal immobilisation, particularly during any airway intervention and ● avoid moving the remainder of the spine. 5.1.3 History and thorough clinical examination for spinal injury including the functions associated with it must be carried out. 5.1.4. The spine is suspected to be stable, unless any of the following 5 criteria are present, · impaired consciousness ● neurologic deficit ● spinal pain or myogelosis ● intoxication ● trauma in the extremities *myogelosis (area of hard or stiff muscle) 5.1.5 The presence of a spinal injury must be assumed in unconscious patients until evidence to the contrary is found. 5.1.6 Carry out full in-line spinal immobilisation if any of the factors in recommendation 4.1.4 are present or if this assessment cannot be done. Standard

Treatment Guidelines-Major Trauma 15 5.2Assessment of Cervical Spine 5.2.1 Assess whether the person is at high, low or no risk for cervical spine injury using the Canadian C-spine rule as follows: ➔ the person is at high risk if they have at least one of the following high-risk factors: ● age 65 years or older ● dangerous mechanism of injury (fall from a height of greater than 1 metre or 5 steps, axial load to the head – for example diving, high-speed motor vehicle collision, rollover motor accident, ejection from a motor vehicle, accident involving motorised recreational vehicles, bicycle collision, horse riding accidents) ● paraesthesia in the upper or lower limbs ➔ the person is at low risk if they have at least one of the following low-risk factors: ● involved in a minor rear-end motor vehicle collision ● comfortable in a sitting position ● ambulatory at any time since the injury ● no midline cervical spine tenderness ● delayed onset of neck pain ➔ the person remains at low risk if they are: ● unable to actively rotate their neck 45 degrees to the left and right (the range of the neck can only be assessed safely if the person is at low risk and there are no high-risk factors).t ➔ the person has no risk if they: ● have one of the above low-risk factors and, ● are able to actively rotate their neck 45 degrees to the left and right. 5.3 Assessment of Thoracic or Lumbosacral Spine 5.3.1 Assess the person with suspected thoracic or lumbosacral spine injury using these factors: ● age 65 years or older and reported pain in the thoracic or lumbosacral spine ● dangerous mechanism of injury (fall from a height of greater than 3 metres, axial load to the head or base of the spine – for example falls landing on feet or buttocks, high-speed motor vehicle collision, rollover motor accident, lap belt restraint only, ejection from a motor vehicle, accident involving motorised recreational vehicles, bicycle collision, horse

riding accidents) ● pre-existing spinal pathology, or known or at risk of osteoporosis – for example steroid use ● suspected spinal fracture in another region of the spine ● abnormal neurological symptoms (paraesthesia or weakness or numbness) ● on examination: ➢ abnormal neurological signs (motor or sensory deficit) ➢ new deformity or bony midline tenderness (on palpation) ➢ bony midline tenderness (on percussion) Standard Treatment Guidelines-Major Trauma 16 ➢ midline or spinal pain (on coughing) ● on mobilisation (sit, stand, step, assess walking): pain or abnormal neurological symptoms (stop if this occurs). 5.4 When to carry out in-line spinal immobilisation 5.4.1 Carry out or maintain full in-line spinal immobilisation if: ● a high-risk factor for cervical spine injury is identified and indicated by the Canadian Cspine rule ● a low-risk factor for cervical spine injury is identified and indicated by the Canadian Cspine rule and the person is unable to actively rotate their neck 45 degrees left and right ● indicated by one or more of the factors listed in recommendation 5.3.1 5.4.2 Do not carry out or maintain full in-line spinal immobilisation in people if: ● they have low-risk factors for cervical spine injury and, are pain free and are able to actively rotate their neck 45 degrees left and right ● they do not have any of the factors listed in recommendation 5.3.1 5.5 How to carry out full in-line spinal immobilisation 5.5.1 The spinal immobilisation devices need to be adjusted In uncooperative, agitated or distressed people, think about letting them find a position where they are comfortable with manual in-line spinal immobilisation. 5.5.2 When carrying out full in-line spinal immobilisation in adults, manually stabilise the head with the spine in-line using the following stepwise approach: ● Fit an appropriately sized semi-rigid collar unless

contraindicated by: ➔ a compromised airway ➔ known spinal deformities, such as ankylosing spondylitis (in these cases keep the spine in the person's current position). ● Reassess the airway after applying the collar. ● Place and secure the person on a stretcher. 5.6 When to carry out or maintain full in-line spinal immobilisation and request imaging 5.6.1 Carry out or maintain full in-line spinal immobilisation and request imaging if: ● a high-risk factor for cervical spine injury is identified and indicated by the Canadian Cspine rule or ● a low-risk factor for cervical spine injury is identified and indicated by the Canadian Cspine rule and the person is unable to actively rotate their neck 45 degrees left and right or ● indicated by one or more of the factors listed in recommendation 4.3.1 5.6.2 Do not carry out or maintain full in-line spinal immobilisation or request imaging for people if: Standard Treatment Guidelines-Major Trauma 17 ● they have low-risk factors for cervical spine injury as identified and indicated by the Canadian C-spine rule, are pain free and are able to actively rotate their neck 45 degrees left and right ● they do not have any of the factors listed in recommendation 4.3.1 5.7 Diagnostic imaging 5.7.1 Imaging for spinal injury should be performed urgently, and the images should be interpreted immediately by a healthcare professional with training and skills in this area after stabilisation. 5.7.2 Perform CT in adults if; ● imaging for cervical spine injury is indicated by the Canadian C-spine rule (see recommendation 4.6.1) or ● there is a strong suspicion of thoracic or lumbosacral spine injury associated with abnormal neurological signs or symptoms. C spine xray should be considered if CT is not available with caution of high false negative rate. 5.7.3 If, after CT, there is a neurological abnormality which could be attributable to spinal cord injury, advice MRI. 5.8 Lumbosacral Spine Imaging 5.8.1 Perform an X-ray as the first-line investigation for

people with suspected spinal column injury without abnormal neurological signs or symptoms in the thoracic or lumbosacral regions (T1–L3). 5.8.2 Perform CT if the X-ray is abnormal or there are clinical signs or symptoms of a spinal column injury. 5.8.3 If a new spinal column fracture is confirmed, image the rest of the spinal column. 5.8.4 After circulatory stabilization and before transfer from the emergency room, a spinal injury should be cleared by clinical examination or imaging . (if available). 5.9 Medications 5.9.1 Do not use the following medications, aimed at providing neuroprotection and prevention of secondary deterioration, in the acute stage after acute traumatic spinal cord injury: ● Methylprednisolone ● Nimodipine ● Naloxone. 5.9.2 Do not use medications in the acute stage after traumatic spinal cord injury to prevent neuropathic pain from developing in the chronic stage. 6.0 Pelvic Fracture Management 6.1 Using a pelvic binder 6.1.1. An acute life-threatening pelvic injury must be excluded when the patient is admitted to the hospital. Standard Treatment Guidelines-Major Trauma 18 6.1.2 The stability of the patient's pelvis must be clinically examined. 6.1.3 If active bleeding is suspected from a pelvic fracture following blunt high-energy trauma, apply a pelvic binder. 6.2 Pelvic imaging 6.2.1 During the diagnostic study a pelvic survey radiograph should be taken and/or computed tomography (CT) be performed once patient is stabilized*. *unstable patients do portable X-Ray if available 6.2.2 Use CT (if available, otherwise X-ray) for first-line imaging with suspected high-energy pelvic fractures once patient is stabilized 6.2.3 Unstable patients with suspected active bleeding from pelvic fracture, use: ● pelvic packing to stabilize the patient. 6.3 Removing a pelvic binder 6.3.1 For people with suspected pelvic fractures and pelvic binders, remove the binder as soon as possible if: ● there is no pelvic fracture, or ● a pelvic

fracture is identified as mechanically stable, or ● the binder is not controlling the mechanical stability of the fracture, or ● there is no further bleeding or coagulation is normal. Remove all pelvic binders within 24 hours of application. 6.4 Log rolling 6.4.1 Do not log roll people with suspected pelvic fractures before pelvic imaging unless: ● an occult penetrating injury is suspected in a person with haemodynamic instability ● log rolling is needed to clear the airway (for example, suction is ineffective in a person who is vomiting). ● When log rolling, pay particular attention to haemodynamic stability. 7.0 Management of open fractures and complications 7.1 Open fractures 7.1.1 Do not irrigate open fractures of the long bones, hindfoot or midfoot in the emergency department before debridement. 7.1.2 Consider a saline-soaked dressing covered with an occlusive layer (if not already applied) for open fractures in the emergency department before debridement. 7.1.3 In the emergency department, administer prophylactic intravenous antibiotics immediately to people with open fractures if not already given. 7.1.4 Do not base the decision whether to perform limb salvage or amputation on an injury severity tool score. 7.1.5 Perform emergency amputation when: ● A limb is the source of uncontrollable life-threatening bleeding, or Standard Treatment Guidelines-Major Trauma 19 ● A limb is salvageable but attempted preservation would pose an unacceptable risk to the person's life, or ● A limb is deemed unsalvageable after orthoplastic assessment 7.1.6 Perform debridement: ● Immediately for highly contaminated open fractures ● Within 24 hours of injury for all other open fractures management 7.2 Vascular injury 7.2.1 Use hard signs (lack of palpable pulse, continued blood loss, or expanding haematoma) to diagnose vascular injury. 7.2.2 Do not rely on capillary return or Doppler signal to exclude vascular injury. 7.2.3 Perform

immediate surgical exploration if hard signs of vascular injury persist after any necessary restoration of limb alignment and joint reduction. Do not delay revascularisation for angiography in people with complex fractures 7.3 Compartment syndrome 7.3.1 In people with fractures of the tibia, maintain awareness of compartment syndrome for 48 hours after injury or fixation by regularly assessing and recording clinical symptoms and signs in hospital 8.0 Pain management in Major trauma 8.1.1 Assess pain regularly in patients with major trauma using a pain assessment scale suitable for patients cognitive function. 8.1.2 For patients with major trauma, use intravenous morphine/opiods as the first-line analgesic and adjust the dose as needed to achieve adequate pain relief. Dose of Morphine – 2.5-5 mg/kg q 4h Pentazocine Dosing: Adult IV: 30 mg every 3-4 hours. Butorphanol:IV: Initial: 1 mg, may repeat every 3-4 hours as needed. Buprenorhine:Slow IV: Initial: 0.3 mg every 6 to 8 hours as needed; 8.1.3 Consider ketamine in analgesic doses as a second-line agent. *Dose of Ketamine 1-4.5 mg/kg (medscape) 8.2 Efficacy of Analgesic Modalities in blunt thoracic trauma 8.2.1 Epidural analgesia is the preferred mode of analgesia delivery in severe thoracic trauma. 9.0 Providing support and Information to patients & relatives Providing information about patients to the next level hospital/casualty 9.1 Providing support 9.1.1 When communicating with patients, family members and carers ● manage expectations and avoid misinformation ● answer questions and provide information honestly, within the limits of your knowledge Standard Treatment Guidelines-Major Trauma 20 ● do not speculate and avoid being overly optimistic or pessimistic when discussing information on further investigations, diagnosis or prognosis ● ask if there are any other questions. 9.1.2 The trauma team structure should include a

clear point of contact for providing information to patients, their family members and carers. 9.2 Providing information 9.2.1 Explain to patients, family members and carers what is happening and why it is happening. Provide: ● information on known injuries ● details of immediate investigations and treatment, and if possible include time schedules. 9.2.2 Offer people with fractures the opportunity to see images of their injury, taken before and after treatment. 9.2.3 Provide people with fractures on the following when the management plan is agreed or changed: ● expected outcomes of treatment, including time to returning to usual activities and the likelihood of permanent effects on quality of life (such as pain, loss of function and psychological effects) ● amputation, if this is a possibility ● activities they can do to help themselves ● home care options, if needed ● rehabilitation, including whom to contact and how (this should include information on the importance of active patient participation for achieving goals and the expectations of rehabilitation) ● mobilisation and weight-bearing, including upper limb load bearing for arm fractures. 9.2.4 Document all key communications with patients, family members and carers about the management plan. 9.2.5 Ensure that all health and social care practitioners have access to information previously given to people with fractures to enable consistent information to be provided. 9.3 Providing information about transfer from an emergency department 9.3.1 For patients who are being transferred from an emergency department to another centre, provide verbal and written information that includes: ● the reason for the transfer ● the location of the receiving centre and the patient's destination within the receiving centre ● the name and contact details of the person responsible for the patient's care at the receiving centre (if possible) ● the name and contact details of the person who was

responsible for the patient's care at the initial hospital. 9.4 Recording information in before transferring to definitive care settings Standard Treatment Guidelines-Major Trauma 21 9.4.1 Record the following in people with major trauma in hospital settings: ● ABCDE (airway with in-line spinal immobilisation, breathing, circulation, disability [neurological], exposure and environment) ● History and Examination. 9.4.2 If possible, record information on whether the assessments show that the person's condition is improving or deteriorating. 9.4.3 Record pre-alert information using a structured system and include all of the following: ● the patient's age and sex ● time of incident ● mechanism of injury ● injuries suspected ● signs, including vital signs and Glasgow Coma Scale ● treatment so far ● estimated time of arrival at emergency department ● special requirements ● the ambulance call sign, name of the person taking the call and time of call ● 9.5 Training and skills 9.5.1 Ensure that each healthcare professional within the trauma service has the training and skills to deliver, safely and effectively, the interventions they are required to give as per this guideline. Training in the form of ATLS, NTMC, EMTC etc 9.6 Receiving information in hospital settings 9.6.1 Casualty Medical Officer/Trauma team leader in the emergency department should receive the pre-alert information, and determine the level of trauma team response according to agreed and written local guidelines. 9.6.2 The trauma team leader should be easily identifiable to receive the handover and the trauma team ready to receive the information. 9.6.3 The pre- hospital documentation, including the recorded pre-alert information, should be quickly available to the trauma team and placed in the patient's hospital notes. 9.7 Sharing information in hospital settings 9.7.1 Follow a structured process when handing over care within the emergency department (including shift changes) and to other

departments. Ensure that the handover is documented. 9.7.2 Ensure that all patient documentation, including images and reports, goes with the patient when they are transferred to other departments or centres. 9.7.3 Produce a written summary, which gives the diagnosis, management plan and expected outcome and: ● is aimed at and sent to the patient's referring physician/surgeon/primary or secondary care hospital within 24 hours of admission

The introduction of trauma teams has improved patient outcome independently. The aim of establishing a trauma team is to ensure the early mobilization and involvement of more experienced medical staff and thereby to improve patient outcome. The team approach allows for distribution of the several tasks in assessment and resuscitation of the patient in a ‘horizontal approach’, which may lead to a reduction in time from injury to critical interventions and thus have a direct bearing on the patient’s ultimate outcome. A trauma team leader or supervisor, who coordinates the resuscitation and ensures adherence to guidelines, should lead the trauma team. There is a major national and international variety in trauma team composition, however crucial are a surgeon, an Emergency Medicine physician or both and anaesthetist. Advanced Trauma Life Support training, simulation-based training, and video review have all improved patient outcome and trauma team performance. Developments in the radiology, such as the use of computed tomography scanning in the emergency room and the endovascular treatment of bleeding foci, have changed treatment algorithms in selected patients. These developments and new insights in shock management may have a future impact on patient management and trauma team composition.

objectives

- •

  The horizontal distribution of tasks between team members reduces the time from injury to critical interventions.

- •

  Organizing the staff caring for seriously injured patients into trauma teams improves outcomes.

- •

  Simulation training of teams improves performance but must be repeated on a regular basis if the effect is to be sustained.

- •

  Videoing and review of real and simulated trauma resuscitations can be used for training and audit.

Trauma is the leading cause of death in the age group up to 44 yr in the Western world,
despite improvements in trauma care over the last four decades.

The current model of civilian trauma systems was first in the USA with the adoption in the American Congress of the Emergency Medical Systems

Act, Public Law 93–154, on November 1, 1973. The intention was to set up an area-wide emergency medical system.
[4]

The rationale for this was that failure to provide sufficient specialized care in an early phase of major trauma had been demonstrated to be a major shortcoming in the management of seriously injured patients.
[5]

One of the improvements in trauma care that resulted from this law was the introduction of multidisciplinary trauma teams. A trauma team aims to rapidly resuscitate and stabilize the patient, and to reduce the time to diagnosis and treatment with the overall objective of improving survival rates. Cowley
[6]

was among the first to conclude that having different specialities in a trauma centre is a necessity to reduce mortality. In the next decade, more studies came to this conclusion.

Trauma team composition

A team approach allows for distribution of the several tasks in assessment and resuscitation of the patient among a number of people. This ‘horizontal approach’ can lead to a reduction in time from injury to critical interventions. Driscoll and Vincent
[11]

showed that the time to complete the primary survey had a direct bearing on the patient’s ultimate outcome.

Outcomes from the initial assessment and resuscitation of trauma patients are improved by an organized trauma team.
[12]

[13]

There is variation, both nationally and internationally, in trauma team composition. However, the different approaches have much in common and an example of a trauma team composition and tasks are summarized in Figure 1 and Table 1.

Table 1Tasks of the trauma team members in the University Medical Centre Utrecht

Anaesthetist
• Airway management • Intubation • Ventilation •

Performs procedures
Surgeon/team leader
• Initial assessment and survey • Coordinates team activities • Performs procedures
Primary nurse
• Calls alert • Records vital information • Assists with procedures of surgeon

Neurologist
• Neurological evaluation
Radiology technician
• Films as needed Chest Pelvis
Radiologist
• Performs FAST if needed • Reads films •

Prepares CT
Secondary nurse
• Assists with airway management • Places monitoring devices • Sets up ventilator
Emergency physician/physician assistant
• Records vital signs • Venous access/draws blood • Inserts urinary catheter

• Assists performed procedures
Circulating nurse
• Brings blood • Carries blood samples • Prepares transport

- Open table in a new tab

The treatment of seriously injured patients requires the rapid assessment of injuries and institution of life-preserving therapy. The trauma team leader is often a surgeon who coordinates the resuscitation and ensures adherence to Advanced Trauma Life Support (ATLS) guidelines. Depending on the local situation, the trauma team can be led by an emergency physician as well. In the basic set up, an anaesthetist, one or two emergency department (ED) nurses, and a radiology technician join the team leader. The assessment and treatment of a protected unobstructed airway, which takes priority over management of all other conditions in the primary

survey, is usually carried out by the anaesthetist, but can also be done by an intensivist, surgeon, or Emergency Medicine physician, depending on local agreements. The team leader interprets the results of the assessment of breathing and circulation and procedural treatment of injuries is provided if necessary. The nurses assist the medical staff and perform various tasks such as obtaining vital signs, performing or assisting with activities like i.v. access, drawing of blood, and undertaking urinary and gastric catheter placement. In many institutions, a nurse may also act as scribe, keeping a contemporaneous record of the management of the patient.

In some units, a neurologist or a neurosurgeon can be present for the determination of the Glasgow coma score, pupillary light response, and focal neurological deficit. In other hospitals, the surgeon or emergency physician will perform the primary neurological examination and consult a specialist when necessary.

A radiology technician should be present to make conventional X-rays of the thorax and pelvis as adjuncts to the primary survey. If a focused assessment sonography in trauma (FAST) is indicated, a radiologist should be present as well. The radiologist can either be a member of the trauma team or can be on site and be paged by the trauma team if necessary.

Usually, additional personnel such as junior surgical residents, emergency physician residents, or respiratory technicians are members of the trauma team as well. It is important not to have excessive numbers of people in the team, since it is more difficult to ensure the overview by the team leader and adherence to ATLS protocol by all team members.

Many hospitals have developed a tiered trauma team response. Depending on the reported trauma mechanism, expected injuries, and physiological parameters, the appropriate trauma team is requested.

Information from prehospital medical personnel is important for guiding the appropriate response and for assembly and preparation of the appropriate trauma team.

[17]

Depending on a triage system, patients are directed to the adequate level hospital,

[18]

[19]

and trauma team activation is requested. The coordinating ED nurse will then activate the appropriate team, according to the activation criteria (Table 2). Evaluation of the current practice has shown that a considerable rate of overtriage is necessary in order to prevent undertriage, and thus a delay in mobilizing the trauma team.

[20]

Table 2Trauma team activation criteria in the University Medical Centre Utrecht. GCS, Glasgow coma score; BSA, body surface area

Mechanism	Motor vehicle accident	• Speed over 80 km h^{-1} •

		Ejection/roll over/trapped • Unrestrained/fatality
	Motor bicycle	• Any with speed >30 km h^{-1}
	Pedestrian/cyclist	• Struck by car or motorcycle/any speed
	Fall	• Adult >3 m and/or 5 stairs • Elderly on anti-coagulant therapy • Motor bikes/cycle/water ski
	Horse	•

		Any horse-related injury
	Assaults	• Shooting • Stabbing • Focal blunt head trauma with GCS <13
	Multiple casualties	• With significant injuries
	Other	• Explosion • Hanging •

		Submersion
Injuries	• Potential airway obstruction/respiratory distress • Penetrating injury to the head/neck/chest/abdomen/pelvis/back/limbs • Paralysis (spinal cord injury) • Burns >10% BSA	
Signs	• Respiratory rate <10 or >30 • Heart rate <40 or >120 • Arterial pressure <90 systolic at any stage	

	• Capillary return >2 s • GCS <14
Treatment	• Multi-trauma transferred from other hospital within 24 h of injury • Intubation or assisted ventilation • >2 litre of fluid resuscitation

- Open table in a new tab

The team leader must check that the resuscitation is proceeding satisfactorily, decide which additional tests should be done, and formulate a definitive plan. Leadership skills have shown to be of particular importance: in situations where a command physician is clearly identified, there usually is a shorter time to primary and secondary survey and to performing diagnostic investigations.

[21] A study performed by Lubbert and colleagues in 2009

[24]

showed that efficient leadership was associated with a lower total number of deviations from ATLS protocol. Studies comparing surgeons with non-surgeons in the role of trauma team leader show no difference in predicted survival or ED length of stay.

Several studies have shown that the availability of an attending trauma surgeon on the trauma team 24 h a day reduces resuscitation time and time to incision for emergency operations, but has not demonstrated an impact on mortality.

Besides leadership, other human factors such as communication, supervision, and seeking help are important. These human factors could influence team structure and collaboration,

effectiveness during resuscitation,

[32]

and leadership attributes

[33]

and they could potentially influence clinical outcome factors. Understanding the role of trauma team members

[34]

and human factors may impact the clinical outcome of trauma patients.

[35]

The effects of the introduction of trauma teams

The aim of establishing a trauma team is to ensure the early mobilization and involvement of more experienced medical staff and thereby to improve

patient outcome. Although it is difficult to separate the benefits of a trauma team from the effects of implementation of trauma systems, there is evidence that the introduction of trauma teams has improved patient outcome. Data from Petrie and colleagues
[36]
showed that patients with an injury severity score (ISS) >12 had a significantly better outcome when a trauma team was activated than when they were treated on service-by-service basis. Not only was the performance better when the trauma team was involved in the management of moderately to severely injured patients, there were significantly more unexpected survivors as well, even though both groups had access to the same personnel, imaging techniques, operating theatres, and intensive care unit in the same tertiary care centre.

The introduction of a trauma team in a level I trauma centre led to a significant improvement in triage time for all patients leaving the ED. Furthermore, it resulted in a trend towards lower overall mortality rates and mortality rates among patients with severe head injury.
[37]
A significant reduction in overall mortality rate, from 6.0% to 4.1%, was seen in another study; in patients who were most severely injured with an ISS of 25 or greater, mortality rates decreased from 30.2% to 22% (8.3% absolute reduction in mortality, 95% confidence interval 2.1–14.4%).
[38]
In patients who meet well-established trauma call criteria who are not treated by a trauma team, a higher mortality has been demonstrated.
[39]

The horizontal approach of trauma team assessment and resuscitation of patients may lead to a reduction in time from injury to critical interventions. A decrease in time to definitive care, for instance, time to haemorrhage control or neurosurgical interventions, may have an impact in mortality. A well-organized trauma team has been shown to carry out a complete resuscitation in a mean of 56 min rather than 122 min, more than halving the total resuscitation time.
[12]

A study in our institution demonstrated an even shorter total trauma room time of 33 min.
[24]

Trauma training

ATLS course

The first ATLS course was in 1978. The course was adopted by the American College of Surgeons (ACS) Committee on Trauma and incorporated as an educational programme 1 yr later. In that same time period, area-wide medical emergency systems were implemented and the development of trauma teams gained more attention. A group of local surgeons and physicians, the Lincoln Medical Education Foundation, together with University of Nebraska Medical Center and the Nebraska State Committee on Trauma (COT) of the ACS, founded courses to improve the quality of ATLS skills.
[40]

Originally, the ATLS course was developed for doctors in rural areas who did not manage trauma patients on a regular base. The ACS expanded the ATLS course nationally in 1980. The first pilot courses seemed to show an improvement of outcome of trauma patients in rural areas.

ATLS courses are nowadays very common and widely accepted and have resulted in better outcome as was shown in several studies.

Ali and colleagues showed that an ATLS programme for physicians resulted in a statistically significant improvement of in-hospital trauma patient outcome (observed to expected mortality ratio of 3.16 pre-ATLS compared with 1.94 post-ATLS). The same study group also showed a significant decrease in mortality and morbidity after instituting a prehospital Trauma Life Support (PHTLS) programme.
[45]

Simulation-based training

Simulation-based training (SBT) is focused on promoting expertise through simulation techniques. It creates a situation where skill development, practice, and feedback are applied and can take place in a replication of the real-world environment.
[46]

The current review will focus on the teamwork aspect of SBT. Shapiro and colleagues
[47]

concluded in 2004 that high-fidelity medical simulation training appeared to be a promising didactic teamwork training method. After an intervention study using a pre- and post-training design, it was clear that there were significant improvements in different domains using the Trauma Team

Performance Observation Tool (TPOT). These included improvements in the domains of leadership (*P*=0.003), situation monitoring (*P*=0.009), mutual support (*P*=0.004), communication (*P*=0.001), and overall (*P*<0.001). The times from arrival to the computed tomography (CT) scanner (26.4–22.1 min, *P*=0.005), and the operating theatre (130.1–94.5 min, *P*=0.021) improved significantly.
[48]

Another pre- and post-intervention study showed significant improvements in the objective variables of resuscitation time (<0.05), T-NOTECHS scores (<0.05), and frequency of near-perfect task completion (<0.001).
[49]

The T-NOTECHS score is a modified non-technical skills scale for trauma and is developed to assess teamwork skills of multidisciplinary trauma resuscitation teams. Miller and colleagues
[50]

concluded that *in situ* trauma simulation (ISTS) improved performance during the period when the training had taken place, especially teamwork and communication skills compared with the period before the ISTS, but that the effect was not sustained when the ISTS training stopped. The scores measured in the period between 1 and 5 weeks after the last ISTS session were similar to the baseline scores. In conclusion, the effect of stimulation training has positive outcomes on team performance, although it is questionable what the long-term effects are. Consequently, it seems to be important that trauma teams train on a regular basis, if the effects of training are to be sustained.

There are many different modalities available for SBT. The diverse range of medical-simulation modalities enables trainees to acquire and practice an array of tasks and skills.
[51]

There is little evidence as to which modality has the best outcome. A study by Wisborg and colleagues
[52]

concluded that there seems to be no difference in outcome in between stimulation using a mannikin or standardized patients when the educational goal is training communication, co-operation, and leadership within the team. A critical note, however, is that the outcome is measured in participants' assessment of their educational outcome and the degree of realism instead of a more objective outcome score.

Video review

Studies have been published describing the videotaping and review of both simulated and actual trauma resuscitations. Video recording of trauma resuscitations can serve three goals. First of all, evaluation of trauma resuscitations can be of use for educational purposes. Videotaping real trauma resuscitations with subsequent review creates the opportunity to modify behaviour by analysing resuscitation performance in a more controlled format with more experienced physicians. Secondly, video registration can serve as a tool for quality assessment, for instance, to monitor adherence to ATLS guidelines.
[53]

Finally, the video registration data can be used for research purposes.

Hoyt and colleagues
[54]
were the first to describe the use of video review of trauma team resuscitations. They evaluated 2500 resuscitations in a 3.5 yr period. The resuscitations were reviewed using an audit form and discussed during a conference attended by various members of the trauma team, including prehospital personnel, radiology, respiratory therapy, doctors, nurses, and students. The review process produced an overall 12% reduction in resuscitation time during a 3 month resident rotation. When stratified for injury severity, the group with an ISS>20 had a reduction in resuscitation time of 15%, compared with a 9% reduction in patients with an ISS<20. A greater benefit for more severely injured individuals was also shown by Townsend and colleagues
[55]
in a similar study.

In order to pursue quality improvement using video recording of trauma resuscitations, an objective evaluation system is required. Written guidelines must direct reviewers through the tape and remove subjective evaluation of events.
[56]

Besides evaluation of objective data, such as adherence to ATLS protocols and total resuscitation time, videotape review can be used to assess teamwork and leadership.
[53]

In order to improve trauma teamwork, a tool to accurately capture and assess the important factors of trauma resuscitation has been developed.

[57]

This tool was developed on the basis of five behavioural domains, which had been used to evaluate non-technical skills (NOTECHS) in the operating theatre. Inter-rater reliability was evaluated using video review of team training using simulated scenarios and actual resuscitations. Although further work to improve inter-rater reliability is warranted, the clinical relevance of the tool was suggested by improvement of the scores after teamwork training, and correlation with clinical parameters in simulated and actual trauma resuscitations.

Scherer and colleagues

[58]

showed an improvement in half of the behaviours studied within 1 month of initiating conference-based video review, compared with no improvements after 3 months of verbal feedback. Video data are objective evidence of an individual's performance. Enabling colleagues to understand their performance is the first step in effecting a change in behaviour. It can also be helpful in identifying incongruities in perceived self-efficacy, which is the discrepancy between the behaviours the participants think they are performing *vs* the behaviour they actually perform.

The future of trauma teams

So far, we have discussed the institution and development of trauma teams and described the current situation. In the latter part of this article, we will discuss the future of trauma care and its impact on the trauma team.

Radiology

The CT has become an important diagnostic tool in trauma care. In many trauma patients, a clear history is not available and physical examination can be misleading
[59]
or equivocal.
[60]
Furthermore, it is not possible to exclude abdominal or pelvic organ injury based on clinical examination.
[61]
Therefore, diagnostic imaging has become a widely accepted standard for management of polytrauma patients. Sonography is usually readily available in the ED and the FAST is used as initial screening. It has a high positive predictive value for detection of free fluid, but a low sensitivity. CT is the modality of choice in order to detect visceral injuries and determine the extent of blunt abdominal trauma.
[62]
[63]
The advantages of the CT are clear: not only does it provide more complete information regarding the abdomen, it also allows for rapid examination of the head, neck, and chest.
[64]
Several large series have shown the effectiveness of targeted CT in management of haemodynamically stable patient with blunt abdominal or thoracic trauma.

A more recent study demonstrated a significant increase in survival in haemodynamically unstable major trauma patients receiving a whole-body CT scan as well, if performed quickly within a well-structured environment and by a well-organized trauma team.
[69]

This is a remarkable result, even though it was a non-randomized retrospective study. Furthermore, there were more than 300 patients who did not receive a CT scan due to emergency surgery. Resuscitation should still be physiology-driven and in patients with severe instability, emergency surgery precedes radiological evaluation. However, since CT scanning is generally available in or close to the trauma room; it can be used early in the resuscitation phase and thus may lead to a better survival of trauma patients. CT scanning may have potential in the prehospital phase; indeed, it is currently in use in stroke patients enrolled into a pilot study in Germany.
[70]

[71]

This development in imaging could have an impact on trauma team composition. CT has a high sensitivity for the detection of parenchymal injuries and a good sensitivity for injuries of the gastrointestinal tract, provided that adequate examination technique and careful diagnostic interpretation is combined.
[64]

The radiologist should thus be a regular member of the trauma team to aid in quick and thorough interpretation of the CT images. Moreover, in

addition to aiding with diagnosis, the interventional radiologist will be increasingly involved in the treatment of trauma patients. A growing number of hospitals are equipped with a hybrid operating theatre facilitating combined surgical and endovascular treatment of trauma patients.

Shock management

Changing insights into coagulation pathophysiology have driven the demand for earlier and different diagnostic technologies such as thromboelastography, and point-of-care testing. Coagulation therapy continues to evolve and may also influence future trauma team composition.

Trauma-induced coagulopathy is well known in severely injured patients and was first recognized during the Vietnam War.

Coagulopathy after trauma is common and was previously attributed to iatrogenic causes such as dilution from i.v. fluid therapy, massive blood transfusion, and other factors such as progressive hypothermia, and acidosis.

While these factors should not be neglected, we now know that acute traumatic coagulopathy (ATC) is an independent predictor of mortality.
[78]

[79]

In 56% of trauma patients, abnormal coagulation is present in the first 25 min after injury.
[80]

In the last decade, we have developed a better pathophysiological understanding of ATC. Key characteristics of ATC are isolated factor V inhibition, dysfibrinogenaemia, systemic anticoagulation, impaired platelet function, and hyperfibrinolysis.
[81]

In addition, activation of protein C due to endothelial disruption is likely to cause coagulation factor consumption and loss of inhibition of fibrinolysis.
[82]

[83]

ATC can be exacerbated by hypothermia, acidosis, and resuscitation with hypocoagulable fluids.
[81]

Increasing injury severity is associated with increasing likelihood of an abnormal coagulation test (ISS 9–16: 5%; ISS 17–25: >10%; ISS >45: 43%). Mortality due to severe injury and coagulopathy occurs quickly. The mean time to death for trauma patients who die of uncontrolled haemorrhage is 2 h
[84]

and more than half of all injured civilians, in rural areas up to 80%, who die from their injuries die in the prehospital phase.
[85]

[86]

It is increasingly recognized that blood and coagulation management is an important aspect of the early treatment of severely injured trauma patients.

Massive haemorrhage requires massive transfusion to maintain adequate circulation and haemostasis.
[87]

Current data support that trauma patients treated with higher ratios of plasma and platelet to red blood cell transfusions have improved outcomes, but further clinical investigations are needed.
[87]

[88]

In cases of massive transfusion, a well-defined protocol helps to delineate how blood products are ordered, prepared, and delivered; determine laboratory algorithms to use as transfusion guidelines; and outline duties and facilitate communication between involved personnel. The development of such a protocol is a joint responsibility of members of the trauma team and a hospital transfusion team.

The improved understanding of ATC and the institution of mass transfusion protocols may have an impact on the operative treatment of trauma patients. Administration of blood products early in the resuscitation could lead to less haemodynamic instability and thus decrease the number of patients requiring damage control surgery, since damage control management is focused on a haemodynamic stable patient before definitive surgical treatment. This could therefore mean that early total care could be possible for more trauma patients and secondary and tertiary surgical treatment can occur sooner, or even in one session.

Conclusions

Trauma patients benefit from resuscitation by a trauma team because of the rapid resuscitation and stabilization and reduction in time to diagnostics and treatment. The team leader must oversee the resuscitation and intervene when necessary. Leadership skills have shown to be of particular importance. Resuscitation should be physiology-driven and the patients' response to resuscitation determines further treatment, which can vary from damage control surgery to observation.

Definition of damage control surgery

- Rapid termination of an operation after control of life-threatening bleeding and contamination followed by correction of physiologic abnormalities and definitive management.

Key principles:

- Control of haemorrhage
- Control of contamination
- Use of temporary shunts to bypass ligated vascular injuries
- Delay of abdominal closure, or temporary wound closure
- Staged definitive procedure

Rationale for damage control surgery and delay of definitive management

Historically, much of the mortality and morbidity from trauma was associated with the early attempt at repair. Attempts were made to complete the definitive management early, in the first operation. The

repair attempts turned into prolonged procedure,s lasting many hours. Frequently such rescues were attempted by teams composed of mainly junior staff, and out of normal working hours. Attempts to subject unstable trauma patients to these "classical" long laparotomies were frustrated by failure. This is because hypothermia, acidosis, and coagulopathy render attempts at definitive surgical repair less likely to succeed. Thus, the rationale for damage control surgery is early surgical control of immediately lifethreatening injuries and the establishment of haemostasis. Definitive management can be delayed in most cases; the patient can spend some time in ICU getting their physiology un-deranged. Definitive management can take place safely (and is more likely to succeed) once the physiological abnormalities are corrected. The timing can be negotiated with the surgical teams, so that the optimum level of expertise can be present.

This has had a marked effect on mortality. The first publication on this topic (Stone et al, 1983) offers a nightmarish glimpse of the bloodied hell-scape that was early trauma surgery. Thirty one patients who developed lethal coagulopathy in theatre were enrolled. Of the "traditional" surgical approach, the mortality rate was 98%. The others were quickly clamped and packed, and taken to ICU with their abdomens open. Their return to theatre was dictated by the resolution of their coagulopthy. The abdominal packs were left in for an average of about 27 hours; then definitive management took place.
The mortality rate from this was 35%.

Indications for damage control surgery

I was able to find this list of indications in Godat's 2013 position paper. It, in turn, draws on Rotondo and Zonies' "The damage control sequence and underlying logic" (1997). In trauma patients, the pre-operative indications include the following:

- Specific injury patterns which favour DCL:
  - Penetrating injury
  - Gun shot wound
  - High-energy blunt torso trauma
  - Major abdominal vascular injury
  - Multicavitary exsanguination
- Systolic blood pressure (SBP) <90 mmHg.
- Need for re-suscitative thoracotomy.
- Hypothermia (≤33°C)
- inappropriate bradycardia
- pH of <7.2
- Transfusion of more than 10units of PRBCs
- Total fluid replacement >12 L
- Estimated blood losses of ≥ 5 L

Temporary abdominal closure (TAC) methods:

- From Godot, *"The ideal TAC should be easily and quickly applied, allow room for expansion, limit contamination, decrease bowel edema, protect the viscera, fascia and skin from damage, evacuate fluids, prevent adhesions, minimize loss of domain and be cost-effective".*
- First TAC experiments ghad patients with intra-abdominal packs termporarily half-closed with towel clips or runing sutures. Abdominal

compartment sydnrome was the cvonsequence. This practice has since been abandoned.

- Later, some sort of erzats water-impermeable barrier was used (eg. a disembowelled IV bag or stoma bag). But, it was *sutured directly to the skin*. Again, abdominal compartment syndrome developed in up to 33% of patients because the abdomen was technically still "closed".
- Vacuum-assicted closure devices are used most frequently today. They consist of packing sponged and an occlusive surface dressing. There is much less abdominal compartment pressure problems with these. But, there are occasional issues with enterocutaneous fistula. The rates of this complication vary from 1.5 to 15% in the literature.

Complications upon returning to the ICU:

Remember that the patient was not being definitively managed in theatre; if you are lucky they are bleeding slightly less than they were before they went to theatre, but in general the resuscitation is only half-complete. Not only that, but they were probably rushed through the ED, and a secondary survey (or trauma CT) may not have been performed.

Thus, one can anticipate the following:

- Old, uncontrolled traumatic bleeding
- New, uncontrolled surgical bleeding
- Uncontrolled coagulopathy, hypothermia and acidosis
- An open abdomen (thus, high sedation and analgesia requirements)
- Abdominal compartment syndrome (if they decided to close it)
- Missed injuries

Principles of ICU management between stages of surgical repair

While recovering from one horrendoplasty and while waiting for the next one, the ICU team has several jobs to do. The emphasis for rescuing the patient has shifted from ED procedures (who now merely triage the trauma) and from the surgical team (who do a quick clamp-and-burn). Now, the ICU is in charge of the bulk of the resuscitation, which - some might argue - is how it should be.

An excellent 2006 article by Sagraves et al ("Damage control surgery—the intensivist's role") does this topic justice with the appropriate amount of detail. The domains of ICU management can be discussed in a familiar sequence, starting with the airway.

A. Keep them intubated. There is no rush to get the tube out.
B. Ventilate with lung-protective strategy.
   The compliance will be poor for a number of reasons (eg. fluid excess, lung contusion, massive distended abdoimen, and so forth).
C. Correct hypovolemia; use lactate to determine the effectiveness of resuscitation.
   Vasopressors will not be helpful (the SVRI is already very high due to the endogenous catecholamine surge)
D. Sedate and paralyse. No coughing is permitted. This improves the integrity of the open abdomen dressing, improves chest wall compliance and protects you from abdominal compartment syndrome.
E. Electrolytes may be deranged; specifically, one ought to obsess over the calcium, which is a necessary cofactor in clotting.

Rewarming and correction of acidosis are essential part of resuscitation.

F. One must remember to measure the CK. In a major trauma, as attention ends up focused on the abdomen, everybody forgets about the compartment syndrome of a compromised limb, and rhabdomyolysis ensues.

G. It would not be wise to start either TPN or NG diet at this stage, particularly if the bowel has been left disconnected. One may wait until after the definitive surgery.

H. **Correct the coagulopathy**. One may consider using Factor VII off-label for this.

I. Antibiotics are indicated; the wounds are usually contaminated.

OVERVIEW

- Damage control surgery, along with permissive hypotension and hemostatic resuscitation, is integral to the concept of damage control resuscitation
- Damage control surgery involves limited surgical interventions to control haemorrhage and minimize contamination until the patient has sufficient physiological reserve to undergo definitive interventions
- This strategy was derived from military experience and is now increasingly adopted into civilian trauma management

DAMAGE CONTROL RESUSCITATION

- Damage control resuscitation (DCR) is a systematic approach to the management of the trauma patient with severe injuries that starts in the

emergency room and continues through the operating room and the intensive care unit (ICU)

- DCR involves haemostatic resuscitation, permissive hypotension (where appropriate) and damage control surgery
- DCR aims to maintain circulating volume, control haemorrhage and correct the ‘lethal triad’ of coagulopathy, acidosis and hypothermia until definitive intervention is appropriate

RATIONALE FOR DAMAGE CONTROL SURGERY

- Management of the metabolic derangement of ongoing bleeding supersedes the need for definitive surgery
- Abbreviated operations that control haemorrhage and contain spillage from the alimentary and urogenital tracts
- Rapid transfer to ICU for correction of acidosis, coagulopathy and hypothermia (ongoing haemostatic resuscitation)
- Definitive operation is deferred
- These operations tend to have a high complication rate
- Survival is given preference over morbidity

Benefits

- maintenance of normothermia
- less coagulopathy
- fewer products used overall, despite increase in pre- and intra-operative blood product use
- may produce decreased ALI, MODS, ARDS and improve survival

STAGES OF DAMAGE CONTROL RESUSCITATION

Recognition

- must be approached from all services (pre-hospital, ED, anaesthesia, surgery, ICU, haematology)

Haemostatic resuscitation

- early transfusion to maintain circulating volume
- minimisation of crystalloid use
- reduce coagulopathy
- keep warm
- prevent acidemia

Rapid movement to the operating theatre (OT)

- “scoop and run” approach
- address immediate life threats prehospital or in the emergency department
- permissive hypotension may be tolerated in penetrating vascular trauma pending surgical repair
- avoid unnecessary delays in transit to the OT

Initial surgery

- short time in OT
- limited focused surgery to control haemorrhage and decontaminate
- pack
- partially resect organs
- staple off and remove injured bowel
- fibrin sealants
- leave abdomen open

Move to ICU

- restore near normal physiology

- correct lethal triad: rewarm, correct acidosis and correct coagulopathy
- optimize ventilation
- plan re-operation once stable

Re-operation at 24-36 hours

- remove packs
- definitive surgery
- formally close abdomen

COMPLICATIONS

- new onset or uncontrolled surgical bleeding
- abdominal compartment syndrome
- inability to wake and wean
- non-life threatening injuries not dealt with or missed (needs secondary survey/full examination)

Trauma & the Triad

Despite great advancements in trauma care over the past 30 years, trauma is still one of the leading causes of death in any age group. This is especially apparent in the young–for those aged 1—44 years old, trauma is the No. 1 cause of death in the United States.1 Of these deaths, hemorrhage accounts for up to 40% and remains as the leading preventable cause of trauma-related death.2,3

The lethal triad of hypothermia, acidosis and coagulopathy has been recognized as a significant cause of death in patients with traumatic injuries. In 1982, a study described a “bloody vicious cycle”• in which hemorrhage and tissue injury cause this predictable triad of complicating factors.4 Ultimately, this triad resulted in worsening hemorrhage and eventual death. Authors of the research suggested treatment of hypothermia, acidosis and coagulopathy in trauma requires as much attention as the traditionally emphasized surgical management of injuries.4

Today, we recognize that to successfully resuscitate the critically ill trauma patient, all emergency providers must have a firm understanding of the lethal triad. This understanding should serve as the cornerstone for all interventions provided to the bleeding trauma patient. Left untreated, hypothermia, acidosis and coagulopathy bring about and propagate each other, eventually resulting in a predictable but irreversible progression toward death.

Hypothermia

Normal human body temperature is 35.6—37.8 degrees C with hypothermia being defined as a core temperature < 35 degrees C.5 In one study, it was found that almost half of EMS-transported trauma patients had a temperature < 36 degrees C on arrival to the ED.6 Important to note is that there was no association between season of the year and frequency of hypothermia. At highest risk were those patients older than 65 and those who had been entrapped.6 In addition, hypothermia in trauma has been associated with a significantly increased mortality compared to patients with the same body temperature from environmental exposure alone. In a

study of 71 trauma victims, a core temperature < 32 degrees C was associated with 100% mortality independent of the presence of shock, injury severity or volume of fluid resuscitation.7 Because hypothermia in a trauma patient predicts such a poor outcome, the traditional classification system of hypothermia has been revised for use in this vulnerable patient population. (See Table 1–below.)

Even mild hypothermia in a trauma patient can result in devastating physiologic consequences. (See Table 2.) Of particular concern is the effect of hypothermia on the coagulation system.8 The coagulation system is a temperature- and pH-dependent series of complex enzymatic reactions that result in the formation of blood clots to stop both internal and external hemorrhage.

Coagulopathy is the term used to describe a broad group of disease states in which there is an impaired ability of this coagulation system to synthesize blood clots.5 It's been repeatedly demonstrated that as a patient's core temperature decreases, so does the body's ability to stop bleeding. This is a result of impaired platelet function, inhibition of the clotting factors, and inappropriate activation of clot breakdown.8

Hypothermia in trauma patients is caused by a multitude of factors. Hemorrhagic shock, traumatic brain injuries, and alcohol intoxication impair the body's ability to regulate its core temperature.8 In addition, patients at the extremes of age and those with certain medical conditions such as diabetes or thyroid disease are at higher risk to develop hypothermia after trauma.8 Furthermore, those patients with prolonged exposure to the

environment as during an extrication and those with severe burns are at risk for rapid heat loss causing profound hypothermia.

Lastly, an important care consideration for a trauma patient is the temperature of the fluids and blood products we infuse as well-intentioned therapy. Room temperature normal saline (20—25 degrees C) is very hypothermic relative to the desired normal body temperature. Thus, large volume resuscitations with even room temperature IV fluids can significantly contribute to this arm of the lethal triad.

Acidosis

A pH level is a measure of the blood's acidity on a scale of 0—14; water has a "neutral"• pH of 7.0. A healthy individual maintains a physiologically normal pH of 7.35—7.45 through a complex balance of hydrogen ions (acids) and buffers predominately controlled by the pulmonary and renal systems.

Acidosis is defined as an arterial pH < 7.35 and can result from a variety of disease states. However, in trauma patients the major contributor is poor perfusion to the tissues. Anemia from acute blood loss, peripheral vasoconstriction in response to hypothermia and blood loss, and overall decreased cardiac output severely impair oxygen delivery to the tissues. This results in tissue oxygen demand far exceeding oxygen delivery. Thus, to make functional energy, the body's cells are forced to utilize anaerobic metabolism instead of the normal aerobic metabolism, resulting in the production of lactic acid as a byproduct.9

As a trauma patient's perfusion worsens, lactic acid rapidly accumulates in the tissues. This causes the body's pH to drop, resulting in a severe metabolic acidosis. It's important to note that this process frequently occurs in the presence of normal or only slightly abnormal vital signs.

An additional cause of acidosis in the trauma patient is excessive resuscitation using unbalanced crystalloid solutions such as normal saline.10 With a pH around 5.5, normal saline is far more acidic than the desired normal blood pH. In large-volume resuscitations, normal saline predictably causes its own metabolic acidosis as a result of the high chloride content.11 Thishyperchloremic metabolic acidosis only serves to compound the existing lactic acidosis of trauma. Furthermore, there's evidence that excessive use of normal saline with its high chloride content may increase systemic tissue inflammation and thereby contribute to the coagulopathy of trauma.11 Lactated Ringers (LRs) is an imperfect substitution: Although its pH is 6.5, LR contains lactate and is incompatible with many medications and blood products.

Lastly, a trauma patient may also have respiratory acidosis. This is a result of hypoventilation due to respiratory depression or obstruction resulting in hypercapnia (increased CO2 levels). Common causes of a respiratory acidosis in trauma include narcotic or alcohol use, traumatic brain injuries, flail chest or preexisting medical conditions such as chronic obstructive pulmonary disease.

With severe acidemia (pH < 7.20), disastrous consequences can occur.12 (See Table 3.) For the trauma patient, one of the most harmful effects is

that their coagulation system can become severely impaired. In one study, the function of part of the coagulation system was reduced by 55—70% when the pH dropped from 7.4 to 7.0.13

Coagulopathy

Coagulopathy can occur for a number of reasons; however, regardless of the specific cause, coagulopathy results in the potential for continued hemorrhage in the bleeding trauma patient.

Coagulopathy in trauma is a common occurrence, present in nearly one in four severely injured patients arriving at the ED. Furthermore, its presence is associated with a four-fold increase in mortality.14—16 The coagulopathy of trauma occurs not only because of hypothermia and acidosis as previously discussed, but also as a result of losing clotting factors through hemorrhage and hemodilution, and the body's use and subsequent depletion of both platelets and clotting factors.9

Dilutional coagulopathy occurs when we resuscitate a bleeding trauma patient with fluid or blood products that don't contain the same clotting factors lost in the acutely hemorrhaged whole blood.10 Crystalloids such as normal saline and packed red blood cells dilute the remaining clotting factors circulating in the trauma victim's blood. Furthermore, in the critically injured, through a complex series of enzymatic reactions, the clotting cascade can become abnormally activated, causing excessive clot formation and subsequent breakdown (fibrinolysis) out of proportion to the injury.9 This abnormal and excessive activation of the coagulation system

rapidly consumes the body's remaining clotting factors, resulting in a further deficiency of the essential factors needed to achieve hemorrhage control.

Lastly, EMS providers should be aware of those trauma patients who have a baseline coagulopathy because of preexisting medical conditions. Examples include those patients on anticoagulant therapy such as warfarin (Coumadin) or a novel oral anticoagulant such as dabigatran for stroke prevention in the setting of atrial fibrillation. These patients and those with chronic liver or renal failure have an increased risk of developing a truly life-threatening coagulopathy and hemorrhage after trauma.17

EMS Management of the Lethal Triad

There are several simple steps providers can and should follow to battle the lethal triad.

1. The triad begins and ends with bleeding, so find the bleeding and stop it. Hold pressure, use combat gauze, apply a tourniquet, bind the pelvis, etc. (See the article "Training & speed are crucial: Options, issues & training to prevent death from massive blood loss,"• by Joe Holley, MD, FACEP, in the JEMS December 2013 supplement, Putting the clamp on hemorrhage: How a simple, effective point-of-injury tool will transform the way bleeding is controlled in the field.)
2. Do not stop your search for bleeding with the first source you find, as others may exist.
3. Always assume your patient's temperature is dropping right before your eyes, because it is, and much faster than you'd expect.
4. "Strip "˜em and flip "˜em,"• but not with reckless abandon. Make every

effort to expose only those body parts you're examining in the moment and keep the remainder of the patient covered.
5. Patients can and will become hypothermic in conditions you consider warm. Prioritize limiting a patient's exposure to the environment, especially during prolonged extrications.
6. Place a warm blanket between the newly extricated patient and your cold, hard backboard.
7. Turn up the heat in your ambulance. If you aren't sweating, it's certainly not warm enough. (Ideally, 27 degrees C.)
8. Promptly remove wet or bloody clothes and replace with a warm blanket. Shivering wastes valuable cellular energy and oxygen in an attempt to stay warm while producing more lactate, contributing to acidosis.
9. We don't bleed normal saline, so limit crystalloid infusion as much as possible. It contributes to the patient's acidosis and dilutes the remaining clotting factors in your patient's blood. IV fluids may improve a number, but may actually hurt your patient in the long run.
10. Except in those patients with a traumatic brain injury, utilize a permissive hypotension resuscitation strategy. Our goal should be to maintain tissue perfusion typically defined as the presence of a radial pulse or normal mental status. We should avoid overly aggressive fluid administration to normalize blood pressure, which can "pop the clot"• and worsen hemorrhage. (See "Vital pathways: Detect & treat symptoms related to hemorrhagic shock,"• by Peter Taillac, MD, FACEP and Chad Brocato, DHSC, CFO, JD, from the JEMS October 2012 issue and "Add a little salt: Permissive hypotension in trauma resuscitation,"• by Jeff Beeson, DO, FACEP, EMT-P and Trenton Starnes, NREMT-P in the JEMS April 2013 issue.)

11. Whenever possible, administer only warmed fluids. (Ideally 40 degrees C.)
12. Measure prehospital lactate levels when available to more accurately detect cryptic shock in trauma patients with normal vital signs. End-tidal carbon dioxide may also be a useful marker.
13. Monitor and maximize oxygenation.
14. Treat causes of hypoventilation to prevent a respiratory acidosis.
15. Identify high-risk patients with a baseline coagulopathy due to medications or preexisting medical conditions.
16. Administer tranexamic acid (TXA)–an antifibrinolytic that prevents clot breakdown and thus decreases blood loss–if your system permits its use. TXA has been shown to decrease mortality in two large trauma studies. (See "TXA: A difference-maker for trauma patients? Role of tranexamic acid in EMS & preoperative trauma management,"• by Jeffrey M. Goodloe, MD, NREMT-P, FACEP; David S. Howerton, NREMT-P; Duffy McAnallen, NREMT-P and Howard Reed, NREMT-P, in the JEMS April 2013 issue.)

Go to:

INTRODUCTION

Massive blood loss is encountered in various situations like polytrauma, major surgeries, gastrointestinal bleeds, obstetric haemorrhage, etc. Timely recognition and efficient management are vital for successful outcomes after major blood loss. American College of Surgeons National Surgical Quality Improvement Program database over 3 years revealed very low incidence of massive transfusion. However, it was associated with high mortality as compared to patients without transfusion. Nonfatal complications such as respiratory and renal, were seen in more than 50% of patients when more than 5 units were transfused.[1] In an analysis of haemorrhage claims in the United States Anaesthesia Closed Claims Project database for claims between 1995 and 2011, the authors note that anaesthesia care was more often assessed as less than appropriate.[2] Anaesthesiologists and other acute care physicians should, therefore, be well versed in the current concepts in the management of massive blood loss and transfusion.

Go to:

DEFINITION OF MASSIVE BLOOD TRANSFUSION

Various definitions of massive blood transfusion (MBT) have been published in the medical literature such as:[3,4,5]

- Replacement of one entire blood volume within 24 h
- Transfusion of >10 units of packed red blood cells (PRBCs) in 24 h
- Transfusion of >20 units of PRBCs in 24 h
- Transfusion of >4 units of PRBCs in 1 h when on-going need is foreseeable
- Replacement of 50% of total blood volume (TBV) within 3 h.

The definitions that use the period of 24 h are not useful during active management of blood loss. Furthermore, when used to identify MBT cases for observational studies, they dilute the data by selecting out early deaths. Therefore, the dynamic definitions, which identify rapid blood transfusions are better suited for use in day-to-day practice.

Data regarding MBT in the paediatric population is scarce. Definitions of MBT suggested for use in children are transfusion of >50% TBV in 3 h, transfusion >100% TBV in 24 h or transfusion support to replace on-going blood loss of >10% TBV/min.[6]

Go to:

PRINCIPLES OF MANAGEMENT OF MASSIVE BLOOD LOSS

Management of intravascular volume loss

a. This is a vital component of blood loss management. Physiologically, haemodynamic compensatory mechanisms maintain vital organ perfusion till about 30% TBV loss,[7] beyond which there is risk of critical hypoperfusion. Inadequate resuscitation at this stage leads to shock. Management of haemorrhagic shock is described elsewhere in this issue.

b. It is important to remember that overzealous resuscitation leading to high arterial and venous pressures may be deleterious as it may dislodge haemostatic clots and cause more bleeding.[8]

Management of loss of blood components

Blood component loss during massive blood loss is best managed by following the massive transfusion protocol (MTP). Mild to moderate blood loss can be managed with crystalloid or colloid infusions alone. However, with increasing loss, dilutional anaemia and later dilutional coagulopathy sets in. Also, plasma substitutes may have direct effects on the coagulation system particularly if used in volumes >1.5 L. In a study on surgical patients with normal coagulation factors, haemostatically critical levels of platelets ($50 \times 10^3/mm^3$), fibrinogen (1.0 g/L) and coagulation factor II, V and VII were reached at blood loss >200%, 150% and 200% respectively.[9,10,11] Therefore, it is generally recommended that replacement of blood

components be guided by laboratory tests.[7] However in situations of large blood losses, the laboratory test based approach for replacement of coagulation factors may lead to a delay in the recognition and treatment of a rapidly developing coagulopathy as turnaround times for most laboratory tests is long. This may lead to catastrophic bleeding. A protocol based empirical replacement of coagulation factors is, therefore, recommended in massive blood losses.

Special considerations

a. Trauma: Acute coagulopathy of trauma shock is caused by a combination of tissue injury and shock, and may occur without significant fluid administration, clotting factor depletion or hypothermia[12,13]

b. Coagulopathy during cardio pulmonary bypass (CPB): Heparin given before CPB and hypothermia lead to platelet dysfunction that has been shown to be a major cause for bleeding in patients on CPB.[14,15] Extensive surgical trauma, prolonged blood contact with the CPB circuit, hypothermia and high doses of heparin lead to dysfunction of the coagulation and inflammatory systems further worsening the postoperative coagulopathy. In these cases, it is important to ensure adequate reversal of anticoagulants like heparin

c. Postpartum haemorrhage: Recent studies suggest that acquired fibrinogen deficiency may be the major coagulation abnormality associated with obstetric bleeding[16] which may be compounded by dilutional coagulopathy and hyperfibrinolysis.[17]

Go to:

WHAT IS MASSIVE TRANSFUSION PROTOCOL?

With better understanding of the pathophysiology of haemorrhagic shock, resuscitation of patients with massive haemorrhage has advanced from reactive, supportive treatment with crystalloid, PRBC, and laboratory report based use of coagulation factors, to use of proactive standardized protocols called MTPs. MTPs are designed to interrupt the lethal triad of acidosis, hypothermia and coagulopathy that develops with massive transfusion thereby improving outcome. MTP describes the process of management of blood transfusion requirements in major bleeding episodes, assisting the interactions of the treating clinicians and the blood bank and ensuring judicious use of blood and blood components. By developing locally agreed and specific guidelines that include clinical, laboratory, blood bank and logistic responses, clinicians can ensure effective management of massive blood loss and improve outcome.

Rationale for massive transfusion protocol

Physicians involved in managing war injuries noticed that early administration of fresh frozen plasma (FFP) during massive transfusion decreased coagulopathy and improved survival in patients. Aggressive management of injury-associated coagulopathy has been promoted in recent years in massive blood loss. Studies have shown improved survival using higher ratio of FFP to RBC transfusion as compared to the conventional approach.[18,19,20] Transfusing fresh whole blood would seem ideal but the time required to conduct safety tests on blood is long enough to cause significant depletion of coagulation factors. Therefore, administering RBCs, coagulation

factors and platelets together maintains the physiological constitution of blood and prevents deficits of one or more constituents.

Massive transfusion protocols are activated by a clinician in response to massive bleeding. Generally this is activated after transfusion of 4-10 units. MTPs have a predefined ratio of RBCs, FFP/cryoprecipitate and platelets units (random donor platelets) in each pack (e.g. 1:1:1 or 2:1:1 ratio) for transfusion.[21,22] Once the patient is in the protocol, the blood bank ensures rapid and timely delivery of all blood components together to facilitate resuscitation. This reduces dependency on laboratory testing during the acute resuscitation phase and decreases the need for communication between the blood bank, laboratory and physician.

Limitations of massive transfusion protocols

1. Not standardised: The trigger for initiating the protocol as well as the optimum ratio of RBC: FFP: Platelets is controversial. Therefore practice varies from centre to centre.
2. Wastage: If MTP is triggered for a nonmassive blood loss situation, it may lead to wastage of blood products.

Other haemostatic/blood replacement strategies

1. Activated factor VII: The role of recombinant activated factor VII (rFVIIa) to manage uncontrolled bleeding is unclear. However, it can be considered as a rescue therapy in patients with life-threatening bleeding that is unresponsive to standard haemostatic therapy. When rFVIIa is used, the recommended dose is 200 μg/kg initially followed by repeat dose of 100 μg/kg at 1 h and 3 h[23]
2. Antifibrinolytic agents: Drugs like tranexemic acid may be useful in bleeding complicated by fibrinolysis such as cardiac surgery, prostatectomy etc.[24] Early administration of tranexamic acid in bleeding trauma patients has been shown to significantly reduce mortality[25,26]
3. Cell salvage: Can be extremely useful in unanticipated blood loss and in patients with rare blood groups. This strategy is generally reserved for massive blood loss in operation theatres as asepsis can be maintained easily. However, the relative contra indications such as a possibility of contamination with infected material and malignant cells should be considered.[27]

Go to:

COMPLICATIONS OF MASSIVE TRANSFUSION

Immediate

Problems secondary to volume resuscitation

a. Inadequate resuscitation: Hypoperfusion leads to lactic acidosis, systemic inflammatory response syndrome (SIRS), disseminated intravascular coagulation and multiorgan dysfunction. It also increases the expression of thrombomodulin on endothelium, which

then complexes with thrombin, which in turn leads to a reduced amount of thrombin available to produce fibrin and increases the circulating concentrations of anticoagulant activated protein C, which worsens the coagulopathy

b. Overzealous resuscitation

    i. Transfusion Associated Circulatory Overload: This is a well-known condition that occurs due to rapid transfusion of blood or blood products. Though this is seen commonly in elderly patients, small children and patients with compromised left ventricular function, it can also be seen in patients requiring massive transfusion. In patients with haemorrhagic shock, crystalloids and colloids are used for initial resuscitation. When blood and blood products become available, patients are transfused with required components that may then lead to circulatory overload.

    ii. Interstitial oedema due to increased hydrostatic pressure which may lead to abdominal compartment syndrome.

Dilutional problems

a. Dilutional coagulopathy: During haemorrhagic shock, there is fluid shift from the interstitial to the intravascular compartment that leads to dilution of the coagulation factors. This is further accentuated when the lost blood is replaced with coagulation factor deficient fluids. Studies have also shown that infusion of colloids and crystalloids induce coagulopathy to a greater extent than that explained by simple dilution.[28,29,30]

b. Low colloid oncotic pressure giving rise to interstitial edema.

Problems related to transfusion of large volume of stored blood

a. Citrate toxicity: 80 ml of citrate phosphate dextrose adenine solution present in each blood bag contains approximately 3 g citrate. A healthy adult can metabolise this load in 5 min.[31] However, hypoperfusion or hypothermia associated with massive blood loss can decrease this rate of metabolism leading to citrate toxicity. Unmetabolised citrate can then lead to hypocalcaemia, hypomagnesemia and worsen the acidosis. Hypocalcaemia can lead to myocardial depression that manifests earlier than hypocalcaemic coagulopathy. Hypotension not responding to fluids should alert the physician to this complication. Calcium supplementation is thus required in most cases of MBT.

b. Hyperkalaemia: Potassium concentrations in PRBCs can range from 7 to 77 mEq/L depending on age of stored blood.[32] Development of hyperkalaemia will depend on the underlying renal function, severity of tissue injury and rate of transfusion. At transfusion rates exceeding 100-150 ml/min, transient hyperkalaemia is frequently seen.[33] Also, acidosis secondary to hypoperfusion may worsen hyperkalaemia. Cardiac effects of hyperkalaemia are accentuated by hypocalcaemia.

c. Hypothermia: Factors contributing to hypothermia include infusion of cold fluids and blood and blood products, opening of coelomic cavities and decreased heat production. Hypothermia leads to decreased citrate metabolism and drug clearance and more importantly, contributes to the development of coagulopathy. Slowing of enzyme activity and decreased platelet function individually have been shown to contribute to

hypothermic coagulopathy at core temperatures below 34°C.[34] Coagulopathy due to hypothermia is not reflected in laboratory tests as the samples are warmed during processing.

d. Hypomagnesemia: Citrate also binds to magnesium and can lead to hypomagnesaemia which can further accentuate effects of hypocalcaemia. Infusion of large amounts of magnesium poor fluid can also contribute to hypomagnesemia.

e. Acidosis: After 2 weeks of storage, PRBCs have a pH below 7.0, and each unit has an acid load of approximately 6 mEq. One of these mEq of acid comes from the fact that PRBCs are made from venous blood with a starting pH of 7.35, a second mEq is acquired in buffering the citric acid in the anticoagulant, and 4 mEqs are generated by glycolysis during PRBC storage.[35] Acidosis directly reduces activity of both extrinsic and intrinsic coagulation pathways. A pH decrease from 7.4 to 7.0 reduces the activity of FVIIa and FVIIa/TF by over 90% and 60% respectively.[36]

Late complications

1. Respiratory failure

   Transfusion related acute lung injury (TRALI): The risk of TRALI increases with the number of allogenic blood and blood products transfused. The exact pathologic mechanisms of TRALI have not been clearly understood and both immunologic and nonimmunologic mechanisms have been suggested

2. SIRS
3. Sepsis
4. Thrombotic complications.

Preparation for massive bleeding

- Large bore intravenous (IV) access: Two peripheral IV (14/16 gauge) cannulae or special wide bore cannulae (insertion sheath) can be sited in neck veins such as the internal jugular vein. In emergency situations, canulation of external jugular vein may be considered
- Warming devices: In-line fluid warmers and surface warmers
- Continuous core temperature monitoring
- Invasive arterial pressure monitoring
- Adequate amount of colloid (gelatins), crystalloid, infusion sets and IV calcium preparations
- Communication with blood bank about emerging massive blood loss situation
- Adequate manpower for sending samples for investigations and getting blood and blood products

- Point-of-care testing is highly desirable: Arterial blood gas (ABG) and thromboelastograph (TEG). ABG with haemoglobin (Hb), electrolyte and lactate levels, repeated hourly, are useful in directing therapy
- Rapid infusion pumps or pressure bags to speed the fluid infusion rate
- Postoperative intensive care: Mechanical ventilation and continuous haemodynamic monitoring are usually required due to occurrence of circulatory overload and haemodynamic/biochemical instability.

Monitoring

Clinical monitoring: Electrocardiogram, capnometry, pulse oximetry, arterial blood pressure, core temperature, and urine output.

Invasive arterial pressure: Invasive arterial pressure measurement allows beat-to-beat pressure measurement and has greater accuracy than cuff based measurements in low flow conditions. Also, the arterial catheter allows frequent arterial blood sampling which is useful in guiding therapy. Many modern haemodynamic monitors calculate pulse pressure variation which is a more specific indicator of volume responsiveness.

Role of central venous pressure monitoring: Central venous catheters, due to their length and high resistance, allow inferior flow rates than wide bore cannulae. However, they are useful for assessment of the haemodynamic status, administration of vasoactive agents and blood sampling.

Laboratory monitoring: Laboratory values should be obtained frequently. Recommended lab tests include Hb, platelet count, prothrombin time, partial thromboplastin time (PTT), fibrinogen, potassium, ionized calcium, ABG for acid base status and central venous oxygen saturation/lactate as an indicator of tissue hypoperfusion.

Limitations of conventional laboratory testing: The time lag between collection of samples and obtaining the reports is a serious limitation in their utility during rapid on-going blood loss.

Role of point of care coagulation testing

Coagulation tests usually have long processing times and may not be helpful in guiding therapy in a rapid evolving blood loss situation. However, results may be useful later to assess how the case developed. Thromboelastography (TEG) is test of the visco elastic properties of blood that examines the entire haemostatic system including platelet function and fibrinolytic system and is particularly useful in complicated coagulopathies. Also, rapid availability of results helps in timely intervention.

Targets of resuscitation in massive blood loss

- Mean arterial pressure (MAP) around 60 mmHg, systolic arterial pressure 80-100 mmHg (in hypertensive patients one may need to target higher MAP)
- Hb 7-9 g/dl
- INR <1.5; activated PTT <42 s

- Fibrinogen >1.5-2 g/L
- Platelets >50 × 10^9/L
- pH 7.35-7.45
- Core temperature >35.0°C
- Base deficit <3.0/lactates <2 mEq/L.

Practical tips

1. Early recognition of massive blood loss and triggering MTP - prescribe blood and blood products early to allow for delivery time lag and thawing time (30 min for FFP)
2. Collect blood sample for cross match early as colloids may interfere with cross matching (mainly dextrans by coating RBC surface)
3. Inotrope/vasopressor drugs should only be used in a blood loss scenario during severe hypotension to avoid critical hypoperfusion and to buy time for fluid resuscitation. They should be stopped as soon as volume deficits are replaced, and a safe blood pressure is achieved.
4. Do not exceed recommended maximum doses of colloid. Also use of starch based colloid solutions in large volumes in a haemodynamically critical patient is controversial in view of evidence of renal dysfunction associated with their use in intensive care unit.[37]

Go to:

SUMMARY

Management of massive loss requires a quick concerted team effort by many medical and paramedical members. Understanding the complex pathophysiology of massive blood loss and its replacement is crucial to a successful outcome. Recent evidence supports early use of coagulation factors to improve outcome. Indian hospitals should formulate MTPs suited to their need and resources to improve survival in massive blood loss.

It is hoped that this document can lead to the development of further standard treatment guidelines for specific areas of trauma management for the Indian context. It seeks to improve the quality of trauma care services, intends to advocate for changes in health policy and decisions towards better outcomes for trauma. Trauma can occur to anybody, anywhere and therefore, it is imperative for a nation as large as ours to holistically work with the government and non-government organizations including all sectors of the society to bring awareness and management skills to every individual to handle a situation in a calm and accurate way. In view of the increasing burden of trauma in India and the rising cost of management of these patients, we would need to look into decreasing this burden and cost by a systematic management approach in each of the following parts: 1. Prevention if done properly, it would lead to more effectiveness with less expenditure. ● Implementation of rules during driving

motored vehicles along with swiftness of penalty for disobeying it is must, like: ○ helmets even for bicyclists and a separate area for them ○ seat belts compulsory ○ speed limits and breaking signals to be taken seriously ○ driver education on basic first aid must be done in driving tests, etc) ● Proper checks and policing on alcohol and drug abuse in vehicle drivers. ● Road quality to be improved, especially in prone areas, like improving lighting, filling potholes. ● Access improved for health care facilities, especially in the rural areas of India ● Implementation of safety rules along with regular drills and checks in large organizations like factories, mines, schools, offices, hospitals, railway stations, etc ● Safety measures to prevent burns, falls, electrocution and prevention of railway accidents (simply closing the doors of local trains should be made compulsory). ● Identification of risks, research and injury surveillance projects to be undertaken regularly. ● Violence minimization in high risk groups like adolescents, alcoholics and drug abusers by awareness sessions to prevent them from entering into abusive relations with society and enabling them to make informed decisions ● Children, aged, mentally and physically challenged, and pregnant women are more prone to injury and hence, infrastructure should be made with them in mind. ● Awareness programmes to be increased using all forms of media to reach maximum population 2. Pre-hospital care - ● Training of paramedical staff to give life saving safe treatment en-route to hospital.

VALUE ADDED COURSE

COMPREHENSIVE TRAUMA LIFE SUPPORT

Annexure II

STUDENT ENROLLMENT LIST (JULY-DECEMBER 2019)

S.No.	University no	Name of the student	Year / CRRI	Signature
1.	U14MB301	RENJITH. J	CRRI	Renjith.
2.	U14MB302	RESHMA. R.L.	CRRI	Reshma.
3.	U14MB303	RICHARD ROZARIO. C	CRRI	Richard Rozario
4.	U14MB304	RUBINA.S	CRRI	Rubina.
5.	U14MB305	SABARI KRISHNAN.N	CRRI	Sabarikrishnan
6.	U14MB306	SANDHYA.S	CRRI	Sandhya S
7.	U14MB307	SANTHOSH KUMAR. L	CRRI	Santhosh kumar.
8.	U14MB308	SARAN. S	CRRI	Saran.
9.	U14MB309	SASIDHARAN. V	CRRI	Sasidharan.
10.	U14MB310	SENTAMIL SELVAN .P	CRRI	Sentamil Selvan.
11.	U14MB311	SHALINI. T. C.	CRRI	Shalini
12.	U14MB312	SHANMUGA RAJA. A	CRRI	Shanmuga Raja. A
13.	U14MB313	SHANMUHA PRIYA. S	CRRI	Shanmuga Priya.
14.	U14MB314	SHAREEFA AKHTAR.S	CRRI	Shareefa akhtar
15.	U14MB315	SHEMBIYAN. R.M.	CRRI	Shembiyan
16.	U14MB316	SIKKANDAR. A	CRRI	Sikkandar. A
17.	U14MB317	SINDHU. M	CRRI	Sindhu
18.	U14MB318	SIVARAJ. S	CRRI	Sivaraj. S
19.	U14MB319	SOUNDARYA. S	CRRI	Soundarya. S.
20.	U14MB320	SOWMYA DEVI. N	CRRI	Sowmya Devi

RESOURCE PERSON

DR. CHANDRASEKAR

COORDINATOR

DR. M KALASREE

Annexure III

MCQ: TRAUMA LIFE SUPPORT

1. A------injury occurs when a patient is such by flying shrapnel from a blast

    a. Primary

    b. Secondary

    c. Tertiary

    d. Quaternary

2. What is the most common mechanism of injury from tractor accident

    a. Ejection

    b. Overturn

    c. Burns

    d. Falls

3. Oxygen, cervical collars ,backboards and personal protective equipments are all considered ------for trauma patients

    a. Specialized care

    b. Essential equipments

    c. Universal necessities

    d. Standard precaution

4. Being thrown by a blast wave and impacting the ground in what type of injury

    a. Tertiary

    b. Primary

    c. Quaternary

    d. Secondary

5. Injury to thorax below ------should increase suspicious of abdominal injury as well

a. 3rd ICS

b. 2ND ICS

c. 4TH ICS

d. 1ST ICS

6. What is a major concern for a patient that was involved in a high energy event

a. Checking vitals before airway

b. The increased chance for serious injury

c. Rapid transportation via helicopter

d. Securing the scene from onlookers

7. The procedure used prevent contamination by a patient body fluids is termed

a. Standard precaution

b. Essential equipment

c. OPIM

d. ITLS primary survey

8. Which of the following is not a consideration when assessing for injuries due to a fail

a. Distance of the fall

b. Anatomical area structure

c. Surface structure

d. Correlation forces

9. Which of the following has the largest effect regarding energy transfer into a patient

a. Mass

b. Weight

c. Velocity

d. Height

10. In what direction do the majority of tractor overturn occurs

a. To the rear

b. To the side

c. To the back

d. To the front

T. C. Shalini

8/10

Annexure III

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Sivaraj .S

Annexure III

8/10

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Annexure V

Student Feedback Form

Course Name: **COMPREHENSIVE TRAUMA CARE SUPPORT**
Subject Code: **ANAES 10**

Name of Student: _____ Roll No.: _____

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear					
2	Course contents met with your expectations					
3	Lecturer sequence was well planned					
4	Lectures were clear and easy to understand					
5	Teaching aids were effective					
6	Instructors encourage interaction and were helpful					
7	The level of the course					
8	Overall rating of the course	1	2	3	4	5

*** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory**

Suggestions if any:

Annexure V

Student Feedback Form

Course Name: **COMPREHENSIVE TRAUMA CARE SUPPORT**
Subject Code: **ANAES 10**

Name of Student: Shalini. T.C Roll No.: U14MB311

We are constantly looking to improve our classes and deliver the best training to you.

Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear				✓	
2	Course contents met with your expectations			✓		
3	Lecturer sequence was well planned			✓		
4	Lectures were clear and easy to understand		✓		✓	
5	Teaching aids were effective		✓			
6	Instructors encourage interaction and were helpful			✓		
7	The level of the course				✓	
8	Overall rating of the course	1	2	3	4	5

*** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory**

Suggestions if any:

Annexure V

Student Feedback Form

Course Name: **COMPREHENSIVE TRAUMA CARE SUPPORT**
Subject Code: **ANAES 10**

Name of Student: Soumya devi Roll No.: U14MB320

We are constantly looking to improve our classes and deliver the best training to you.

Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear				✓	
2	Course contents met with your expectations			✓		
3	Lecturer sequence was well planned				✓	
4	Lectures were clear and easy to understand					✓
5	Teaching aids were effective			✓		
6	Instructors encourage interaction and were helpful				✓	
7	The level of the course					✓
8	Overall rating of the course	1	2	3	4	5

*** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory**

Suggestions if any:

Good.

Date: 02.12.2019

From
Dr M Kalasree
Head Of Department Incharge,
Department of Anaesthesia
Sri Lakshmi Narayana Institute of Medical Sciences
Puducherry

To
The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Puducherry

Sub: Completion of value-added course: Comprehensive Trauma Care Support

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: Comprehensive Trauma Care Support in July- Dec 2019 for 20 students. We solicit your kind action to send certificates for all the participants, whose name list is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards,

Dr. M Kalasree

Head of Dept. Anaesthesiology
Sri Lakshmi Narayana Institute of Medical Sciences
Gorimedu, Kirumampakkam, Puducherry - 605 502

Encl: Certificates

Photographs

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that _____RUBINA S_____ has actively participated in the Value Added Course on Comprehensive Trauma Life Support held during July - December 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. CHANDRASEKAR
RESOURCE PERSON

DEPARTMENT OF ANAESTHESIOLOGY
SRI LAKSHMI NARAYANA INSTITUTE
OF MEDICAL SCIENCES
OSUDU, KUDAPAKKAM, PUDUCHERRY-605 502

Dr. KALASREE M
COORDINATOR

Head of the Department
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry - 605 502.

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that _____SARAN S_____ has actively participated in the Value Added Course on Comprehensive Trauma Life Support held during July - December 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr.CHANDRASEKAR
RESOURCE PERSON

DEPARTMENT OF ANAESTHESIOLOGY
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
OSUDU, KUDAPAKKAM, PUDUCHERRY-605 502.

Dr. KALASREE M
COORDINATOR

Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry - 605 502.


COMPREHENSIVE TRAUMA LIFE SUPPORT
AIRWAY
REDMI K20 PRO
AI TRIPLE CAMERA

Sri Lakshmi Narayana Institute of Medical Sciences

Date: 01.06.2019

From

Dr.G.Somasundram
Principal of Allied Health Sciences,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

To

The Dean,
Sri Lakshmi Narayana Institute of Medical College
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: Congestive Heart Failure and Pulmonary Edema

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **Congestive Heart Failure and Pulmonary Edema** from July to September 2019. We solicit your kind permission for the same.

Kind Regards

Dr.G.Somasundram

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: **Dr. Jayalakshmi**

The HOD: **Dr. Somasundram. G**

The Expert: **Dr. Sangeetha**

The committee has discussed about the course and is approved.

Dean	Subject Expert	HOD
(Sign & Seal)	(Sign & Seal)	(Sign & Seal)

Dr. G. JAYALAKSHMI, BSC., MBBS., DTCD., M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Agaram, Kudapakkam Post,
Villianur Commune, Puducherry - 605502.

PRINCIPAL
Allied Health Sciences
Sri Lakshmi Narayana Institute of Allied Health Sciences
Osudu, Agaram Post, Puducherry - 605 502.

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affliated to Bharath University, Chennai - TN]

Circular

30.06.2019

Sub: Organizing Value-added Course: "Congestive Heart Failure and Pulmonary Edema".reg

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research** is organizing **"Congestive Heart Failure and Pulmonary Edema"**. The course content and registration form is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before July to September 2019. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

Dr. G. JAYALAKSHMI, BSC., MBBS., DTCD., M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Agaram, Kudapakkam Post,
Villianur Commune, Puducherry - 605502.

Encl: Copy of Course content

VALUE ADDED COURSE

1. Name of the programme & Code

"Congestive Heart Failure and Pulmonary Edema" & VAC01/AHS/2019-15/07

2. Duration & Period

30 hrs. & July to September 2019

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Assessment - *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

1 time July to September 2019

8. Year of discontinuation:

9. Summary report of each program year-wise

Value Added Course- July to September 2019					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	VAC01/AHS/2019-15/07	Congestive Heart Failure And Pulmonary Edema	Dr. Sangeetha	AHS	30 AHS students July to September 2019

10. Course Feed Back

Enclosed as Annexure- V

RESOURCE PERSON

COORDINATOR
Dr.G.Somasundram

PRINCIPAL
Allied Health Sciences
Sri Lakshmi Narayana Institute of Allied Health Sciences
Osudu, Agaram Post, Puducherry - 605 502.

Course Proposal

Course Title: "**Pulmonary Edema with Left Ventricular Failure"**

Course Objective:

1. To enhance the performance skill in Pulmonary Edema with Left Ventricular Failure.
2. To assess the reaction of target allied Health students in Pulmonary Edema with Left Ventricular Failure getting their feedback.

Course Outcome: Improvement in the "Pulmonary Edema with Left Ventricular Failure"
Course Audience: Students of AHS Batch
Course Coordinator: Dr.G.Somasundram
Course Faculties with Qualification and Designation:
1. Dr.Sangeetha
Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Time	Hours
1.	15.07.2019	Introduction to Pulmonary Edema with Left Ventricular Failure	4-6p.m	2
2.	17.07.2019	What is Pulmonary Edema	2-4p.m	2
3.	20.07.2019	What is Left Ventricular	4-6p.m	2
4.	22.07.2019	Cardiogenic and Non-Cardiogenic Pulmonary Edema	4-6p.m	2
5.	23.07.2019	Drugs used in Pulmonary Edema	4-6p.m	2
6.	25.07.2019	Complications of Pulmonary Edema	4-6p.m	2
7.	27.07.2019	Drugs used in Left Ventricular Failure	4-6P.M	2
8.	29.07.2019	Complications of Left Ventricular Failure	4-6p.m	2
9.	03.08.2019	Contraindication for drugs used in Left Ventricular Failure with Pulmonary Edema	4-6p.m	2
10.	05.08.2019	COPD	4-6p.m	2
11.	07.08.2019	Chronic Bronchitis	4-6p.m	2
12.	09.08.2019	Emphysema	4-6p.m	2
13.	10.08.2019	Pre course and Post Course evaluation, Feedback analysis	2-4p.m	2
14.	12.08.2019	Steps model explanation and various performance assessment	4-6p.m	2 m
15.	17.08.2019	Orientation of the students about the training program and assessment	2-4p.m	2
		Total		30 hrs

REFERENCE BOOKS:

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4. What Is Pulmonary Hypertension? From Diseases and Conditions Index (DCI). National Heart, Lung, and Blood Institute. Last updated September 2008. Retrieved on 6 April 2009.

5. Adair, Olivia Vynn (2001). Cardiology secrets (2nd Ed.). Elsevier Health Sciences. Chapter 41, page 210. ISBN 1-56053-420-6.

6. Papaioannou V, Terzi I, Dragoumanis C, Pneumatikos I (2009). "Negative-pressure acute tracheobronchial hemorrhage and pulmonary edema". J Anesth. 23 (3): 417–20. Doi: 10.1007/s00540-009-0757-0. PMID 19685125. S2CID 9616605.

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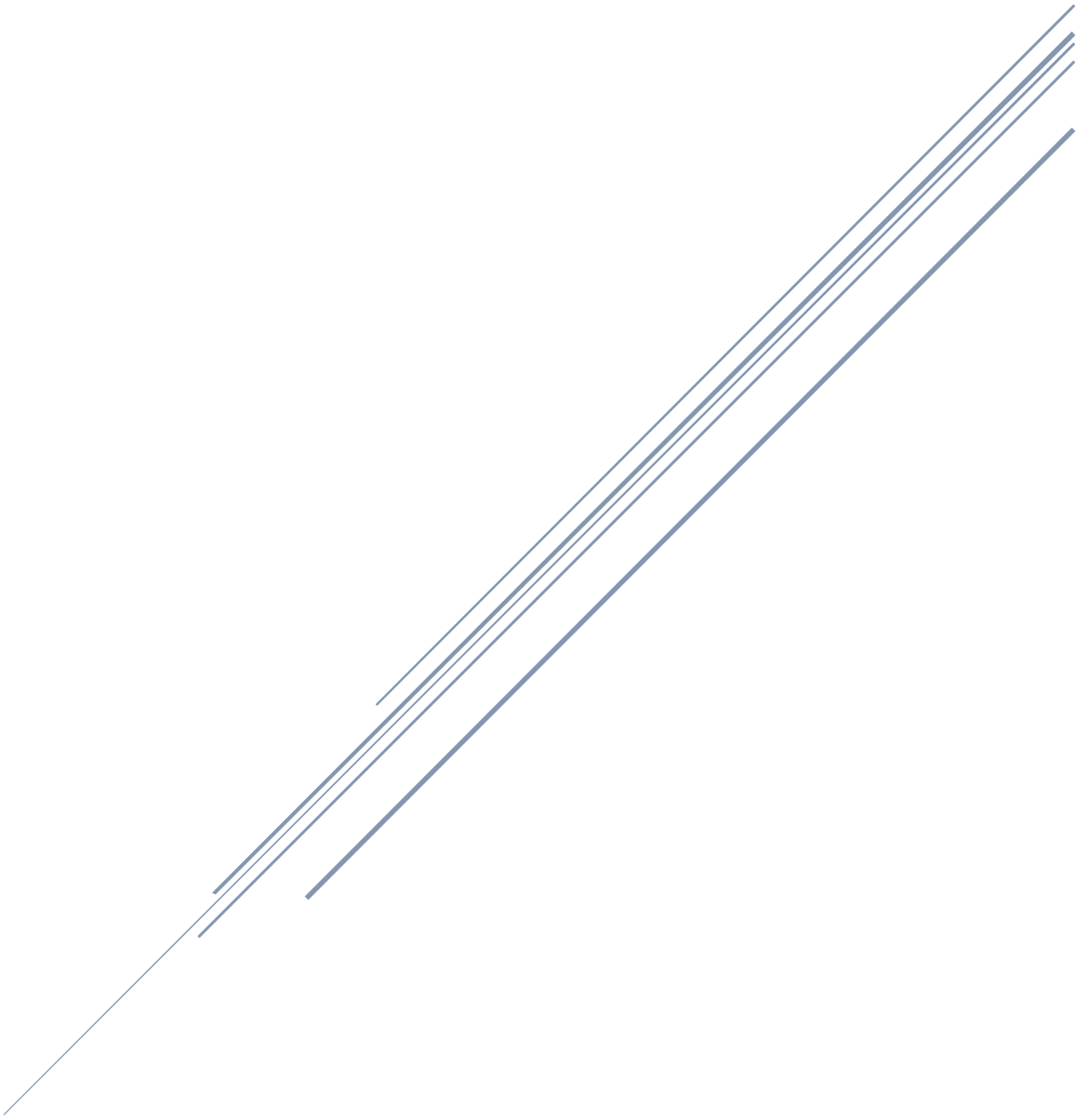
PULMONARY EDEMA WITH HEART FAILURE



CONTENT

- LV FAILURE
  - Treatment / Management
  - Differential Diagnosis
  - Complications
  - Risk Factors for Heart Failure
- PULMONARY EDEMA
  - Symptoms
  - Causes
  - Risk factors
  - Complications
  - Prevention
  - Diagnosis
  - Treatment

Congestive Heart Failure and Pulmonary Edema

LV FAILURE

Introduction

The heart is comprised of the pericardium, myocardium, and endocardium. Pathology in any of those structures can lead to heart failure. Left ventricular failure occurs when there is dysfunction of the left ventricle causing insufficient delivery of blood to vital body organs. Left ventricular failure can further subdivide into heart failure with preserved ejection fraction (HFpEF with EF over 50%), heart failure with reduced ejection fraction (HFrEF with EF less than 40%), or heart failure with mid-range ejection fraction (EF between 41 and 49 percent).

Etiology

The most common etiologies of left heart failure are coronary artery disease and hypertension. The latter can cause left heart failure through left ventricular hypertrophy (leading to HFpEF), and also serves as a risk factor for coronary artery disease (which can lead to HFrEF). Diabetes, smoking, obesity, male gender, and a sedentary lifestyle are also considered risk factors. Many of these causes are preventable, and as such risk factor control remains of extreme importance in preventing heart failure.

Epidemiology

Heart failure is more prevalent and has a higher incidence in the elderly population. Approximately 5.7 million people in the United States have diagnosed heart failure. The incidence is around 10 per 1000 in people over 65. Approximately 50% of all patients with heart failure are considered to have HFrEF; this diagnosis is becoming more prevalent with time. HFpEF, as opposed to HFrEF, is more common in women (79% versus 49%) and also tends to affect an older population.

Pathophysiology

Multiple mechanisms can lead to left heart failure. Chronic or poorly controlled hypertension causes increased afterload and therefore increased cardiac workload, which can lead to hypertrophy of the left ventricle. Initially, this hypertrophy serves as a compensatory mechanism and can help maintain cardiac output, but long-term can inhibit relaxation of the myocardium leading to impaired cardiac filling and decrease left ventricular output. Coronary arterial disease causes direct ischemic damage to the myocardium, leading to remodeling and scar formation, which decreases contractility and cardiac output. Arrhythmias can cause remodeling, but in general, decrease cardiac output by impaired ventricular filling and decreased ventricular

relaxation. Cardiomyopathies encompass a diverse pathologic spectrum and have variable mechanisms causing cardiac dysfunction.

History and Physical

Patients with left heart failure may present with complaints of shortness of breath (often on exertion, a sensitivity of 89%), orthopnea (a specificity of 89%), paroxysmal nocturnal dyspnea and/or symptoms of volume overload (e.g., leg swelling, weight gain, increased abdominal girth, or right upper quadrant pain due to liver congestion). Interestingly, some patients with advanced disease might experience weight loss, referred to as "cardiac cachexia."

On physical exam, the most common signs encountered are:

- Rales on lung auscultation indicative of pulmonary edema
- Decreased breath sounds on lung auscultation suggestive of pleural effusion
- S3 gallop on heart auscultation indicative of elevated left ventricular end-diastolic pressure
- Point of maximal impulse displaced laterally on palpation characteristic of increased heart size
- Jugular venous distention (jugular venous pressure over 8 cm of water) indicative of elevated right atrial pressure
- Positive hepatojugular reflux (exerting manual pressure on the congested liver causing increased jugular venous pressures)
- Increased abdominal girth due to ascites
- Swelling of the scrotum
- Low blood pressure and rapid heart rate can occur in severely decompensated failure due to decreased cardiac output

Evaluation

The diagnosis of heart failure is clinical. However, several tests are available for further evaluation:

- Laboratory tests: brain natriuretic peptide (BNP) or NT-proBNP may be the most helpful as it can differentiate acute heart failure from other causes of shortness of breath. However, this test lacks specificity, and a high level of this hormone is not diagnostic of acute heart failure. Other laboratory tests include troponin T (to detect myocardial infarction, although the levels may be high due to heart failure itself), complete blood count, and basic metabolic panel (low sodium, in particular, indicates advanced disease) and liver function tests (to detect liver injury due to volume overload).

- Electrocardiography can show nonspecific findings, like ischemic changes, left ventricular hypertrophy, or arrhythmias.
- Echocardiography can help distinguish HFrEF from HFpEF by determining the ejection fraction, and diastolic left ventricular function can evaluate associated regional wall motion abnormalities that may be suggestive of an ischemic component, as well as valvular and pericardial pathologies.
- Coronary angiography is indicated in patients with anginal symptoms and may also be indicated in patients with worsening heart failure symptoms.

Treatment / Management

Patients should receive education on the importance of lifestyle modification for improving the outcome of their disease. This includes reasonable salt consumption and avoidance of alcohol, nicotine, and recreational drugs.

Treating the underlying cause is of extreme importance as some heart failure conditions may be reversible when the precipitating factors are addressed, like cardiomyopathies induced by alcohol, tachycardia or ischemia. Tight control of blood pressure will also help prevent further deterioration. Besides loop diuretics for volume overload, the pharmacologic treatment differs between HFrEF and HFpEF: -For HFrEF, the mainstay of treatment is the combination of an angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blockers (ARBs) with a beta blocker (carvedilol, metoprolol or bisoprolol). If the patient remains symptomatic on a maximal dose of ACE inhibitor or ARB, an angiotensin receptor-neprilysin inhibitor may be substituted. Other medications include hydralazine, nitrates, and mineralocorticoid receptor antagonists such as spironolactone, ivabradine, and digoxin (as a last resort). Nitrates in combination with hydralazine may be especially efficacious in African American patients. Digoxin, ivabradine and the diuretics have not been shown to offer any mortality benefit.

- For HFpEF, the treatment focuses on the underlying cause or contributing factors: control of blood pressure, revascularization if ischemic cardiomyopathy, and management of arrhythmias. A mineralocorticoid receptor antagonist may be beneficial in these patients.

Severely symptomatic patients with an ejection fraction less than 35% should obtain a referral for implantable cardioverter-defibrillator (ICD) or cardiac resynchronization therapy (CRT) (depending on QRS width and the type of intraventricular conduction delay) after medical optimization. In advanced cases, mechanical circulatory assist devices such as an LVAD, continuous infusion of inotropic medications such as dobutamine or milrinone (which is still possible in the ambulatory setting), and cardiac transplantation are options.

Differential Diagnosis

- When approaching a patient with shortness of breath on exertion, a broad differential diagnosis exists. A patient with established left heart failure might have a concomitant disease that might

contribute to the patient's presentation, and additional workup for other conditions is warranted in case of atypical presentations. Those conditions include other cardiovascular causes (like primary pulmonary hypertension), pulmonary causes (like chronic obstructive pulmonary disease and interstitial lung disease) and extra-cardiopulmonary causes (like anemia).

- Isolated lower limb edema is less likely heart failure, and other causes must be ruled out first, like venous insufficiency, cirrhosis, nephrotic syndrome, lymphedema and thrombosis of the veins.

Staging

The "2009 focused update incorporated into the ACC/AHA 2005 guidelines for the diagnosis and management of heart failure in adults" recommends a staging for heart failure. Patients with stages A and B are those who are asymptomatic but are prone to develop heart failure in the future, for example, diabetic and hypertensive patients. Stage B differs from stage A by the presence of a structural cardiac abnormality, like ventricular hypertrophy or systolic dysfunction, but again with no symptoms. Stage C and D patients include those who have ever experienced symptoms of heart failure. Stage D patients are those with severe heart failure who require advanced treatment like mechanical support, around-the-clock inotropic agents and heart transplantation.Stage C and D patients can be further classified based on the New York Heart Association (NYHA) Functional Classification:

- Class I: symptoms not restricting daily activities.
- Class II: symptoms occurring at moderate effort slightly restricting daily activities.
- Class III: symptoms occurring at minimal effort with significant restriction of daily activities.
- Class IV: debilitating symptoms are occurring at rest.

Prognosis

The mortality rate in heart failure in 2008 was 18.2 per 100,000 for males and 15.8 per 100,000 for females based on the "Morbidity and Mortality: 2012 Chart Book on Cardiovascular, Lung and Blood Diseases". Patients with HFpEF have been known to have a lower mortality rate than those with HFrEF.

Multiple variables have associations with worse outcome in heart failure: male gender, advancing age, low ejection fraction, high NYHA functional class, low hematocrit, and sodium levels, high brain natriuretic peptide, low peak exercise oxygen uptake, wide QRS, renal failure, low blood pressure, elevated heart rate, and volume overload refractory to medical treatment.

Complications

Left heart failure can be complicated with severe volume overload leading to respiratory distress and anasarca as well as arrhythmias (tachyarrhythmias or bradyarrhythmias), cardiogenic shock due to pump failure and death. It was also reported that pulmonary embolism, acute coronary syndrome, cerebrovascular accidents and rupture of the myocardium are common causes of sudden death in patients with heart failure. In addition to implantable cardioverter-defibrillators, several medications (stated above) reduce mortality in left heart failure and initiation of therapy should be as soon as indicated.

Deterrence and Patient Education

Compliance with lifestyle modification and pharmacologic treatment and control of precipitating factors (like hypertension and arrhythmias) are crucial to prevent hospitalizations for heart failure exacerbation and improve the quality of life. Many of those precipitating factors are potentially under patient control. That is why patient education is an integral part of a multidisciplinary approach to decrease mortality and morbidity due to heart failure.

Enhancing Healthcare Team Outcomes

An interprofessional approach is crucial in patients with advanced heart failure with an increased risk of readmissions. In a systematic review of 29 randomized controlled trials, an interprofessional approach decreased heart-failure related hospital admissions by 27% and all-cause mortality by around 25%. This approach was also cost-effective. Well-trained nurses are an integral part of this approach since heart failure clinics led by nurses and in coordination with the patients' providers were very successful in enhancing patient outcome. In addition to the availability of heart failure clinics, training personnel in heart failure management and patient education are cornerstones to a successful an interprofessional approach. Telephone follow up reduced hospital readmissions due to heart failure but not mortality.

Risk Factors and Etiology of Heart Failure

There are many causes of heart failure and the most common of which is coronary artery disease in the United States. The importance of identifying the risk factors for heart failure is that heart failure is preventable. In recognition of the preventable nature of the condition, the American College of Cardiology and the American Heart Association have modified their classification schemes so that patients currently without any structural abnormalities are identified early and treated appropriately. Treatment of systolic and diastolic hypertension concurrently in alignment with contemporary guidelines reduces the risk of heart failure by approximately 50%.

Risk Factors for Heart Failure

- Coronary artery disease (CAD)
- Connective tissue disorders (i.e., rheumatoid arthritis, scleroderma, systemic lupus erythematous)

- Endocrine disorders (i.e., diabetes mellitus, thyroid function disorders, growth hormone deficiency)
- Hypertension
- High-output conditions (i.e.: anemia, Paget disease)
- Valvular heart disease
- Metabolic causes (i.e., obesity)
- Myocarditis (i.e., secondary to HIV/AIDS, medications, or viruses)
- Infiltrative disorders (i.e., amyloidosis, sarcoidosis)
- Peripartum cardiomyopathy
- Stress cardiomyopathy (Takotsubo)
- Valvular heart disease
- Medications (i.e., amphetamines, anabolic steroids)
- Tachycardia induced cardiomyopathy
- Toxins (i.e., cocaine, alcohol)
- Nutritional deficiency (i.e., L-carnitine deficiency, thiamine)

Risk Factors and Etiology Acute Heart Failure (ADHF) / Flash Pulmonary Edema

Acute heart failure is the worsening of heart failure symptoms to the point that the patient requires intensification of therapy and intravenous treatment. Acute heart failure can be dramatic and rapid in onset, such as flash pulmonary edema or more gradual with the worsening of symptoms over time until a critical point of decompensation is reached. For those with a history of pre-existing heart failure, there is often a clear trigger for decompensation.

Potential Triggers of Acute Decompensated Heart Failure / Flash Pulmonary Edema

- Arrhythmia
- Acute coronary syndrome (CAD)
- Infection
- Worsening hypertension (i.e., hypertensive crisis)
- Medication non-adherence
- Acute renal artery stenosis
- Left ventricular diastolic dysfunction
- Obstructive sleep apnea
- Stress (Takotsubo) cardiomyopathy

Epidemiology

Heart Failure is a major public health problem and is now the most common cause of hospitalization in the US among patients 65 years and older, and approximately 915000 new cases of heart failure are diagnosed each year in the United States. The increasing prevalence of heart failure is most likely secondary to the aging of the population, increased risk factors, better outcomes for acute coronary syndrome survivors, and a reduction in mortality secondary to improved management of chronic conditions. Incidence rates for heart failure increase with age for both sexes.

The lifetime risk of developing heart failure for those over age 40 years residing in the U.S. is 20%. The risk and incidence of heart failure continue to increase from 20 per 1000 people age 60 to 65 years to over 80 per 1000 people over age 80. There are also differences in risk for heart failure based on the population, with African Americans having the highest risk and greater five-year mortality for heart failure than the white population in the U.S. The European Society of Cardiology states that the prevalence of heart failure is 1 to 2% and rises to greater than 10% in the over 70 population.

Heart Failure Statistics

- Heart Failure survival has improved over time, yet the absolute 5-year mortality rates from diagnosis for HF have remained at 50 percent.
- Heart failure is the number one diagnosis among all hospitalizations, and the cost of annual heart failure care exceeds $30 billion every year.
- Most of the cost spent on heart failure patients is for hospitalizations and re-admissions.

Acute Heart Failure

While consensus guidelines tend to use the term heart failure to refer to those with established chronic disease, acute heart failure is defined as a more rapid onset of signs and symptoms or the gradual worsening of chronic symptoms that necessitate intravenous treatment. Acute heart failure exacerbation that requires hospitalization tends to occur in the more elderly population mean age of 79 years old with a slightly higher preponderance of women affected than men. Data from the UK National Heart Failure Audit shows mortality rates of approximately 10% during the index admission, 30-day post-discharge mortality of 6.5% and 1-year mortality of 30%.

Pathophysiology

Different cardiovascular or metabolic abnormalities can cause heart failure, but in most patients, the clinical symptoms are secondary to left ventricular dysfunction. In cases caused by left ventricular dysfunction, the ejection fraction may be preserved or compromised. The ejection fraction is important because most clinical trials select patients based on the percentage of ejection fraction and use the data on ejection fraction to help guide therapy. In contrast,

pulmonary edema associated with acute decompensated heart failure is secondary to dysregulation of pulmonary fluid homeostasis and the forces that balance fluid movement into the alveolar space

History and Physical

History

Heart failure is mainly a clinical diagnosis. It is essential to consider the following during the history and physical.

1. The presentation of heart failure may vary based on each patient. If the patient has a history of heart failure in the past, ask them if this is the same presentation as when they had previous episodes of heart failure or an acute decompensation.

2. Consider non-cardiac and other causes for the patient's symptoms. It is important to ensure that there is a broad differential diagnosis and to avoid anchoring bias, premature closer, and diagnostic inertia.

3. Heart failure symptoms:

- Increasing dyspnea (on exertion, on lying flat or at rest, exercise intolerance)
- Increasing leg swelling, ascites, edema
- Increased body weight -ask patients if they have been tracking their weight at home and if it has increased since their symptoms have become worse.
- What are the patient's baseline symptoms, and are the current symptoms worse or similar to when they had previous heart failure exacerbations?
- Palpitations, automatic implantable cardioverter-defibrillator (*AICD*) shocks (associated with worse prognosis)
- Chest pain, fatigue
- Duration of Illness, recent or frequent hospitalizations for heart failure
- Medications or diet changes
- Anorexia, cachexia, or early satiety (associated with worse prognosis)
- Symptoms of transient ischemic attack (TIA) or thromboembolism (indicate a possible need for anticoagulation)
- Social history and family history (to assess for possible familial cardiomyopathy, alcohol or other cause
- Travel history (exposure risk some tropical diseases)

Physical Examination

The physical examination should include the following:

- Vital signs - assess blood pressure, heart rate, temperature, oxygen saturation, and respiratory rate. Vital signs are important in helping develop and refine the differential diagnosis and help the healthcare provider to better tailor the physical examination.
- Check patient weight – The patient's weight and BMI should be checked during each office visit. The information can be used to track response to treatment and the potential progression of heart failure or ADHF. Losing weight can also be a warning sign of worsening HF.
- Assessment of jugulovenous distension – Jugulovenous distension can be a marker for fluid overload. The patient should be lying at a 45-degree angle in bed to get an accurate assessment.
- Pulse - Assess the regularity and strength of the pulse
- Cardiac Examination
    - Extra heart sounds (i.e., S3 is associated with a worse prognosis), murmurs
    - Size and location of maximal cardiac impulse (can suggest ventricular enlargement if displaced)
    - Presence of right ventricular heave
- Pulmonary Examination - Respiratory rate, rhonchi, rales (note: pleural effusions can mask reduce breath sounds, and rhonchi or rales may be less prominent)
- Abdominal examination - check for ascites, hepatomegaly, hepatojugular reflux
- Lower extremity examination - assess for peripheral edema, the temperature of skin (cool lower extremities may be suggestive of worse cardiac output)

Evaluation

Classification of Heart Failure

Classification is one of the key determinates of how to evaluate and treat heart failure. When a patient is in acute or decompensated heart failure, our focus is on expeditious identification and treatment of life threats. When evaluating chronic heart failure, different classification schemes are available. The classification scheme used to categorize the type and degree of heart failure is based on the presentation and will affect the treatment and prognosis of the condition. Heart failure classification schemes are generally based on one of the following:

1. Anatomic findings (i.e., heart failure with different degrees of ejection fraction)
2. The chamber of the heart involved (including functional)
3. Symptoms of the patient

All heart failure patients should also be classified based on the ACCF/American Heart Association stages of heart failure, a New York Heart Association functional classification.[1]

ACCF/AHA Stages of Heart Failure

The ACC/AHA stages of heart failure are defined by the risk of heart failure, the presence of active heart failure, and whether structural heart disease is present. In general, the higher the classification, the greater the treatment and interventions that the patient may require.

- A - No structural heart disease present, high risk for heart failure, and asymptomatic
- B - Structural heart disease present, asymptomatic
- C - Structural heart disease present and current or previous symptoms of heart failure
- D - Heart failure that is refractory and requiring specialized interventions

NYHA Functional Classification of Heart Failure

The NYHA classification is a functional classification of heart failure and based upon how much the patients' symptoms limit their physical activity and to what degree physical activity can cause the person to become symptomatic. The grading scale is from me up to the most severe of grade IV where the patient is unable to carry on physical activity and has symptoms at rest.

Diagnostic Tests

Testing for heart failure patients should be focused on the patient's symptoms, clinical suspicion, and the current and any pre-existing or current stage of heart failure. The ordering of multiple routine tests should be avoided in all heart failure patients. Basic tests that should merit consideration for all patients evaluated for heart failure are the following:

- Serum electrolytes and kidney function
- Complete blood count
- Lipid level
- Liver function tests
- Troponin level - if there is concern that myocardial injury as the cause for symptoms
- Thyroid-stimulating hormone
- An electrocardiogram should also be performed in all heart failure patients

Other tests that may be considered based on severity and classification of patient condition are:

- Chest x-ray to assess for signs of pulmonary congestion or edema in acute decompensated heart failure
- Biomarkers - used to assess patients with more complex symptoms than acute heart failure (i.e., B-type natriuretic peptide and N-terminal pro-B-type natriuretic peptide)

For further information on the recommendations for evaluating heart failure, please see the American Heart Association and New York Heart Association classification based heart failure guidelines.

Treatment / Management

Treatment of Acute Decompensated Heart Failure and Pulmonary Edema

The focus of treatment for patients in heart failure is dependent on the severity of the symptoms and the stage of heart failure. When patients are in acute decompensated heart failure or flash pulmonary edema, the most important focus for therapeutic interventions is the enhancement of hemodynamic status through reduction of vascular congestion and improving preload, afterload, and myocardial contractility.

In flash pulmonary edema, where there is a rapid onset of heart failure, the initial management, and treatment goals are very similar to acute decompensated heart failure. Treatment options for acute decompensated heart failure and flash pulmonary edema are as follows:

1. ABC's - As with all patients, it is important to assess airway, breathing, and circulation in the initial evaluation and initiate appropriate management based on patient status. In decompensated heart failure, patients should be hooked up to cardiorespiratory monitoring, have IV access and oxygen administered if hypoxic or tachypnea, ECG performed, and have labs drawn based on clinical suspicion and patient condition.
2. Diuretics - most patients presenting in heart failure have a form of volume overload. AHA and ACC guidelines recommend intravenous (IV) loop diuretic administration to treat fluid overload. IV administration is preferred over oral for diuretics to maximize the bioavailability of the medication and clinical effect. Furosemide is a common treatment for acute decompensated heart failure and flash-pulmonary edema because of its anti-vasoconstrictor and diuretic effects.
3. Vasodilators - Patients with acute decompensated heart failure with HTN and acute pulmonary edema can benefit from treatment with vasodilators. Most vasodilators promote smooth muscle relaxation and vasodilatation to reduce preload and afterload through the cyclic guanine monophosphate pathway. Vasodilation relieves pulmonary vascular congestion and improves left ventricular preload and afterload. The common vasodilator medications used are Nitroglycerin and Sodium Nitroprusside.

    4.

    - Nitroglycerin can be given transdermal, sublingual, or intravenously depending on patient condition. In acute decompensation or flash pulmonary edema, nitroglycerin is best given sublingually or intravenously to allow for titration of effect.
    - Sodium Nitroprusside is only given intravenously. Patients with renal dysfunction treated with sodium Nitroprusside may need to have their cyanide levels monitored. Check with your pharmacist about guidelines for monitoring cyanide levels

5. Ionotrophic Medications - Additional treatment options for patients in cardiogenic shock or who have signs of end-organ dysfunction secondary to hypo perfusion. Inotropes should only be used as a treatment adjunct in acute decompensated

heart failure since data from the ADHERE registry suggest increased mortality with use. Dobutamine and MIlrinone are two inotropes that are more commonly used. Dobutamine is preferable for beta-blocker naive patients, while Milrinone is preferred for patients previously taking oral beta blockers who experience an acute decompensation.

6. CPAP/BIPAP - Continuous Positive Airway Pressure (CPAP) and Bilevel Positive Airway Pressure (BIPAP) are noninvasive methods of respiratory support to treat respiratory insufficiency secondary to pulmonary vascular congestion and pulmonary edema. The use of CPAP and BIBAP has reduced the need for intubation and mechanical ventilation in heart failure patients with acute respiratory decompensation. In situations where CPAP and BIPAP are ineffective in improving the patient's respiratory status, consider early intubation and mechanical ventilation to help prevent further decompensation and progression of symptoms.
7. Coronary revascularization - When performed in appropriately selected patients, revascularization can reduce mortality and morbidity by improving diastolic and systolic dysfunction. According to the American Heart Association 2013 CHF guidelines, coronary artery revascularization may be indicated as an intervention for heart failure patients with angina, LV dysfunction, and CAD. Interventional cardiology should be consulted early for patients according to AHA recommendations.
8. Admission to inpatient service for further treatment and evaluation. Patients being treated for flash pulmonary edema should be admitted to the hospital with the level of monitoring and care appropriate for each case. For select patients with acute decompensated heart failure, it may be possible to treat them at home depending on the severity of symptoms

The Medical Management of Heart Failure – Risk Factor Modification and Prevention of Acute Decompensation

While acute decompensated heart failure and flash pulmonary edema can be dramatic and require intensive care and aggressive therapy, the main focus of heart failure management is on helping prevent the progression of the disease and mitigate episodes of acute exacerbation. The American Heart Association and the New York Heart Association stages of heart failure are what medical practitioners often use to guide the evidence-based treatment of heart failure. Treatment of early stages of chronic heart failure usually focuses on risk factor modification, and as the disease process progresses, it starts to include more aggressive interventions.

- Risk factor modification
    1. Dietary and lifestyle changes, such as decreased salt intake, reducing obesity and smoking cessation
    2. Tighter control and management of hypertension, diabetes and dyslipidemia and other chronic diseases that can exacerbate CHF
- More aggressive intervention for those with a higher degree of CHF

1. Echocardiography for patients with a higher risk of left ventricular ejection fraction reduction
2. Implantable cardiac defibrillator placement when indicated in patients with ischemic cardiomyopathy at high risk of sudden death

For further information on the medical management of chronic heart failure, please refer to the American Heart Association and New York Heart Association guidelines.

Advanced Treatment Strategies for End-Stage Congestive Heart Failure

For select patients with end-stage heart failure, which are refractory to other treatment strategies, the option of mechanical circulatory support and cardiac transplantation should be considered. Mechanical circulatory support, as for example, a left ventricular assist device, is often used as a bridge therapy until a heart transplant is available. In certain situations, mechanical circulatory support is utilized as destination therapy.

For patients who are not candidates for mechanical circulatory support or cardiac transplantation, palliative care, and continuous inotropic support should be a consideration and discussed with the patient.

Differential Diagnosis

When patients present in acute decompensated heart failure or flash pulmonary edema, there are many different diagnoses to consider, based on the risk factors for heart failure alone. It is also important to consider other potentially life-threatening causes of heart failure.

1. Sepsis - Septic patients are at risk of multiorgan system failure. Approximately 1 out of 3 patients with sepsis present with reversible left ventricular systolic dysfunction, reduced ejection fracture, and 1 out of 2 patients with sepsis have left ventricular or right ventricular diastolic dysfunction. The cardiac dysfunction associated with sepsis can result in significantly increased mortality. Left ventricular diastolic dysfunction is associated with an increased mortality risk of 80%, and right ventricular diastolic dysfunction is associated with a 60% increased mortality
2. Acute respiratory distress syndrome (ARDS) is characterized by acute respiratory failure, and diffuse pulmonary infiltrates, which could potentially mimic flash pulmonary edema.
3. Neurological causes - Hemispheric and hippocampal brain infarcts are associated with heart failure and sudden cardiac death. Infarct of certain areas of the brain tissue can result in a sympathetic storm and loss of vasomotor homeostasis precipitated neurogenic pulmonary edema.
4. Pulmonary embolism - While a massive pulmonary embolism can cause acute cardiac dysfunction secondary to obstruction of blood flow, post pulmonary embolism syndrome may also present with heart failure type symptoms. Post pulmonary embolism syndrome, reduced exercise tolerance has been associated with reduced left ventricular ejection fraction, arrhythmia, valvular dysfunction, n and left ventricular diastolic dysfunction.

5. Acute coronary syndrome - Acute coronary syndrome or myocardial infarction is a common cause of acute decompensated heart failure.

Prognosis

The diagnosis of heart failure alone can be associated with a mortality rate greater than many cancers. Despite advances made in heart failure treatments, the prognosis of the condition worsens over time, resulting in frequent hospital admissions and premature death. One recent study showed that patients recently diagnosed with new-onset heart failure had a mortality rate of 20.2% at one year and 52.6% at five years. The one and five-year mortality rates also increase significantly based on patient age. Another study showed that the one and five-year mortality for patients at 60-year-old is 7.4%, and 24.4% and for patients at 80-year-olds is 19.5% and 54.4%. The mortality rates were similar when evaluated across different cardiac ejection fractions.

The prognosis is worse for heart failure patients who are hospitalized. Heart failure patients commonly require repeat hospitalizations and develop an intolerance for standard treatments as the disease progresses. Data from U.S. Medicare beneficiaries hospitalized during 2006 showed 30-day and 1-year mortality rates post admission of 10.8% and 30.7, % respectively. Mortality outcomes at one year also demonstrate a clear relationship with age and increase from 22% at 65 years old to 42.7% for patient's age 85 years and older.

Complications

Potential Complications of Heart Failure

- Worsening clinical status despite aggressive therapy
- Associated renal impairment and organ dysfunction which can compromise heart failure treatment efforts
- Recurrent hospitalizations for heart failure or most commonly associated co-morbidities, with resultant financial and personal cost to patients and families
- The progressive loss of ability to carry out activities of daily life
- Increased morbidity and mortality from the date of patient initial diagnosis with heart failure

Deterrence and Patient Education

Effective treatment of comorbidities and risk factor reduction can decrease the chance of developing heart failure. Patient education should be focused on ensuring compliance with prescribed evidence-based treatments.

- Hypertension - effective treatment of systolic and diastolic hypertension can reduce the risk of heart failure by approximately 50%
- Diabetes - is directly associated with the development of heart failure, independent of other associated clinical conditions
- Alcohol - heavy alcohol use is associated with heart failure
- Metabolic syndromes - important to keep up treatment based on evidence-based guidelines to decrease the risk of heart failure (i.e., lipid disorders)
- Patient education regarding dietary salt restriction and fluid restriction is imperative

Enhancing Healthcare Team Outcomes

The treatment of heart failure and acute decompensated heart failure is challenging despite the use of maximal evidence-based therapy based on the stage of heart failure. Given the limited effect that current treatment strategies have on the progression of heart failure, it is important to identify ways to maximize patient outcomes and quality of care by the interprofessional team.

Patients at potential risk for heart failure based on comorbidities or other identified risk factors should receive appropriate evidence-based preventative counseling and treatments. When appropriate, the primary care providers who may be the most involved in the management of the patients' risk factors should consult other specialists, including cardiologists, endocrinologists, pharmacists, cardiology nurses, and nutritionists, to ensure that they are providing the best advice and treatment for their patients. Nurses monitor patients, provide education, and collaborate with the physicians and the rest of the team to improve outcomes. Pharmacists review medications, inform patients and their families about side effects and monitor compliance.

Given the propensity of heart failure patients to require re-current admissions, often because of non-heart failure related conditions, the collaboration between inpatient and outpatient services can be of benefit in the continuity of care and helping promote improved outcomes.

PULMONARY EDEMA

Pulmonary edema is a condition caused by excess fluid in the lungs. This fluid collects in the numerous air sacs in the lungs, making it difficult to breathe.

In most cases, heart problems cause pulmonary edema. But fluid can collect in the lungs for other reasons, including pneumonia, exposure to certain toxins and medications, trauma to the chest wall, and traveling to or exercising at high elevations.

Pulmonary edema that develops suddenly (acute pulmonary edema) is a medical emergency requiring immediate care. Pulmonary edema can sometimes cause death. The outlook improves if you get treated quickly. Treatment for pulmonary edema varies depending on the cause but generally includes supplemental oxygen and medications.

Symptoms

Pulmonary edema signs and symptoms may appear suddenly or develop over time. The signs and symptoms you have depends on the type of pulmonary edema.

Sudden (acute) pulmonary edema signs and symptoms

- Difficulty breathing (dyspnea) or extreme shortness of breath that worsens with activity or when lying down
- A feeling of suffocating or drowning that worsens when lying down
- A cough that produces frothy sputum that may be tinged with blood
- Wheezing or gasping for breath
- Cold, clammy skin
- Anxiety, restlessness or a sense of apprehension
- Bluish lips
- A rapid, irregular heartbeat (palpitations)

Long-term (chronic) pulmonary edema signs and symptoms

- Difficulty breathing with activity or when lying flat
- Awakening at night with a cough or breathless feeling that may be relieved by sitting up
- More shortness of breath than normal when you're physically active

- Wheezing
- Rapid weight gain
- Swelling in your lower extremities
- Fatigue
- New or worsening cough

High-altitude pulmonary edema (HAPE) signs and symptoms

HAPE can occur in adults and children who travel to or exercise at high altitudes. Signs and symptoms are similar to those that occur with acute pulmonary edema and can include:

- Headache, which may be the first symptom
- Shortness of breath with activity, which worsens to shortness of breath at rest
- Decreased ability to exercise as you once could
- Dry cough, at first
- Later, a cough that produces frothy, pink sputum
- A very fast heartbeat (tachycardia)
- Weakness
- Chest pain
- Low-grade fever

Signs and symptoms of high-altitude pulmonary edema (HAPE) tend to get worse at night.

When to see a doctor

Pulmonary edema that comes on suddenly (acute pulmonary edema) is life-threatening. Call 911 or emergency medical help if you have any of the following acute signs and symptoms:

- Shortness of breath, especially if it comes on suddenly

- Trouble breathing or a feeling of suffocating (dyspnea)
- A bubbly, wheezing or gasping sound when you breathe
- Pink, frothy sputum when you cough
- Breathing difficulty along with a lot of sweating
- A blue or gray color to your skin
- Confusion
- A significant drop in blood pressure resulting in lightheadedness, dizziness, weakness or sweating
- A sudden worsening of any of pulmonary edema symptoms

Don't attempt to drive yourself to the hospital. Instead, call 911 or emergency medical care and wait for help.

Request an Appointment at Mayo Clinic

Causes

The causes of pulmonary edema vary. Pulmonary edema is grouped into two categories, depending on where the problem started.

- If a heart problem causes the pulmonary edema, it's called cardiogenic pulmonary edema. Most often, the fluid buildup in the lungs is due to a heart condition.
- If pulmonary edema is not heart related, it's called noncardiogenic pulmonary edema.
- Sometimes, pulmonary edema can be caused by both a heart problem and a non-heart problem.

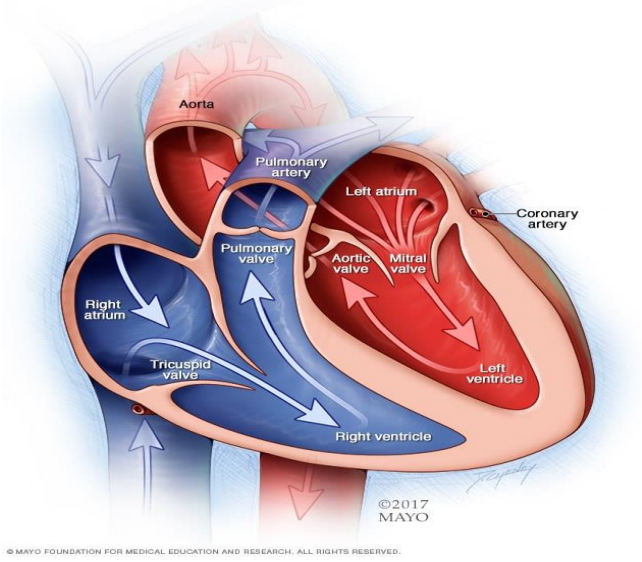
Understanding the relationship between your lungs and your heart can help explain why pulmonary edema may occur.

How your lungs work

Your lungs contain many small, elastic air sacs called alveoli. With each breath, these air sacs take in oxygen and release carbon dioxide. Normally, this exchange of gases occurs without problems.

But sometimes, the alveoli fill with fluid instead of air, preventing oxygen from being absorbed into your bloodstream.

How your heart works



Chambers and valves of the heart Open pop-up dialog box

Your heart is made of two upper and two lower chambers. The upper chambers (the right and left atria) receive incoming blood and pump it into the lower chambers (right and left ventricles). The lower chambers pump blood out of your heart.

Normally, deoxygenated blood from all over your body enters the right atrium then the right ventricle, where it's pumped through large blood vessels (pulmonary arteries) to your lungs. There, the blood releases carbon dioxide and picks up oxygen as it flows by the alveoli.

The oxygen-rich blood then returns to the left atrium through the pulmonary veins, flows through the mitral valve into the left ventricle and finally leaves your heart through the largest blood vessel in the body, called the aorta.

The heart valves keep blood flowing in the correct direction. The aortic valve keeps the blood from flowing backward into your heart. From the aorta, the blood travels to the rest of your body.

Heart-related (cardiogenic) pulmonary edema

Cardiogenic pulmonary edema is caused by increased pressures in the heart.

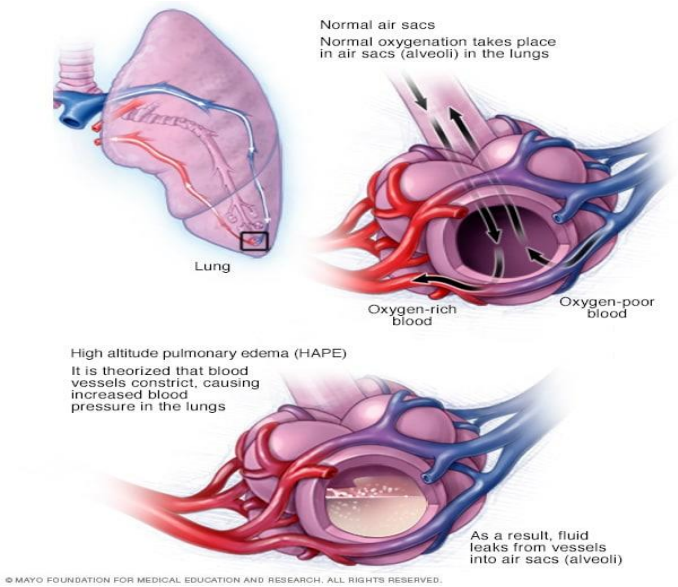
It's usually a result of heart failure. When a diseased or overworked left ventricle can't pump out enough of the blood it gets from your lungs, pressures in the heart go up. The increased pressure pushes fluid through the blood vessel walls into the air sacs.

Medical conditions that can cause heart failure and lead to pulmonary edema include:

- **Coronary artery disease.** Over time, the arteries that supply blood to your heart muscle can become narrow from fatty deposits (plaques). A slow narrowing of the coronary arteries can make the left ventricle weak. Sometimes, a blood clot forms in one of these narrowed arteries, blocking blood flow and damaging part of your heart muscle, resulting in a heart attack. A damaged heart muscle can no longer pump as well as it should.
- **Cardiomyopathy.** This term means heart muscle damage. If you have cardiomyopathy, your heart has to pump harder, and pressures go up. The heart may be unable to respond to conditions that require it to work harder, such as exercise, infection or a rise in blood pressure. When the left ventricle can't keep up with the demands that are placed on it, fluid backs up into your lungs.
- **Heart valve problems.** Narrowing of the aortic or mitral heart valves (stenosis) or a valve that leaks or doesn't close properly affects blood flow into the heart. The heart has to work harder, and pressures go up. If valve leakage develops suddenly, you may develop sudden and severe pulmonary edema.
- **High blood pressure (hypertension).** Untreated or uncontrolled high blood pressure can enlarge the heart.

- **Other heart problems.** Inflammation of the heart muscle (myocarditis), congenital heart defects and abnormal heart rhythms (arrhythmias) also may cause pulmonary edema.
- **Kidney disease.** High blood pressure due to narrowed kidney arteries (renal artery stenosis) or fluid buildup due to kidney disease can cause pulmonary edema.
- **Chronic health conditions.** Thyroid disease and a buildup of iron (hemochromatosis) or protein (amyloidosis) also may contribute to heart failure and cause pulmonary edema.

Non-heart-related (noncardiogenic) pulmonary edema



High-altitude pulmonary edema

Open pop-up dialog box

Pulmonary edema that is not caused by increased pressures in your heart is called noncardiogenic pulmonary edema.

Causes of noncardiogenic pulmonary edema include:

- **Acute respiratory distress syndrome (ARDS).** This serious disorder occurs when your lungs suddenly fill with fluid and inflammatory white blood cells. Many

conditions can cause ARDS, including severe injury (trauma), widespread infection (sepsis), pneumonia and severe bleeding.

- **Adverse drug reaction or drug overdose.** Many drugs — ranging from aspirin to illegal drugs such as heroin and cocaine — are known to cause pulmonary edema.
- **Blood clot in the lungs (pulmonary embolism).** If a blood clot travels from the blood vessels in your legs to your lungs, you can develop pulmonary edema.
- **Exposure to certain toxins.** Inhaling toxins or breathing in some of your stomach contents when you vomit (aspiration) causes intense irritation of the small airways and alveoli, resulting in fluid buildup.
- **High altitudes.** Pulmonary edema has been seen in mountain climbers, skiers, hikers and other people who travel to high elevations, usually above 8,000 feet (about 2,400 meters). High-altitude pulmonary edema (HAPE) generally occurs in those who don't first become acclimated to the elevation (which can take from a few days to a week or so). But people who live at high altitudes can get HAPE with no elevation change if they have a respiratory infection.
- **Near drowning.** Inhaling water causes fluid buildup in the lungs that is reversible with immediate medical care.
- **Negative pressure pulmonary edema.** Pulmonary edema can develop after a blockage in the upper airway causes negative pressure in the lungs from intense efforts to breathe despite the blockage. With treatment, most people with this type of pulmonary edema recover in about 24 hours.
- **Nervous system conditions or procedures.** A type of pulmonary edema called neurogenic pulmonary edema can occur after a head injury, seizure or brain surgery.
- **Smoke inhalation.** Smoke from a fire contains chemicals that damage the membrane between the air sacs and the capillaries, allowing fluid to enter your lungs.
- **Transfusion-related lung injury.** Blood transfusions may cause fluid overload in the left ventricle, leading to pulmonary edema.
- **Viral infections.** Pulmonary edema can be caused by viruses such as the Hantavirus and dengue virus.

Risk factors

Heart failure and other heart conditions that raise pressure in the heart increase the risk of pulmonary edema. Risk factors for heart failure include:

- Abnormal heart rhythms (arrhythmias)
- Alcohol use
- Congenital heart disease
- Coronary artery disease
- Diabetes
- Heart valve disease
- High blood pressure
- Sleep apnea

However, some nervous system conditions and lung damage due to near drowning, drug use, smoke inhalation, viral infections and blood clots also raise your risk.

People who travel to high-altitude locations above 8,000 feet (about 2,400 meters) are more likely to develop high-altitude pulmonary edema (HAPE). It usually affects those who do not first become acclimated to the elevation (which can take from a few days to a week or so).

Children who have existing pulmonary hypertension and structural heart defects may be more likely to get HAPE.

Complications

Complications depend on the underlying cause.

In general, if pulmonary edema continues, the pressure in the pulmonary artery can go up (pulmonary hypertension). Eventually, the heart becomes weak and begins to fail, and pressures in the heart and lungs go up.

Complications can include:

- Breathing difficulty
- Swelling of the legs, feet and abdomen
- Buildup of fluid in the membranes that surround your lungs (pleural effusion)
- Congestion and swelling of the liver

Immediate treatment is necessary for acute pulmonary edema to prevent death.

Prevention

You may be able to prevent pulmonary edema by managing existing heart or lung conditions and following a healthy lifestyle.

For example, you can reduce your risk of many kinds of heart problems by taking steps to control your cholesterol and blood pressure. Follow these tips to keep your heart healthy:

- Eat a healthy diet rich in fresh fruits, vegetables, whole grains, fat-free or low-fat dairy, and a variety of proteins.
- Manage your weight.
- Get regular exercise.
- Don't smoke.
- Limit salt and alcohol.
- Manage stress.

Preventing high-altitude pulmonary edema (HAPE)

To prevent HAPE, gradually ascend to high elevations. Although recommendations vary, most experts advise increasing elevation no more than 1,000 to 1,200 feet (about 300 to 360 meters) a day once you reach 8,200 feet (about 2,500 meters).

Some climbers take prescription medications such as acetazolamide or nifedipine (Adalat CC, Procardia) to help prevent signs and symptoms of HAPE. To prevent HAPE, start taking the medication at least one day before ascent. Ask your

doctor how long you need to take the medication after you've arrived at your high-altitude destination.

Diagnosis

Breathing problems require immediate diagnosis and treatment. Your doctor can make a preliminary diagnosis of pulmonary edema based on your signs and symptoms and the results of a physical exam, electrocardiogram and chest X-ray.

Once your condition is more stable, your doctor will ask questions about your medical history, especially whether you have ever had cardiovascular or lung disease.

Tests that may be done to diagnose pulmonary edema or to determine why you developed fluid in your lungs include:

- **Chest X-ray.** A chest X-ray can confirm the diagnosis of pulmonary edema and exclude other possible causes of your shortness of breath. It's usually the first test done when someone has signs or symptoms of pulmonary edema.
- **Chest CT.** A computed tomography (CT) scan of the chest may not provide the cause for the pulmonary edema, but can give your doctor indirect clues to help make a diagnosis.
- **Pulse oximeters.** A sensor is attached to your finger or ear and uses light to determine how much oxygen is in your blood.
- **Arterial blood gas test.** Blood is taken, usually from an artery in your wrist, and checked for the amount of oxygen and carbon dioxide it contains (arterial blood gas concentrations).
- **B-type natriuretic peptide (BNP) blood test.** Increased levels of BNP may signal a heart condition.
- **Other blood tests.** Blood tests to diagnose pulmonary edema and its causes also usually include a complete blood count, metabolic panel to check kidney function and thyroid function test.
- **Electrocardiogram (ECG or EKG).** This painless test detects and records the timing and strength of your heart's signals using small sensors (electrodes) attached to the skin on your chest and legs. The signals are recorded in the form of

waves on graph paper or a monitor. An ECG can show signs of heart wall thickening or previous heart attack. A portable ECG machine such as a Holter monitor may be used to continuously monitor your heartbeat at home.

- **Echocardiogram.** An echocardiogram creates a moving picture of your heart using sound waves (ultrasound). It can identify areas of poor blood flow, abnormal heart valves and heart muscle that is not working normally. Your doctor can use this test to help diagnose fluid around the heart (pericardial effusion).
- **Cardiac catheterization and coronary angiogram.** This test may be done if an ECG, echocardiogram or other tests don't show the cause of pulmonary edema, or if you also have chest pain.

  During cardiac catheterization, a doctor inserts a long, thin tube (catheter) in an artery or vein in your groin, neck or arm. X-rays help guide the catheter through the blood vessel to your heart. During a coronary angiogram, dye flows through the catheter, allowing blood vessels to show up more clearly on the X-rays. A coronary angiogram can reveal any blockages and measure the pressure in your heart chambers.
- **Ultrasound of the lungs.** This painless test uses sound waves to measure blood flow through the lungs. It can quickly reveal signs of fluid buildup and plural effusions. Lung ultrasound has become an accurate tool for diagnosing pulmonary edema.

More Information

- Cardiac catheterization
- Chest X-rays
- Echocardiogram

Treatment

The first treatment for acute pulmonary edema is supplemental oxygen. You usually receive oxygen through a face mask or nasal cannula — a flexible plastic tube with two openings that deliver oxygen to each nostril. This should ease some of your symptoms.

Your doctor will monitor your oxygen level closely. Sometimes it may be necessary to assist your breathing with a machine such as a mechanical ventilator or one that provides positive airway pressure.

Depending on the severity of your condition and the reason for your pulmonary edema, you may also receive one or more of the following medications:

- **Diuretics.** Doctors commonly prescribe diuretics, such as furosemide (Lasix), to decrease the pressure caused by excess fluid in your heart and lungs.
- **Morphine (MS Contin, Oramorph, others).** This narcotic may be taken by mouth or given through an IV to relieve shortness of breath and anxiety. But some doctors believe that the risks of morphine may outweigh the benefits and are more likely to use other drugs.
- **Blood pressure drugs.** If you have high or low blood pressure when you develop pulmonary edema, you'll be given medications to help manage the condition. Your doctor may also prescribe medications that lower the pressure going into or out of your heart. Examples of such medicines are nitroglycerin (Nitromist, Nitrostat, others) and nitroprusside (Nitropress).
- **Inotropes.** This type of medication is given through an IV if you are in the hospital with severe heart failure. Inotropes improve heart pumping function and maintain blood pressure.

It is important to diagnosis and treat, if possible, any nervous system problems or causes of heart failure.

Treating high-altitude pulmonary edema (HAPE)

As with other forms of pulmonary edema, oxygen is the usually the first treatment. If supplemental oxygen isn't available, you may use portable hyperbaric chambers, which imitate a descent for several hours until you are able to move to a lower elevation.

Treatments for high-altitude pulmonary edema (HAPE) also include:

- **Immediately descending to a lower elevation.** If you're climbing or traveling at high altitudes and have mild symptoms of HAPE, descend 1,000 to 3,000 feet (about 300 to 1,000 meters) as quickly as you can, within reason. Depending on

the severity of your condition, you may need rescue assistance to get off the mountain.

- **Stop exercising and stay warm.** Physical activity and cold can make pulmonary edema worse.
- **Medication.** Some climbers take prescription medications such as acetazolamide or nifedipine (Adalat CC, Procardia) to help treat or prevent symptoms of HAPE. To prevent HAPE, medication is started at least one day before ascent.

Clinical trials

Explore Mayo Clinic studies testing new treatments, interventions and tests as a means to prevent, detect, treat or manage this condition.

Lifestyle and home remedies

Lifestyle changes are an important part of heart health and can help you manage some forms of pulmonary edema.

- **Keep blood pressure under control.** If you have high blood pressure, take your medications as prescribed and check your blood pressure regularly. Record the results. Ask your doctor for your target blood pressure.
- **Manage other medical conditions.** Address any underlying medical conditions, such as controlling your glucose levels if you have diabetes.
- **Avoid the cause of your condition.** If pulmonary edema results from drug use or high altitudes, for example, you'll want to avoid these things to prevent further lung damage.
- **Don't smoke.** It's always a healthy idea to stop smoking. If you need help quitting, talk to your doctor. He or she can provide tips and, sometimes, medications to help you quit smoking.

- **Eat less salt.** Salt helps your body retain fluid. In some people with severely damaged left ventricular function, getting too much salt may be enough to trigger congestive heart failure. Your doctor may recommend a low-salt diet. If you need help, a dietitian can show you how to determine the salt content in foods and create a nutritious, good-tasting diet. In general, most people should consume less than 2,300 milligrams a day of salt (sodium). Ask your doctor what level is safe for you.
- **Choose a healthy diet.** You'll want to eat a plenty of fruits, vegetables and whole grains. Limit saturated fats and Trans fats, added sugars, and sodium.
- **Manage your weight.** Being even slightly overweight increases your risk of cardiovascular disease. On the other hand, even losing small amounts of weight can lower your blood pressure and cholesterol and reduce your risk of diabetes.
- **Get regular exercise.** Healthy adults should get at least 150 minutes of moderate aerobic activity or 75 minutes of vigorous aerobic activity a week, or a combination of the two. If you're not used to exercise, start out slowly and build up gradually. Be sure to get your doctor's OK before starting an exercise program.

SRI LAKSHMI NARAYANA INSTITUTE OF ALLIED HEALTH SCIENCE

MEDICAL EDUCATIONAL PROJECT

Pulmonary edema and Left Ventricular Failure - VAC01/AHS/2019-15/07

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10	**GOKUL PRASAD**	**UAH1802159**	
11	**GOPIKA.K**	**UAH1802160**	
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15	**MOHAMMED AFSAL.N**	**UAH1802166**	
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SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - III

Assessment Form

Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry

Course code: VAC01/AHS/2019-15/07

Multiple Choice Question 10x2=20

1) A 73-year-old male presents with acute pulmonaryoedema. His blood pressure is 180/110 mm Hg And heart rate 120 beats min−1 (sinus rhythm, QRSduration <100 ms), and he has cool peripheries. His serum lactate is 5 (normal 0.6–1.3) mmol litre−1 and there is left ventricular hypertrophy (LVH) on his ECG but no ischaemic changes. Thecardiac silhouette is not enlarged on chest X-ray. The following statements regarding cardiac function are correct:

(a). His cardiac output is likely to be limited byimpaired left ventricle (LV) filling.
(b). The presence of pulmonary oedema and elevated serum lactate concentrations indicates a reduced ejection fraction.
(c). Myocardial oxygen demand is likely to beincreased during this episode.
(d). The patient's blood pressure suggestsadequate tissue perfusion.

2) Regarding the pharmacological management ofacute decompensated heart failure (ADHF):
(a). Dobutamine is likely to be useful in the supportive treatment of ADHF caused by mitral incompetence.
(b). Dopamine has a positive inotropic effect.
(c). Levosimendan is likely to be usefullycombined with a α-1 adrenergic agonist.
(d). Opioid toxicity is associated with increased right ventricular (RV) afterload.
(e). Continued use of drugs with negative inotropic effects should generally be avoided in decompensated cardiac failure

3) An elderly, normotensive female patient is recovering from an episode of acute decompensated heart failure during which she hada good response to nitrates and diuretics, and a short spell of non-invasive ventilation. She is now in a 'post-stabilization' phase of her management. Her echocardiogram shows a mildly dilated left ventricle with an ejection fraction (EF) of 40%. She has a resting heart rate of 90 beats min−1 (sinus rhythm), blood pressure of 110/65 mm Hg and oxygen saturation of 95% on room air, but shortness of breath when moving from bed to chair. Her creatinine clearance is normal. The following therapies may be advocated as demonstrating survival benefit for her heart failure:
(A). Calcium antagonists.
(b). β-Blockers.
(c). Aldosterone antagonists.
(d). Furosemide infusion.
(e). Low-dose epinephrine infusion to relieve pulmonary congestion and improve tissueperfusion.

4) A 76-year-old male who has had a previous myocardial infarction presents with acute decompensated heart failure (ADHF). His transthoracic echocardiogram confirms an ejectionfraction (EF) of <35% and the 12-lead ECG is reported as 68 beats min−1 with second-degree heart block and left bundle branch block. The QRS duration is 160 Ms. He is haemodynamically stable, in no

respiratory distress and comfortable, but requires dobutamine and noradrenaline to maintain adequate cardiac output and perfusion pressure. From the information, available, the following therapies should be considered:

(a). B-Block.
(b). Angiotensin II receptor blockers.
(c). Implantable cardioverter defibrillator (ICD).
(d). Morphine.
(e). Cardiac resynchronization therapy

5) In acute respiratory distress syndrome (ARDS):(a). The diagnosis can be made on the ratio of Arterial oxygen partial pressure to fractional inspired oxygen (PaO2/FiO2 ratio), regardless of pressures used to ventilate the lungs.
(a). The diagnosis requires direct measurement ofintracardiac pressures.
(b). The mild form has a mortality rate of 27%.
(c). The onset is slow and insidious.
(d). Patients develop reduced pulmonary compliance and increased ventilation perfusion mismatch.

6) The pathophysiology of acute respiratory distresssyndrome (ARDS) includes:

(a). Production of inflammatory mediators, usually reduced by non-steroidal anti-inflammatory drugs (NSAIDs) as management of the disease.
(b). Fibroproliferation and microvascular thrombusformation in the first few hours of a known insult.
(c). An acute phase characterized by hypoxaemiaand flooding of the lungs with low-protein fluid.
(d). An inevitable progression to widespreadfibrosis and lung remodelling.
(e). Radiological imaging demonstratinghomogeneous lung fields.

7) Regarding management strategies for acuterespiratory distress syndrome (ARDS):

(a). Aiming for normal gas exchange can worsenthe disease process.
(b). An optimal level of positive end-expiratory pressure (PEEP) at 5 cm H2O has been identified and recommended by the ARDSnetgroup.
(c). Driving ventilator pressure (ΔP), when reduced,is strongly associated with survival.
(d). High-frequency oscillation ventilation (HFOV) is associated with higher mortality than conventional ventilation.
(e). Prone positioning is a simple, low-risk procedure that should be performed in anypatient with a diagnosis of ARDS.

8) Appropriate statements concerning acute respiratory distress syndrome (ARDS) include the following:

(a). There is level-1 evidence supporting the use ofsteroids in early ARDS.
(b). Initial ventilator settings for a newly diagnosedARDS patient include a tidal volume of 6 ml kg^{-1}.
(c). There is clear evidence of a mortality benefit for a conservative fluid management strategyin ARDS.
(d). Inhaled nitric oxide improves oxygenation at24 h but does not improve the likelihood of survival.
(e). On follow-up, most survivors of ARDS returnto normal function by 5 years after the illness

9) With reference to modern defibrillators: (a). They are most likely to use a triphasic Waveform.
(b). The duration of the biphasic truncated exponential (BTE) waveform is limited to 10Ms.
(c). The rectilinear biphasic (RB) waveform uses an inductor to control current flow during the initial phase of the biphasic waveform.
(d). Defibrillators using either the RB or the BTEwaveform have similar success rates for cardioversion of atrial fibrillation.
(e). Biphasic defibrillators can be used for direct defibrillation or direct current (DC) cardioversion of the heart during cardiac surgery.

10) Appropriate indications for direct current (DC)cardioversion include the following:

(a). Atrial fibrillation in a patient with Wolff–Parkinson–White (WPW) syndrome.
(b). A patient with digoxin-induced ventriculartachycardia (VT).
(c). A multifocal atrial tachycardia (MAT) in a critical care patient with pneumonia receiving norepinephrine and dobutamine infusions.
(d). A narrow complex tachyarrhythmia in a patientwith associated haemodynamic instability.
(e). A patient with atrial fibrillation in whom a rate control strategy has proved unsuccessful, with poor symptomatic control.

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

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SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

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respiratory distress and comfortable, but requires dobutamine and noradrenaline to maintain adequate cardiac output and perfusion pressure. From the information, available, the following therapies should be considered:

(a). B-Block.
(b). Angiotensin II receptor blockers.
(c). Implantable cardioverter defibrillator (ICD).
(d). Morphine.
(e). Cardiac resynchronization therapy

5) In acute respiratory distress syndrome (ARDS):(a). The diagnosis can be made on the ratio of Arterial oxygen partial pressure to fractional inspired oxygen (PaO2/FiO2 ratio), regardless of pressures used to ventilate the lungs.
(a). The diagnosis requires direct measurement ofintracardiac pressures.
(b). The mild form has a mortality rate of 27%.
(c). The onset is slow and insidious.
(d). Patients develop reduced pulmonary compliance and increased ventilation perfusion mismatch.

6) The pathophysiology of acute respiratory distresssyndrome (ARDS) includes:

(a). Production of inflammatory mediators, usually reduced by non-steroidal anti-inflammatory drugs (NSAIDs) as management of the disease.
(b). Fibroproliferation and microvascular thrombusformation in the first few hours of a known insult.
(c). An acute phase characterized by hypoxaemiaand flooding of the lungs with low-protein fluid.
(d). An inevitable progression to widespreadfibrosis and lung remodelling.
(e). Radiological imaging demonstratinghomogeneous lung fields.

7) Regarding management strategies for acuterespiratory distress syndrome (ARDS):

(a). Aiming for normal gas exchange can worsenthe disease process.
(b). An optimal level of positive end-expiratory pressure (PEEP) at 5 cm H2O has been identified and recommended by the ARDSnetgroup.
(c). Driving ventilator pressure (ΔP), when reduced,is strongly associated with survival.
(d). High-frequency oscillation ventilation (HFOV) is associated with higher mortality than conventional ventilation.
(e). Prone positioning is a simple, low-risk procedure that should be performed in anypatient with a diagnosis of ARDS.

8) Appropriate statements concerning acute respiratory distress syndrome (ARDS) include the following:

(a). There is level-1 evidence supporting the use ofsteroids in early ARDS.
(b). Initial ventilator settings for a newly diagnosedARDS patient include a tidal volume of 6 ml kg^{-1}.
(c). There is clear evidence of a mortality benefit for a conservative fluid management strategyin ARDS.
(d). Inhaled nitric oxide improves oxygenation at24 h but does not improve the likelihood of survival.
(e). On follow-up, most survivors of ARDS returnto normal function by 5 years after the illness

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9) With reference to modern defibrillators: (a). They are most likely to use a triphasic Waveform.
(b). The duration of the biphasic truncated exponential (BTE) waveform is limited to 10Ms.
(c). The rectilinear biphasic (RB) waveform uses an inductor to control current flow during the initial phase of the biphasic waveform.
(d). Defibrillators using either the RB or the BTEwaveform have similar success rates for cardioversion of atrial fibrillation.
(e). Biphasic defibrillators can be used for direct defibrillation or direct current (DC) cardioversion of the heart during cardiac surgery.

10) Appropriate indications for direct current (DC)cardioversion include the following:

(a). Atrial fibrillation in a patient with Wolff–Parkinson–White (WPW) syndrome.
(b). A patient with digoxin-induced ventriculartachycardia (VT).
(c). A multifocal atrial tachycardia (MAT) in a critical care patient with pneumonia receiving norepinephrine and dobutamine infusions.
(d). A narrow complex tachyarrhythmia in a patientwith associated haemodynamic instability.
(e). A patient with atrial fibrillation in whom a rate control strategy has proved unsuccessful, with poor symptomatic control.

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

ARULMOZIHI. A
UAH1802153.

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - III

Assessment Form

Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry

Course code: VAC01/AHS/2019-15/07

Multiple Choice Question 10x2=20

1) A 73-year-old male presents with acute pulmonaryoedema. His blood pressure is 180/110 mm Hg And heart rate 120 beats min−1 (sinus rhythm, QRSduration <100 ms), and he has cool peripheries. His serum lactate is 5 (normal 0.6–1.3) mmol litre−1 and there is left ventricular hypertrophy (LVH) on his ECG but no ischaemic changes. Thecardiac silhouette is not enlarged on chest X-ray. The following statements regarding cardiac function are correct:

(a). His cardiac output is likely to be limited byimpaired left ventricle (LV) filling.
(b). The presence of pulmonary oedema and elevated serum lactate concentrations indicates a reduced ejection fraction.
(c). Myocardial oxygen demand is likely to beincreased during this episode.
(d). The patient's blood pressure suggestsadequate tissue perfusion.

2) Regarding the pharmacological management ofacute decompensated heart failure (ADHF):
(a). Dobutamine is likely to be useful in the supportive treatment of ADHF caused by mitral incompetence.
(b). Dopamine has a positive inotropic effect.
(c). Levosimendan is likely to be usefullycombined with a α-1 adrenergic agonist.
(d). Opioid toxicity is associated with increased right ventricular (RV) afterload.
(e). Continued use of drugs with negative inotropic effects should generally be avoided in decompensated cardiac failure

3) An elderly, normotensive female patient is recovering from an episode of acute decompensated heart failure during which she hada good response to nitrates and diuretics, and a short spell of non-invasive ventilation. She is now in a 'post-stabilization' phase of her management. Her echocardiogram shows a mildly dilated left ventricle with an ejection fraction (EF) of 40%. She has a resting heart rate of 90 beats min−1 (sinus rhythm), blood pressure of 110/65 mm Hg and oxygen saturation of 95% on room air, but shortness of breath when moving from bed to chair. Her creatinine clearance is normal. The following therapies may be advocated as demonstrating survival benefit for her heart failure:
(A). Calcium antagonists.
(b). β-Blockers.
(c). Aldosterone antagonists.
(d). Furosemide infusion.
(e). Low-dose epinephrine infusion to relieve pulmonary congestion and improve tissueperfusion.

4) A 76-year-old male who has had a previous myocardial infarction presents with acute decompensated heart failure (ADHF). His transthoracic echocardiogram confirms an ejectionfraction (EF) of <35% and the 12-lead ECG is reported as 68 beats min−1 with second-degree heart block and left bundle branch block. The QRS duration is 160 Ms. He is haemodynamically stable, in no

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(d). Inhaled nitric oxide improves oxygenation at24 h but does not improve the likelihood of survival.
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(e). A patient with atrial fibrillation in whom a rate control strategy has proved unsuccessful, with poor symptomatic control.

Sri Lakshmi Narayana Institute of Medical Sciences

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(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that **GOPIKA.K (UAH1802160)** has actively participated in the Value Added Course on **Congestive Heart Failure And Pulmonary Edema(VAC01/AHS/2019-15/07)** held during month Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

RESOURCE PERSON

Dr. G.Somasundram

COORDINATOR

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that **ARAVINTH.S(UAH1802151)** has actively participated in the Value Added Course on **Congestive Heart Failure And Pulmonary Edema(VAC01/AHS/2019-15/07)** held during month Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

RESOURCE PERSON

Dr. G.Somasundram

COORDINATOR

Annexure- V

Student Feedback Form

Course Name: Congestive Heart Failure and Pulmonary Edema

Subject Code: VAC01/AHS/2019-15/07

Name of Student: _____ Roll No.: _____

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Feedback Form

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. The course met my expectations.	○	○	○	○	○
2. I will be able to apply the knowledge learned.	○	○	○	○	○
3. The course objectives for each topic were identified and followed.	○	○	○	○	○
4. The content was organised and easy to follow.	○	○	○	○	○
5. The quality of instruction was good.	○	○	○	○	○
6. Class participation and interaction were encouraged.	○	○	○	○	○
7. Adequate time was provided for questions and discussion.	○	○	○	○	○

8. How do you rate the course overall?
   - ○ Excellent
   - ○ Good
   - ○ Average
   - ○ Poor
   - ○ Very poor

9. The aspects of the course could be improved?

10. Other comments?

Signature of the Student:
Date:

Annexure- V

Student Feedback Form

Course Name: Congestive Heart Failure and Pulmonary Edema

Subject Code: VAC01/AHS/2019-15/07

Name of Student: ABIJITH.C.C Roll No.: 0AH1802150

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Feedback Form

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. The course met my expectations.	✓				
2. I will be able to apply the knowledge learned.		✓			
3. The course objectives for each topic were identified and followed.			✓		
4. The content was organised and easy to follow.	✓				
5. The quality of instruction was good.		✓			
6. Class participation and interaction were encouraged.		✓			
7. Adequate time was provided for questions and discussion.	✓				

8. How do you rate the course overall?
   - Excellent
   - ✓ Good
   - Average
   - Poor
   - Very poor

9. The aspects of the course could be improved?

   NO.

10. Other comments?

    Class was

Signature of the Student: Abijith.
Date: 14/8/19

Annexure- V

Student Feedback Form

Course Name: Congestive Heart Failure and Pulmonary Edema

Subject Code: VAC01/AHS/2019-15/07

Name of Student: ARUL. B Roll No.: UAH1802152

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Feedback Form

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. The course met my expectations.	✓				
2. I will be able to apply the knowledge learned.		✓			
3. The course objectives for each topic were identified and followed.	✓				
4. The content was organised and easy to follow.		✓			
5. The quality of instruction was good.			✓		
6. Class participation and interaction were encouraged.	✓				
7. Adequate time was provided for questions and discussion.		✓			

8. How do you rate the course overall?
   - ✓ Excellent
   - Good
   - Average
   - Poor
   - Very poor

9. The aspects of the course could be improved?

   NO.

10. Other comments?

    Now I can able. understand CHF and PE

Signature of the Student: Arul.

Date: 14/08/19

Date: 20.08.2019

From

Dr.G.Somasundram
Department of Pharmacology,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To

The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: Congestive Heart Failure and Pulmonary Edema

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: "**Congestive Heart Failure and Pulmonary Edema"** July to September 2019 for 30 AHS Students. We solicit your kind action to send certificates for the participants that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards,

Dr.G.Somasundram

Encl: Certificates

Photographs



Sri Lakshmi Narayana Institute of Medical Sciences

Date: 05.08.2017

From

Dr.G.Somasundram
Principal of Allied Health Sciences,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

To

The Dean,
Sri Lakshmi Narayana Institute of Medical College
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: Pericardiocentesis

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **Pericardiocentesis** from September to October 2019. We solicit your kind permission for the same.

Kind Regards

Dr.G.Somasundram

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: **Dr. Jayalakshmi**

The HOD: **Dr. Somasundram. G**

The Expert: **Dr. Pasmithadevi**

The committee has discussed about the course and is approved.

Dean	Subject Expert	HOD
(Sign & Seal)	(Sign & Seal)	(Sign & Seal)

Dr. G. JAYALAKSHMI, BSC., MBBS., DTCD., M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Agaram, Kudapakkam Post,
Villianur Commune, Puducherry - 605502.

PRINCIPAL
Allied Health Sciences
Sri Lakshmi Narayana Institute of Allied Health Sciences
Osudu, Agaram Post, Puducherry - 605 502.

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affiliated to Bharath University, Chennai - TN]

Circular

31.08.2017

Sub: Organizing Value-added Course: "Pericardiocentesis".reg

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research** is organizing **"Pericardiocentesis"**. The course content and registration form is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before September to October 2019. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

Dr. G. JAYALAKSHMI, BSC., MBBS., DTCD., M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Agaram, Kudapakkam Post,
Villianur Commune, Puducherry - 605502.

Encl: Copy of Course content

VALUE ADDED COURSE

1. Name of the programme & Code

"Pericardiocentesis" & VAC02/AHS/2019-16/09

2. Duration & Period

30 hrs. & September to October 2019

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Assessment - *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

1 time September to October 2019

8. Year of discontinuation: 2020

9. Summary report of each program year-wise

Value Added Course- September to October 2019					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	VAC02/AHS/2019-16/09	**Pericardiocentesis**	Dr. Pasmithadevi	AHS	30 AHS students September to October 2019

10. Course Feed Back

Enclosed as Annexure- V

RESOURCE PERSON

COORDINATOR
Dr.G.Somasundram

PRINCIPAL
Allied Health Sciences
Sri Lakshmi Narayana Institute of Allied Health Sciences
Osudu, Agaram Post, Puducherry - 605 502.

Course Proposal

Course Title: "**Pericardiocentesis"**

Course Objective:

1. To enhance the performance skill in Pericardiocentesis.
2. To assess the reaction of target allied Health students in Pericardiocentesis getting their feedback.

Course Outcome: Improvement in the "Pericardiocentesis"
Course Audience: Students of AHS Batch
Course Coordinator: Dr.G.Somasundram
Course Faculties with Qualification and Designation:
1. Dr.Pasmithadevi
Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Time	Hours
1.	16.09.2019	Introduction to Pericardiocentesis	4-6p.m	2
2.	17.09.2019	What is Pericardiocentesis	2-4p.m	2
3.	19.09.2019	Pericarditis	4-6p.m	2
4.	20.09.2019	Pericardial effusion	4-6p.m	2
5.	22.09.2019	Cardiac Tamponade	4-6p.m	2
6.	23.09.2019	Complications of Pericarditis	4-6p.m	2
7.	25.09.2019	Indications of Pericardiocentesis	4-6P.M	2
8.	27.09.2019	Contraindications for Pericardiocentesis	4-6p.m	2
9.	30.09.2019	Video demonstration Pericardiocentesis	4-6p.m	2
10.	04.09.2019	Risk of Pericardiocentesis	4-6p.m	2
11.	05.09.2019	Diagnostic procedure involved in Pericarditis	4-6p.m	2
12.	07.09.2019	Echo in Pericarditis	4-6p.m	2
13.	10.09.2019	Pre course and Post Course evaluation, Feedback analysis	2-4p.m	2
14.	11.09.2019	Steps model explanation and various performance assessment	4-6p.m	2 m
15.	12.09.2019	Orientation of the students about the training program and	2-4p.m	2

		assessment		
		Total		30 hrs.

REFERENCE BOOKS:

1.Gupta, Pooja; Ibrahim, Amar; Butany, Jagdish (2014-01-01), Willis, Monte S.; Homeister, Jonathon W.; Stone, James R. (eds.), "Chapter 16 - The Pericardium and its Diseases", Cellular and Molecular Pathobiology of Cardiovascular Disease, San Diego: Academic Press, pp. 297–314, doi:10.1016/b978-0-12-405206-2.00016-8, ISBN 978-0-12-405206-2.

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3.Fashoyin-Aje, Lola A.; Brahmer, Julie R. (2020-01-01), Niederhuber, John E.; Armitage, James O.; Kastan, Michael B.; Doroshow, James H. (eds.), "59 - Malignancy-Related Effusions", Abeloff's Clinical Oncology (Sixth Edition), Philadelphia: Elsevier, pp. 863–873.e4, doi:10.1016/b978-0-323-47674-4.00059-1, ISBN 978-0-323-47674-4.

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5. Sovari, Ali S. (2019-01-01), Brown, David L. (ed.), "44 - Pericardiocentesis", Cardiac Intensive Care (Third Edition), Philadelphia: Elsevier, pp. 461–464.e1, doi:10.1016/b978-0-323-52993-8.00044-8, ISBN 978-0-323-52993-8.

PERICARDIOCENTESIS

Contents

- Uses
  - Cardiac tamponade
  - Analysis of pericardial fluid
  - Pericarditis
- Contra-indications
  - Long-term drainage
  - Aortic dissection
  - Diagnosis of pericardial effusion
- Risks
- Technique
  - Position
  - Process
  - Intraoperative assessment

Pericardiocentesis



Pericardiocentesis (PCC), also called pericardial tap, is a medical procedure where fluid is aspirated from the pericardium (the sac enveloping the heart).

Uses

Cardiac tamponade

Pericardiocentesis can be used to diagnose and treat cardiac tamponade. Cardiac tamponade is a medical emergency in which excessive accumulation of fluid within the pericardium (pericardial effusion) creates increased pressure.[3] This prevents the heart from filling normally with blood. This can critically decrease the amount of blood that is pumped from the heart, causing obstructive shock, which can be lethal. The removal of the excess fluid reverses this dangerous process, and is often the first treatment for cardiac tamponade due to its speed.

Analysis of pericardial fluid

It can also be used to analyze the fluid surrounding the heart. Fluid may be analysed to differentiate a number of conditions, including.

- infection
- spread of cancer
- autoimmune conditions, such as lupus and rheumatoid arthritis

Pericarditis

Pericardiocentesis can relieve the symptoms of pericarditis. There may be a normal amount of pericardial fluid, but inflammation still causes compression of the heart. Removal of some of this fluid reduces pressure on the heart.

What is pericarditis?

Pericarditis is an inflammation of the pericardium. Pericarditis is usually acute – it develops suddenly and may last up to several months. The condition usually clears up after 3 months, but sometimes attacks can come and go for years. When you have pericarditis, the membrane around your heart is red and swollen, like the skin around a cut that becomes inflamed. Sometimes there is extra fluid in the space between the pericardial layers, which is called pericardial effusion. Pericarditis can affect anyone, but it is most common in men aged 16 to 65.

SYMPTOMS AND CAUSES

What are the symptoms of pericarditis?

Pericarditis can cause chest pain that:

- Is sharp and stabbing (caused by the heart rubbing against the pericardium)
- May get worse when you cough, swallow, take deep breaths or lie flat
- Feels better when you sit up and lean forward

You also may feel the need to bend over or hold your chest to breathe more comfortably.

Other symptoms include:

- Pain in your back, neck or left shoulder Trouble breathing when you lie down
- A dry cough

- Anxiety or fatigue

Pericarditis can cause swelling in your feet, legs and ankles. This swelling may be a symptom of constrictive pericarditis. This is a serious type of pericarditis where the pericardium gets hard and/or thick. When this happens, the heart muscle can't expand, and it keeps your heart from working like it should. Your heart can become compressed, which causes blood to back up into your lungs, abdomen and legs, and cause swelling. You can also develop an abnormal heart rhythm.

If you have symptoms of constrictive pericarditis, including shortness of breath, swelling of the legs and feet, water retention, heart palpitations, and severe swelling of the abdomen, call your cardiologist to schedule an evaluation.

Pericardial effusion and cardiac tamponade

When there is a fluid build-up in the space between the pericardium, it can cause a condition called pericardial effusion. If the fluid builds up quickly, it can cause cardiac tamponade. This is a sudden build-up of fluid in between the layers of the pericardium that keeps your heart from working like it should and can cause your blood pressure to drop. Cardiac tamponade is life-threatening and requires immediate drainage of the fluid.

If you have any symptoms of acute pericarditis, call your doctor right away. If you feel your symptoms are a medical emergency, call 911 right away to get treatment at the nearest hospital.

What causes pericarditis?

There are many causes of pericarditis:

- Viral pericarditis is caused by a complication of a viral infection, most often a gastrointestinal virus.
- Bacterial pericarditis is caused by a bacterial infection, including tuberculosis.
- Fungal pericarditis is caused by a fungal infection.
- Parasitic pericarditis is caused by an infection from a parasite.
- Some autoimmune diseases, such as lupus, rheumatoid arthritis and scleroderma can cause pericarditis. Other causes of pericarditis include injury to the chest, such as after a car accident (traumatic

pericarditis), other health problems such as kidney failure (uremic pericarditis), and tumors, genetic diseases such as Familial Mediterranean Fever (FMF), or rarely, medications that suppress the immune system.

Your risk of pericarditis is higher after a heart attack, heart surgery (postpericardiotomy syndrome), radiation therapy or a percutaneous treatment, such as cardiac catheterization or radiofrequency ablation (RFA). In these cases, it is likely that the inflammation of the pericardium is an error in the body's response to the procedure or condition. It can sometimes take several weeks for symptoms of pericarditis to develop after bypass surgery.

Many times, the cause of pericarditis is unknown. This is called idiopathic pericarditis.

About 15-30% of patients with pericarditis have repeat episodes of pericarditis that come and go for many years.

DIAGNOSIS AND TESTS

How is pericarditis diagnosed?

Sharp pain in the chest and back of the shoulders and difficulty breathing are 2 major clues that you may have pericarditis rather than a heart attack. Your doctor will talk to you about your symptoms and medical history, such as whether you have recently been sick and review your history of heart conditions, surgery and other health problems that could put you at a higher risk of pericarditis.

Your doctor will listen to your heart. Pericarditis can cause a rubbing or creaking sound, caused by the rubbing of the inflamed lining of the pericardium. This is called the "pericardial rub" and is best heard when you lean forward, hold your breath and breathe out. Depending on how bad the inflammation is, your doctor may also hear crackles in your lungs, which are signs of fluid in the space around the lungs or extra fluid in the pericardium.

Cleveland Clinic imaging specialists in the Center for the Diagnosis and Treatment of Pericardial Diseases often use a variety of ways to check for pericarditis and any complications, such as pericardial effusion or constrictive pericarditis. You may need one or more tests, such as:

- Chest X-ray to see the size of your heart and any fluid in your lungs.
- Electrocardiogram (ECG or EKG) to look for changes in your heart rhythm. In about half of all patients with pericarditis, the heart rhythm goes through a sequence of four distinct patterns. Some patients do not have any changes, and if they do, they may be temporary.
- Echocardiogram (echo) to see how well your heart is working and check for fluid or pericardial effusion around the heart. An echo will show the classic signs of constrictive pericarditis, including a stiff or thick pericardium that constricts the heart's normal movement.
- Cardiac MRI to check for extra fluid in the pericardium, pericardial inflammation or thickening, or compression of the heart. A contrast agent called gadolinium is used during this highly specialized test.
- CT scan to look for calcium in the pericardium, fluid, inflammation, tumors and disease of the areas around the heart. Iodine dye is used during the test to get more information about the inflammation. This is an important test for patients who may need surgery for constrictive pericarditis.
- Cardiac catheterization to get information about the filling pressures in the heart. This is used to confirm a diagnosis of constrictive pericarditis.

Blood tests can be used to make sure you are not having a heart attack, to see how well your heart is working, test the fluid in the pericardium and help find the cause of pericarditis. If you have pericarditis, it is common for your sedimentation rate (ESR) and ultra-sensitive C reactive protein levels (markers of inflammation) to be higher than normal. You may need other tests to check for autoimmune diseases like lupus and rheumatoid arthritis.

Contra-indications

Long-term drainage

Pericardiocentesis is a one-off procedure, which may not be appropriate for long-term drainage. In cases where longer term drainage is needed, the cardiothoracic surgeon can create a pericardial window. This involves the removal of a section of the pericardium, and the placement of a chest tube.

Aortic dissection

Pericardiocentesis is not appropriate if cardiac tamponade is associated with aortic dissection. In this case, there is a high risk of the procedure worsening this aortic dissection by causing hemorrhage.

Diagnosis of pericardial effusion

Pericardiocentesis is not usually useful for diagnosis of more minor pericardial effusion.

Risks

Less than 1.5% of patients experience complications from Pericardiocentesis. The most common complications are lacerations of coronary arteries, and puncture of the left ventricle (with associated bleeding from both). Echocardiograms can help to identify complications. Blind approaches are typically only advised in emergencies, and a guided approach is typically preferred (using echocardiography).

Technique

Position

The patient undergoing Pericardiocentesis is positioned supine with the head of the bed raised between a 30 and 60 degree angle. This places the heart in proximity to the chest wall for easier insertion of the needle into the pericardial sac. Anatomically, the procedure is carried out under the xiphoid process, up and leftwards.

Process

Pericardiocentesis is usually performed using a local anaesthetic. A wide-bore catheter is inserted. More modern procedures may be performed in a cardiac catheterization lab.

There are two locations that Pericardiocentesis can be performed without puncturing the lungs.

The most standard location is through the infrasternal angle and is also called subxiphoid approach. The needle is inserted at an angle between 30 and 45 degrees to the chest.

Another location is through the 5th or 6th intercostal space at the left sternal border at the cardiac notch of the left lung, and is also called as parasternal approach. The needle is inserted at an angle of 90 degrees to the chest. Some evidence suggests that this poses lower risk of vascular damage in adults.

Intraoperative assessment

Pericardiocentesis is generally done under ultrasound guidance to minimize complications. An electrocardiogram (ECG) is continuously recorded during Pericardiocentesis to assess for complications.

The Pericardium

The pericardium is a thin, two-layered, fluid-filled sac that covers the outer surface of the heart. It provides lubrication for the heart, shields the heart from infection and malignancy, and contains the heart in the chest wall. It also keeps the heart from over-expanding when blood volume increases, which keeps the heart functioning efficiently.

MANAGEMENT AND TREATMENT

What treatments are available for patients with pericarditis?

Medications

Treatment for acute pericarditis may include medication for pain and inflammation, such as ibuprofen and aspirin. Depending on the cause of your pericarditis, you may need an antibiotic or antifungal medication.

If your symptoms are severe, last longer than 2 weeks, or clear up and then return, your doctor may also prescribe an anti-inflammatory drug called colchicine. Colchicine can help control the inflammation and prevent pericarditis from returning weeks or even months later.

If you need to take large doses of ibuprofen, your doctor may prescribe medications to ease gastrointestinal symptoms. If you take large doses of

nonsteroidal anti-inflammatory drugs (NSAIDs), you will need frequent follow-up appointments to look for changes in your kidney and liver function.

If you have chronic or recurrent pericarditis, you may need to take NSAIDs or colchicine for several years, even if you feel well. A diuretic ("water pill") usually helps get rid of the extra fluid caused by constrictive pericarditis. If you develop a heart rhythm problem, your doctor will talk to you about treatment.

Your doctor may also talk to you about treatment with steroids or other medications, such as azathioprine, IV human immunoglobulin, and anaconda.

Other treatments

Most times, medications are the only treatment needed for patients with pericarditis. But, if fluid builds up in the pericardium and compresses the heart, you may need a procedure called Pericardiocentesis. A long, thin tube called a catheter is used to drain the extra fluid. The catheter and a needle are guided to the pericardium with the use of echocardiography. If the fluid cannot be drained with the needle, a surgical procedure called a pericardial window is performed.

If you have constrictive pericarditis, you may need to have some of your pericardium removed. The surgery is called a pericardiectomy.

Surgery is not usually used as treatment for patients with recurrent pericarditis, but your doctor may talk to you about it if other treatments aren't successful.

Here are some key points about pericarditis. More detail and supporting information is in the main article.

- Pericarditis is a swelling of the pericardium, a sack-like tissue that contains the heart.
- The condition can have a number of causes, including bacterial or viral infection, parasites, or fungus.
- Most commonly, pericarditis is due to a virus.

- Symptoms of pericarditis include palpitations, a dry cough, and pain in the shoulder.
- In rare cases, pericarditis can permanently scar the pericardium.

SRI LAKSHMI NARAYANA INSTITUTE OF ALLIED HEALTH SCIENCE

MEDICAL EDUCATIONAL PROJECT

Pericardiocentesis - VAC02/AHS/2019-16/09

SlNo.	Name of the Students	University Register Number	Signature
1	**AKSHARA S**	**UAH1902203**	
2	**ANGEL ABRAHAM**	**UAH1902204**	
3	**ASWIN S**	**UAH1902205**	
4	**ATHIRA S RAJ**	**UAH1902206**	
5	**BARANI U**	**UAH1902207**	
6	**BUVANESWARI V**	**UAH1902208**	
7	**ELANTHIRAIYAN NS**	**UAH1902209**	
8	**GETZI R**	**UAH1902210**	
9	**GNANARITHICA G**	**UAH1902211**	
10	**GOKULDASSAN A**	**UAH1902212**	
11	**HARIHARASUDAN RM**	**UAH1902213**	
12	**HARINI H**	**UAH1902214**	
13	**INDUMATHI K**	**UAH1902215**	
14	**JAGADESHWARAN S**	**UAH1902216**	
15	**JANANI M**	**UAH1902217**	
16	**KHAMIL MUBARAK P**	**UAH1902218**	
17	**KANIMOZHI G**	**UAH1902219**	
18	**KARUPPASAMY P**	**UAH1902220**	
19	**KAVYAMADHU**	**UAH1902221**	
20	**KRISHNA S .RAJU**	**UAH1902222**	
21	**MALLO DIPUNG**	**UAH1902223**	
22	**MINNU PRASAD**	**UAH1902224**	
23	**NANDHINI R**	**UAH1902225**	
24	**NAVYA R**	**UAH1902226**	

25	**NILA K**	**UAH1902227**	
26	**NIRANJAN DEVI D**	**UAH1902228**	
27	**PAVITHRA P**	**UAH1902229**	
28	**PEMMADA JEEVAN PRAMOD**	**UAH1902230**	
29	**PETREESHIA RUBINI A**	**UAH1902231**	
30	**PRAVEEN KUMAR K**	**UAH1902232**	

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14	JAGADESHWARAN S	UAH1902216	
15	JANANI M	UAH1902217	
16	KHAMIL MUBARAK P	UAH1902218	
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27	**PAVITHRA P**	**UAH1902229**	P. Pavithra
28	**PEMMADA JEEVAN PRAMOD**	**UAH1902230**	Pemmada Jeevan
29	**PETREESHIA RUBINI A**	**UAH1902231**	Petreeshia Rubini A
30	**PRAVEEN KUMAR K**	**UAH1902232**	K. Praveen Kumar

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - III

Assessment Form

Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry

Course code: VAC02/AHS/2019-16/09

Multiple Choice Question 10x2=20

1. What is the characteristic appearance of heart in cardiac tamponade?

   a. figure of 8 appearance
   b. wer vase heart
   c. coren sabot
   d. tear bottle heart

2. The three most common causes of cardiac tamponade are all accept?

   a. neoplastic disease
   b. idiopathic pericarditis
   c. pericardial effusion
   d. cardiac catheterization

3. What is the characteristic triad associated with cardiac tamponade?

   a. beck's triad
   b. sandblom's triad
   c. whipple's triad
   d. murphy's triad

4. All of the following are features of beck's triad except?

   a. soft or absent heart sounds
   b. hypotension
   c. jugular venous distension
   d. prominent y descent

5. All of the following are true about cardiac tamponade except?

   a. it can result by even 200 ml of fluid in the pericardial space , if it develops rapidly
   b. in slowly developing effusions more than 2000 ml of fluid can exist in the pericardial space
   c. the volume of fluid required to produce cardiac tamponade varies directly with the thickness of

the ventricular myocardium
d. the volume of fluid required to produce cardiac tamponade varies directly with the thickness of parietal pericardium

6. Which of these features aid in the diagnosis of cardiac tamponade?

a. Pulse paradoxes
b. Enlarged heart on chest radiograph
c. A kinesis of left ventricular wall on echocardiography
d. Low amplitude ECG voltage
e. Quiet heart sounds

7. The following are true regarding pericardial fluid:

a. its presence always confirms the diagnosis of tamponade
b. The normal volume of pericardial fluid is 15-20ml
c. Echocardiographic estimation of pericardial fluid volume strongly predicts clinical haemodynamic compromise
d. It has an exponential pressure volume relationship
e. Pericardiocentesis is only diagnostic in the management of cardiac tamponade

8. The following are true regarding the management of cardiac tamponade:

a. Pericardiocentesis is indicated in all forms of cardiac tamponade
b. Treatment involves careful fluid resuscitation and inotropes
c. Echocardiographic evidence of chamber collapse predicts a positive fluid responsiveness
d. Emergency drainage is indicated in tamponade with incipient cardiac arrest
e. Once the pericardial effusion is drained it may be necessary to wean infusions of inotropes and vasopressors

9. Which of the following is least likely to cause constrictive pericarditis

a. Tuberculosis pericardial effusion
b. Staphylococcal effusion
c. Post cardiac surgery
d. acute rheumatic fever

10. A type of pericarditis that's known for sharp chest pains.

a. TB Pericarditis
b. Constrictive Pericarditis
c. Fibrous Pericarditis

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Nandhini.R.
VDH 190225

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - III

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Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry

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c. Fibrous Pericarditis

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Akshara. S
URH19022203

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - III

Assessment Form

Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry

Course code: VAC02/AHS/2019-16/09

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SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

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Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that **JANANI M (UAH1902217)** has actively participated in the Value Added Course on **Pericardiocentesis**(VAC02/AHS/2019-16/09) held during month Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

RESOURCE PERSON

Dr. G.Somasundram

COORDINATOR

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that **GETZI R(UAH1902210)** has actively participated in the Value Added Course on **Pericardiocentesis**(VAC02/AHS/2019-16/09) held during month Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

RESOURCE PERSON

Dr. G.Somasundram

COORDINATOR

5Annexure- V

Student Feedback Form

Course Name: Pericardiocentesis

Subject Code: VAC02/AHS/2019-16/09

Name of Student: _____Roll No.:

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Feedback Form

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. The course met my expectations.	○	○	○	○	○
2. I will be able to apply the knowledge learned.	○	○	○	○	○
3. The course objectives for each topic were identified and followed.	○	○	○	○	○
4. The content was organised and easy to follow.	○	○	○	○	○
5. The quality of instruction was good.	○	○	○	○	○
6. Class participation and interaction were encouraged.	○	○	○	○	○
7. Adequate time was provided for questions and discussion.	○	○	○	○	○

8. How do you rate the course overall?
   - ○ Excellent
   - ○ Good
   - ○ Average
   - ○ Poor
   - ○ Very poor

9. The aspects of the course could be improved?

10. Other comments?

Signature of the student:
Date:

5Annexure- V

Student Feedback Form

Course Name: **Pericardiocentesis**

Subject Code: VAC02/AHS/2019-16/09

Name of Student: ASWIN S Roll No.: UAH1902205

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Feedback Form

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. The course met my expectations.	✓	○	○	○	○
2. I will be able to apply the knowledge learned.	○	✓	○	○	○
3. The course objectives for each topic were identified and followed.	✓	○	○	○	○
4. The content was organised and easy to follow.	○	✓	○	○	○
5. The quality of instruction was good.	✓	○	○	○	○
6. Class participation and interaction were encouraged.	✓	○	○	○	○
7. Adequate time was provided for questions and discussion.	✓	○	○	○	○

8. How do you rate the course overall?
   - ✓ Excellent
   - Good
   - Average
   - Poor
   - Very poor

9. The aspects of the course could be improved?

No

10. Other comments?

The Class was Good.

Signature of the student: [signature]

Date: 12/9/19

5Annexure- V

Student Feedback Form

Course Name: **Pericardiocentesis**

Subject Code: VAC02/AHS/2019-16/09

Name of Student: Geetya Roll No.: DAH190222

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Feedback Form

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. The course met my expectations.	✓	○	○	○	○
2. I will be able to apply the knowledge learned.	○	✓	○	○	○
3. The course objectives for each topic were identified and followed.	✓	○	○	○	○
4. The content was organised and easy to follow.	✓	○	○	○	○
5. The quality of instruction was good.	○	✓	○	○	○
6. Class participation and interaction were encouraged.	○	✓	○	○	○
7. Adequate time was provided for questions and discussion.	✓	○	○	○	○

8. How do you rate the course overall?
   - ○ ✓ Excellent
   - ○ Good
   - ○ Average
   - ○ Poor
   - ○ Very poor

9. The aspects of the course could be improved?

10. Other comments? NO

The way of teaching was good.

Signature of the student:
Date: 12/9/19

Date: 15.09.2017

From

Dr.G.Somasundram
Department of Pharmacology,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To

The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: Pericardiocentesis

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: "**Pericardiocentesis"** September to October 2019 for 30 AHS Students. We solicit your kind action to send certificates for the participants that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards,

Dr.G.Somasundram

Encl: Certificates

Photographs



Sri Lakshmi Narayana Institute of Medical Sciences

Date: 14-09-2019

From

Dr.G.Somasundram
Principal of Allied Health Sciences,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

To

The Dean,
Sri Lakshmi Narayana Institute of Medical College
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: antihistamines

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **Antihistamines** from October to November 2019. We solicit your kind permission for the same.

Kind Regards

Dr.G.Somasundram

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: **Dr. Jayalakshmi**

The HOD: **Dr. Somasundram. G**

The Expert: **Dr. Antony**

The committee has discussed about the course and is approved.

Dean	Subject Expert	HOD
(Sign & Seal)	(Sign & Seal)	(Sign & Seal)

Dr. G. JAYALAKSHMI, BSC., MBBS., DTCD., M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Agaram, Kudapakkam Post,
Villianur Commune, Puducherry - 605502.

PRINCIPAL
Allied Health Sciences
Sri Lakshmi Narayana Institute of Allied Health Sciences
Osudu, Agaram Post, Puducherry - 605 502.

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affliated to Bharath University, Chennai - TN]

Circular

29.09.2019

Sub: Organizing Value-added Course: "Antihistamines ".reg

With reference to the above-mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research** is organizing **"Antihistamines"**. The course content and registration form is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before October to November 2019. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

Dr. G. JAYALAKSHMI, BSC., MBBS., DTCD., M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Agaram, Kudapakkam Post,
Villianur Commune, Puducherry - 605502.

Encl: Copy of Course content

VALUE ADDED COURSE

1. Name of the programme & Code

"Antihistamines" & VAC/AHS/2019-14/10

2. Duration & Period

30 hrs. & October to November 2019

3. Information Brochure and Course Content of Value-Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Assessment - *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

1 time October to November 2019

8. Year of discontinuation: 2020

9. Summary report of each program year-wise

Value Added Course- October to November 2019					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	**VAC03/AHS/2019-14/10**	Antihistamines	Dr. Antony	AHS	21 students October to November 2019

10. Course Feed Back

Enclosed as Annexure- V

RESOURCE PERSON

COORDINATOR
Dr.G.Somasundram

PRINCIPAL
Allied Health Sciences
Sri Lakshmi Narayana Institute of Allied Health Sciences
Osudu, Agaram Post, Puducherry - 605 502.

Course Proposal

Course Title: "**Antihistamines"**

Course Objective:

1. To enhance the performance skill in antihistamines.
2. To assess the objectives and protocols in antihistamines.
3. To assess the reaction of target allied Health students towards the antihistamines by getting their feedback.

Course Outcome: Improvement in the "Antihistamines"
Course Audience: Students of AHS Batch 2019
Course Coordinator: Dr.G.Somasundram
Course Faculties with Qualification and Designation:

1. Dr. Antony

Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Time	Hours
1.	14.10.2019	Introduction to antihistamines, Background, Objectives,	4-6p.m	2
2.	16.10.2019	What are allergies	2-4p.m	2
3.	18.10.2019	Introduction to allergies	4-6p.m	2
4.	19.10.2019	Substances or allergen's that cause allergies	4-6p.m	2
5.	21.10.2019	Symptoms of histamine	4-6p.m	2
6.	23.10.2019	Classification of antihistamines	4-6p.m	2
7.	24.10.2019	conventional didactic lecture and video	4-6P.M	2
8.	26.10.2019	Difference between second & first generation	4-6p.m	2
9.	28.10.2019	H1 first generation antihistamines	4-6p.m	2
10.	30.10.2019	H2 generation antihistamines	4-6p.m	2
11.	01.11.2019	Side effects of antihistamine	4-6p.m	2
12.	04.11.2019	Forms of antihistamines	4-6p.m	2
13.	05.11.2019	Pre course and Post Course evaluation, Feedback analysis from Likert scale	2-4p.m	2
13.	06.11.2019	Steps model explanation and various performance assessment methods	4-6p.m	2
14.	08.11.2019	Orientation of the students about the training program and assessment	2-4p.m	2
		Total		30 hrs

REFERENCE BOOKS:

1. Leslie G Grammer & Paul a Greenberg, Patterson's Allergic Diseases.
2. Ekaterini Tiligada & Madeleine Ennis, Histamine Receptors as Drug Target
3. Kevin Parker, a Clinical Guide to Allergic Diseases

Antihistamines

- Antihistamines are a class of drugs commonly used to treat symptoms of allergies.
- These drugs help treat conditions caused by too much histamine; a chemical created by your body's immune system.
- Antihistamines are a class of drugs commonly used to treat symptoms of pollen and other allergens. They are also used to treat a variety of other conditions such as stomach problems, colds, anxiety and more.

What are allergies?

- Your body protects you from many threats. Your ribs protect your heart and lungs from injury.
- Your skin protects your body from outside elements like sun, wind and bacteria that can cause disease and infections. Your eyelashes protect your eyes from debris.
- And your body's internal protection system – your immune system – battles substances that enter your body that are deemed "foreign."
- An allergy occurs when your immune system overreacts to the "foreign" substance.
- In the case of an allergy, substances that are usually harmless and don't bother some people, such as dust or animal dander, do bother you! Your body views these substances as "foreign," which then triggers an overreaction by your body's defense system that includes the release of histamine.
- The substances that trigger the overreaction are called allergens. The symptoms that result are called an allergic reaction.
- Allergies are one of the most common chronic conditions in the world. Some 40 million to 50 million people in the United States have them.

- **What is histamine?**

- Histamine is an important chemical that has a role in a number of different bodily processes.
- It stimulates gastric acid secretion, plays a role in inflammation, dilates blood vessels, affects muscle contractions in the intestines and lungs and affects your heart rate.
- It also helps transmit messages between nerve cells and helps fluids move through blood vessel walls. Histamine is also released if your body encounters a threat from an allergen.
- Histamine causes vessels to swell and dilate, leading to allergy symptoms.

What are some of the substances, or allergens, that cause allergies?

The top eight most common things that can cause an allergic reaction in some people include:

- Food.
- Dust.
- Pollen.
- Pet dander, saliva or urine.
- Mold.
- Insect bites and stings.
- Latex.
- Certain medications/drugs.

What allergic symptoms do histamines cause?

Too much histamine, caused by your body being oversensitive and overreacting to an allergen, causes a variety of symptoms. Symptoms include:

- Congestion, coughing.
- Wheezing, shortness of breath.
- Tiredness (fatigue).
- Itchy skin, hives and other skin rashes.
- Itchy, red, watering eyes.
- A running or blocked nose, or sneezing.
- Insomnia.

What are antihistamines?

An antihistamine is a prescription or over-the-counter medication that blocks some of what histamine does. “Anti” means against, so antihistamines are medicines that work against or block histamine.

How are antihistamines classified?

- Antihistamines are divided into two major subtypes. The first subtype is called H-1 receptor antagonists or H-1 blockers.
- This subtype of antihistamines is used to treat allergy symptoms. The second subtype is called H-2 receptor antagonists or H-2 blockers.
- They are used to treat gastrointestinal conditions, including gastroesophageal reflux disease [GERD] (also called acid reflux), peptic ulcers, gastritis, motion sickness, nausea and vomiting.
- The naming structure (H-1 and H-2) tells doctors and scientists the cell type the location of the histamine receptor that the antihistamine medication blocks.

- The H-1 blocker subtype is further broken down into two groups — first-generation antihistamines and second-generation antihistamines.

What’s the difference between first- and second-generation antihistamines?

- Just like the name implies, the first-generation antihistamine were the first type approved by the Food and Drug Administration (FDA).
- They began to be approved in the United States in the 1930s and are still prescribed today.
- They work on histamine receptor in the brain and spinal cord along with other types of receptors.
- Most notable about this generation of antihistamines is that they cross the blood-brain barrier, which results in drowsiness.
- Second-generation antihistamines were approved by the FDA and first came to market in the 1980s.
- The second-generation antihistamines do not cross the blood-brain barrier to the extent that first-generation do and therefore do not cause drowsiness at standard dosage levels.
- Second-generation antihistamines are considered to be safer than first generation antihistamines because they don't cause drowsiness and interact with fewer drugs.

What are some examples of H-1 first- and second-generation antihistamines and H-2 blockers?

There are many prescription and over-the-counter H-1 antihistamines. If you have allergies, you're likely taking a H-1 antihistamine. A few examples of first-generation over-the-counter and prescription H-1 blockers include:

- Brompheniramine (Children's Dimetapp Cold®).
- Chlorpheniramine (Chlor-Trimeton®).
- Clemastine (Dayhist®).
- Cyproheptadine (Periactin®).
- Dexchlorpheniramine Dimenhydrinate (Dramamine®).
- Diphenhydramine (Benadryl®).
- Doxylamine (Vicks NyQuil®, Tylenol Cold and Couth Nighttime®).

- Hydroxyzine (Vistaril®).
- Phenindamine (Nolahist®).

A few examples of second-generation over-the-counter and prescription H-1 blockers include:

- Azelastine (Astelin®).
- Loratadine (Claritin®).
- Cetirizine (Zyrtec®).
- Desloratadine (Clarinex®).
- Fexofenadine (Allegra®).

If you're taking an antihistamine to help with stomach issues, you're likely taking a H-2 antihistamine. A few examples of H-2 antihistamines include:

- Cimetidine (Tagamet HB®).
- Famotidine (Pepcid®).
- Nizatidine (Axid®).
- Ranitidine (Zantac®).

Besides allergies, what other medical conditions do antihistamines treat?

H-1 antihistamines treat:

- Allergic rhinitis/hay fever.
- Allergic conjunctivitis.
- Hives and other skin rashes.
- Colds.
- Food allergies.
- Hypersensitivity to certain drugs.
- Insect bites and stings.

First-generation H-1 antihistamines also treat:

- Insomnia.
- Motion sickness.
- Anxiety.

H-2 antihistamines treat:

- Heartburn.
- Gastroeophageal reflux disease (GERD).
- Duodenal and gastric ulcers.
- Zollinger-Ellison syndrome.

Other conditions antihistamines treat include:

- Anorexia.
- Headaches.
- Anaphylaxis.
- Vertigo.
- Parkinson's disease (to decrease stiffness and tremors).
- Some types of bone pain.

Your healthcare provider may prescribe antihistamines for even other conditions.

What are the side effects of antihistamines?

You and your healthcare provider should discuss specific antihistamines and decide together if the potential benefits of an antihistamine outweigh its potential side effects.

Some of the common side effects of first-generation antihistamines include:

- Drowsiness.

- Dry mouth, dry eyes.
- Blurred or double vision.
- Dizziness and headache.
- Low blood pressure.
- Mucous thickening in the airways.
- Rapid heart rate.
- Difficulty urinating and constipation.

Some of the common side effects of second-generation antihistamines include:

- Headache.
- Cough.
- Tiredness.
- Sore throat.
- Abdominal pain or discomfort
- Nausea or vomiting.

Common side effects of H-2 antihistamines include:

- Drowsiness.
- Joint or muscle pain.
- Headache.
- Confusion in the elderly.
- Dizziness.
- Breast swelling and tenderness.

what dosage forms are antihistamines available?

Antihistamines come in several forms including:

- Liquids.
- Lotions.
- Syrups.
- Gels.
- Eye drops.
- Tablets.
- Nasal sprays.
- Creams.
- Capsules.
- Suppositories

How do I know which antihistamine to take?

- If you need a prescription antihistamine, you and your healthcare provider will work together to figure out what medication will be best for you. Many drugs interact with antihistamines, so your healthcare provider will want to know what medical conditions you have and medications you are currently taking.
- They will also want to know if you are pregnant, plan to become pregnant or are breastfeeding.
- Some antihistamines are not recommended in pregnancy because they may cause birth defects in very high doses. Antihistamines can pass into breast milk, so you should consult with your healthcare provider before using antihistamines if you are breastfeeding.
- Children and the elderly are more sensitive to the effects of antihistamines, so special consideration will be given to the use of these products in these patients.
- Never give over-the-counter cough and cold antihistamines to children under four years of age.

These medications can cause life-threatening side effects.

Can antihistamines cause fever?

Fever is not one of the side effects of antihistamines.

Can antihistamines cause constipation?

Yes, some antihistamines, such as diphenhydramine, do cause constipation as a side effect.

Can antihistamines cause dizziness?

Yes. Dizziness is a common side effect of some antihistamines.

Can antihistamines cause depression?

One study of 92 people with chronic itchiness saw that patients who took the antihistamines cetirizine and hydroxyzine reported an increase in depression and anxiety. The effects of all antihistamines on mood disorders have yet to be studied.

Can antihistamines cause high blood pressure?

If you're already taking medication for high blood pressure, combining that with an antihistamine can increase your heart rate and raise your blood pressure. Talk to your healthcare provider about your options.

Can antihistamines cause weight gain?

Antihistamines can cause you to gain weight, yes. One antihistamine, cyproheptadine, is used for that reason. Histamine is known to reduce your appetite, so antihistamines cancel that out.

What antihistamines can you take together?

Antihistamines should not be combined unless directed to do so by your healthcare provider under their guidance and supervision. Antihistamines should be used only as directed or you could experience serious side effects. Read labels very carefully.

What should I do if antihistamines don't work?

Talk to your regular healthcare provider, your pharmacist or get an allergist to help you find ways to treat your allergies. Some allergies can be treated with decongestants or immunotherapy.

Can I take antihistamines if I'm pregnant or breastfeeding?

It's safest to talk to your healthcare provider if you are pregnant, planning to become pregnant or are breastfeeding. Animal studies have shown that some antihistamines can cause birth defects. Small amounts of antihistamines pass on to your baby if you breastfeed. For these reasons your healthcare provider will want to talk with you and make careful choices (or different choices) if there is any concern for your or your child's safety.

Are antihistamines safe for dogs?

Diphenhydramine is a common medication used to treat allergies, hives, food allergies, anxiety and other conditions in dogs. However, you should consult your veterinarian about the use of diphenhydramine in your pet. The dosage in dogs is based on their weight plus your veterinarian will want to examine your dog to be sure an antihistamine is the correct drug for the correct diagnosis. If an antihistamine is needed, your veterinarian will want to

prescribe a brand that is specific to animals and at a dosage correct for your pet.

Do antihistamines cause dementia?

Long term use of some antihistamines may increase your risk of dementia. Diphenhydramine (Benadryl®) blocks the effects of a neurotransmitter called acetylcholine. This neurotransmitter is vital for memory and learning. Diphenhydramine increased the risk of dementia by 54% in one 3,000 patient study followed for seven years.

What questions should I ask my healthcare provider?

- What type of antihistamine would work best for me?
- How do I proper take the prescribed antihistamine?
- What side effects might occur with the recommended medication?
- What antihistamine won't interfere with the current medications I am taking?
- When, or for what conditions, does taking an antihistamine that would make me drowsy make sense?
- Can I live my life normally while using this medication? Can I drive? Can I operate heavy machinery?
- Can I take antihistamines if I am pregnant, planning to become pregnancy or am breastfeeding?
- Can antihistamines be safely given to my child?
- What are the consequences if I don't take an antihistamine to help with my allergies?

A note from Cleveland Clinic

- Histamine is on your side. The chemical does its best to regulate help your heart and lungs and protect your body from foreign allergens, among other roles.
- But it can be oversensitive, and it can overreact, and that's where antihistamines can help.
- If you're have allergies, stomach symptoms or any of the other conditions and symptoms mentioned in this article, talk to your healthcare provider about your options. Your symptoms may be able to be treated.

Summary

- Most healthcare providers recommend using second- or third-generation antihistamines to treat mild to moderate allergy symptoms, including congestion, watery eyes, and itchy skin.
- People can still buy first-generation antihistamines. However, these forms can cause drowsiness and sedation.
- People can choose between a wide range of antihistamines in drugs stores and online.
- Parents and caregivers may want to consult a health care professional before giving an antihistamine to a child, especially if the child is 12 years old or younger.



Table. Commonly available antihistamines

Antihistamine	Generation and classification	Common trade names
Chlorpheniramine	First, sedating	Chlor-Trimeton
Brompheniramine	First, sedating	Dimetapp
Diphenhydramine	First, sedating	Benadryl
Cetirizine	Second, nonsedating	Zrytec
Levocetirizine	Second, nonsedating	Xyzal
Loratadine	Second, nonsedating	Claritin
Desloratadine	Second, nonsedating	Clarinex
Fexofenadine	Second, nonsedating	Allegra

SRI LAKSHMI NARAYANA INSTITUTE OF ALLIED HEALTH SCIENCE

MEDICAL EDUCATIONAL PROJECT

Antihistamine - VAC03/AHS/2019-14/10

SlNo.	Name of the Students	University Register Number	Signature
1	**PUNNYA PRAKASH**	**UAH1902233**	
2	**RAHUL A**	**UAH1902234**	
3	**RANGANAYAGI P**	**UAH1902235**	
4	**SABIR KS**	**UAH1902236**	
5	**SANJAY K**	**UAH1902237**	
6	**SARATH KRISHNAN R**	**UAH1902238**	
7	**SINDHU P**	**UAH1902240**	
8	**SREE BHAGYA V**	**UAH1902241**	
9	**SURIYA GAYATHIRI S**	**UAH1902242**	
10	**USHA RANI B**	**UAH1902243**	
11	**VENKADALAKSMI A**	**UAH1902244**	
12	**VIGNESHWARAN V**	**UAH1902245**	
13	**VISHNU PRIYA MADHU**	**UAH1902246**	
14	**VIVEDHA K**	**UAH1902247**	
15	**VYSHNAV KRISHNAN C**	**UAH1902248**	
16	**YUKESH S**	**UAH1902249**	
17	**HRIDHIK DINAKAR**	**UAH1907101**	
18	**MOHAMMED NIZHAMUDHEEN MV**	**UAH1907102**	
19	**MOHAMMEDNIHAD K M**	**UAH1907103**	
20	**NANDHU P. R**	**UAH1907104**	
21	**REEHANA U**	**UAH1907105**	

SRI LAKSHMI NARAYANA INSTITUTE OF ALLIED HEALTH SCIENCE

MEDICAL EDUCATIONAL PROJECT

Antihistamine - VAC03/AHS/2019-14/10

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1	PUNNYA PRAKASH	UAH1902233	
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5	SANJAY K	UAH1902237	
6	SARATH KRISHNAN R	UAH1902238	
7	SINDHU P	UAH1902240	
8	SREE BHAGYA V	UAH1902241	
9	SURIYA GAYATHIRI S	UAH1902242	
10	USHA RANI B	UAH1902243	
11	VENKADALAKSMI A	UAH1902244	
12	VIGNESHWARAN V	UAH1902245	
13	VISHNU PRIYA MADHU	UAH1902246	
14	VIVEDHA K	UAH1902247	
15	VYSHNAV KRISHNAN C	UAH1902248	
16	YUKESH S	UAH1902249	
17	HRIDHIK DINAKAR	UAH1907101	
18	MOHAMMED NIZHAMUDHEEN MV	UAH1907102	
19	MOHAMMEDNIHAD K M	UAH1907103	
20	NANDHU P. R	UAH1907104	
21	REEHANA U	UAH1907105	

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - III

Assessment Form

Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry

Course code: VAC03/AHS/2019-14/10

Multiple Choice Question 10x2=20

1. Antihistamines are a class of drugs commonly used to treat symptoms of ……..
    a) **A**llergies
    b) Rashes
    c) Both a&b
    d) None of the above
2. An allergy occurs when your immune system overreacts to the ……substance.
    a) Pollen
    b) Foreign
    c) dust
    d) None of the above
3. ……..is an important chemical that has a role in a number of different bodily processes
    a) Antihistamine
    b) Histamine
    c) Heparin
    d) All of the above
4. An example for the allergic reaction
    a) Pollen
    b) Pollution
    c) Radiation
    d) None of the above
5. Identify the symptom of the histamines……
    a) Fever
    b) Dizziness
    c) Congestion & coughing
    d) Headache

6. An ……. is a prescription or over-the-counter medication that blocks some of what histamine does
    a) Antihistamines
    b) Histamines
    c) Both a &b
    d) None of the above
7. Examples for H1 receptors
    a) Chlorpheniramine
    b) Pheniramine
    c) Cyclophrenine
    d) None of the above
8. H1 receptors are used to treat……..
    e) Allergic conjunctivitis
    f) Fever
    g) Rashes
    h) None of the above
9. Example for H2 receptors……
    a) Ranitidine
    b) Ranitidine
    c) Chlorpheniramine
    d) Pheniramine
10. H-2 antihistamines treat
    a) Heart burn
    b) Heart attack
    c) Allergic conjunctivitis
    d) None of the above

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

SREE BHAGYA.
JAH19022241

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - III

Assessment Form

Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry

Course code: VAC03/AHS/2019-14/10

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SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

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9. Example for H2 receptors.....
    a) Ranitidine
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SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

REEHANA. O
UA U L90711105

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - III

Assessment Form

Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry

Course code: VAC03/AHS/2019-14/10

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   b) Dizziness
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   d) Headache

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

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Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that **RAHUL A(UAH1902234)** has actively participated in the Value Added Course on **Antihistamines VAC03/AHS/2019-14/10** held October to November 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

RESOURCE PERSON

Dr. G.Somasundram

COORDINATOR

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that **VIGNESHWARAN V(UAH1902245)** has actively participated in the Value Added Course on **Antihistamines VAC03/AHS/2019-14/10** held October to November 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

RESOURCE PERSON

Dr. G.Somasundram

COORDINATOR

5Annexure- V

Student Feedback Form

Course Name: ANTIHISTAMINES

Subject Code: VAC03/AHS/2019-14/10

Name of Student: _____Roll No.:

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Feedback Form

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. The course met my expectations.	○	○	○	○	○
2. I will be able to apply the knowledge learned.	○	○	○	○	○
3. The course objectives for each topic were identified and followed.	○	○	○	○	○
4. The content was organised and easy to follow.	○	○	○	○	○
5. The quality of instruction was good.	○	○	○	○	○
6. Class participation and interaction were encouraged.	○	○	○	○	○
7. Adequate time was provided for questions and discussion.	○	○	○	○	○

8. How do you rate the course overall?
   - ○ Excellent
   - ○ Good
   - ○ Average
   - ○ Poor
   - ○ Very poor

9. The aspects of the course could be improved?

10. Other comments?

Signature of the student:
Date:

5Annexure- V

Student Feedback Form

Course Name: ANTIHISTAMINES

Subject Code: VAC03/AHS/2019-14/10

Name of Student: VIVEDHA A.K Roll No.: UAM19D2247

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Feedback Form

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. The course met my expectations.	✓	○	○	○	○
2. I will be able to apply the knowledge learned.	○	✓	○	○	○
3. The course objectives for each topic were identified and followed.	✓	○	○	○	○
4. The content was organised and easy to follow.	○	○	✓	○	○
5. The quality of instruction was good.	✓	○	○	○	○
6. Class participation and interaction were encouraged.	○	✓	○	○	○
7. Adequate time was provided for questions and discussion.	○	✓	○	○	○

8. How do you rate the course overall?
   - ✓ Excellent
   - Good
   - Average
   - Poor
   - Very poor

9. The aspects of the course could be improved? No

10. Other comments?
The was interesting

Signature of the student: Vivedha

Date: 8.11.2019

5Annexure- V

Student Feedback Form

Course Name: ANTIHISTAMINES

Subject Code: VAC03/AHS/2019-14/10

Name of Student: HRIDHIK DINAKAR Roll No.: UAH190710

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Feedback Form

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. The course met my expectations.	✓	o	o	o	o
2. I will be able to apply the knowledge learned.	o	✓	o	o	o
3. The course objectives for each topic were identified and followed.	✓	o	o	o	o
4. The content was organised and easy to follow.	o	o	✓	o	o
5. The quality of instruction was good.	✓	o	o	o	o
6. Class participation and interaction were encouraged.	o	✓	o	o	o
7. Adequate time was provided for questions and discussion.	o	✓	o	o	o

8. How do you rate the course overall?
   - o Excellent
   - ✓ Good
   - o Average
   - o Poor
   - o Very poor

9. The aspects of the course could be improved? NO

10. Other comments? The class was good and from the Pratical class we learnt a lot

Signature of the student: Hridhik

Date: 8.11.2019

Date: 10.11.2019

From

Dr.G.Somasundram
Department of Pharmacology,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To

The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: Antihistamines

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: **Antihistamines** from October to November 2019 for 21 AHS Students. We solicit your kind action to send certificates for the participants that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards,

Dr.G.Somasundram

Encl: Certificates

Photographs



Sri Lakshmi Narayana Institute of Medical Sciences

Date: 14.10.2019

From

Dr.G.Somasundram
Principal of Allied Health Sciences,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

To

The Dean,
Sri Lakshmi Narayana Institute of Medical College
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: "CLINICAL PAHARMACOLOGY"

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **"CLINICAL PAHARMACOLOGY"** from. We solicit your kind permission for the same.

Kind Regards

Dr.G.Somasundram

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: **Dr. Balagurunathan. K**

The HOD: **Dr. Somasundram. G**

The Expert: **Dr. Sumitra**

The committee has discussed about the course and is approved.

Dean	Subject Expert	HOD
(Sign & Seal)	(Sign & Seal)	(Sign & Seal)

DEAN
Prof.K.BALAGURUNATHAN,M.S
(General surgeon)
SRI LAKSHMI NARAYANA
INSTITUTE OF MEDICAL SCIENCES
OSUDU PONDICHERRY

PRINCIPAL
Allied Health Sciences
Sri Lakshmi Narayana Institute of Allied Health Sciences
Osudu, Agaram Post, Puducherry - 605 502.

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affliated to Bharath University, Chennai - TN]

Circular

04.11.2019

Sub: Organizing Value-added Course: "CLINICAL PAHARMACOLOGY".**reg**

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research** is organizing **"CLINICAL PAHARMACOLOGY"**. The course content and registration form is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before November to December 2019. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

DEAN
Prof.K.BALAGURUNATHAN,M.S
(General surgeon)
SRI LAKSHMI NARAYANA
INSTITUTE OF MEDICAL SCIENCES
OSUDU PONDICHERRY

Encl: Copy of Course content

VALUE ADDED COURSE

1. Name of the programme & Code

"CLINICAL PAHARMACOLOGY" & VAC04/AHS/2019-18/11

2. Duration & Period

30 hrs. & November to December 2019

3. Information Brochure and Course Content of Value-Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Assessment - *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

1-time November to December 2019

8. Year of discontinuation: 2020

9. Summary report of each program year-wise

Value Added Course- November to December 2019					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	VAC04/AHS/2019-18/11	**"CLINICAL PAHARMACOLOGY"**	**Dr. Sumitra**	AHS	30 students October to December 2019

10. Course Feed Back

Enclosed as Annexure- V

RESOURCE PERSON

COORDINATOR
Dr. G Somasundaram

PRINCIPAL
Allied Health Sciences
Sri Lakshmi Narayana Institute of Allied Health Sciences
Osudu, Agaram Post, Puducherry - 605 502.

Course Proposal

Course Title: "**CLINICAL PHARMCOLOGY"**

Course Objective:

1. To enhance the performance skill in Clinical Pharmacology.
2. To assess the objectives and protocols in Clinical Pharmacology.
3. To assess the reaction of target allied Health students towards the Clinical Pharmacology by getting their feedback.

Course Outcome: Improvement in the "CLINICAL PHARMCOLOGY"
Course Audience: Students of AHS Batch 2019
Course Coordinator: Dr. G. Somasundaram
Course Faculties with Qualification and Designation:
1.Dr. Sumitra
Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Time	Hours
1.	18.11.2019	Introduction to Clinical pharmacology	4-5p.m	1
2.	19.11.2019	Principles Clinical pharmacology	2-3p.m	1
3.	20.11.2019	Pharmacodynamics	4-5p.m	1
4.	21.11.2019	Pharmacokinetics	4-5p.m	1
5.	22.11.2019	Routes of drug administration	4-5p.m	1
6.	23.11.2019	Advantages of oral route and Disadvantages of oral route	4-5p.m	1
7.	25.11.2019	Bioavailability	4-5P.M	1
8.	26.11.2019	Factors affecting drug absorption and bioavailability	4-5p.m	1
9.	27.11.2019	Distribution of drugs and Factors determining the rate of distribution of drugs	4-5p.m	1
10.	28.11.2019	Plasma concentration of drug (PC)	4-5p.m	1
11.	29.11.2019	metabolism of drugs and Enzymes responsible for metabolism of drugs	4-5p.m	2
12.	30.11.2019	Excretion of drugs and Different routes of drug excretion	4-5p.m	1
13.	02.12.2019	Drug safety and effectiveness	2-3p.m	1
14.	03.12.2019	Factors modifying the dosage and action of drugs	4-5p.m	1
15.	04.12.2019	Acetylation and hydroxylation of drugs	4-5p.m	1
16.	05.12.2019	Pharmaceutical drug interactions and	3-5p.m	2

		Pharmacokinetic drug interactions		
17.	06.12.2019	Interactions during biotransformation	3-5p.m	2
18.	07.12.2019	Enzyme inhibitors: Disulfiram, isoniazid, allopurinol, cimetidine, etc.	4-5p.m	1
19.	09.12.2019	Drug tolerance, Emotional factors, Adverse drug reactions	4-5p.m	1
20.	10.12.2019	Side effects are intact pharmacological effects	3-5p.m	2
21.	11.12.2019	Untoward effects and Allergic reactions	4-5p.m	1
22.	12.12.2019	Development and evaluation of new drugs	4-5p.m	1
23.	13.12.2019	Assessment procedure and giving feedback in weaker areas	1-5p.m	4
		Total		30hrs

REFERENCE BOOKS:

1. Aronson JK. A manifesto for clinical pharmacology from principles to practice. Br J Clin Pharmacol 2010; 70: 3–13.
2. Martin, Jennifer H., David Henry, Jean Gray, Richard Day, Felix Bochner, Albert Ferro, Munir Pirmohamed, Klaus Mörike, and Matthias Schwab. "Achieving the World Health Organization's vision for clinical pharmacology." British journal of clinical pharmacology 81, no. 2 (2016): 223-227.
3. https://ascpt.onlinelibrary.wiley.com/hub/journal/15326535/aims-and-scope/read-full-aims-and-scope
4. *Atkinson, Arthur (2012). Principles of clinical pharmacology. London: Elsevier Academic Press. ISBN 978-0123854711.*
5. *Ambrose, Paul G (January 2007). Pharmacokinetics-Pharmacodynamics of Antimicrobial Therapy, Clinical Infectious Diseases, Volume 44, Issue 1.*

"CLINICAL PHARMACOLOGY"

What is Clinical Pharmacology?

Clinical pharmacology is the study of drugs in humans.

It is underpinned by the basic science of pharmacology, with added focus on the application of pharmacological principles and methods in the real world. It has a broad scope, from the discovery of new target molecules, to the effects of drug usage in whole populations.

Clinical pharmacologists are physicians, pharmacists, and scientists whose focus is developing and understanding new drug therapies. Clinical pharmacologists work in a variety of settings in academia, industry and government. In the laboratory setting they study biomarkers, pharmacokinetics, drug metabolism and genetics. In the office setting they design and evaluate clinical trials, create and implement regulation guidelines for drug use, and look at drug utilization on local and global scales. In the clinical setting they work directly with patients, participate in experimental studies, and investigate adverse reactions and interactions.

Clinical Pharmacology, in theory, has been practiced for centuries through observing the effects of herbal remedies and early drugs on humans. Most of this work was done through trial and error. In the early 1900s, scientific advances allowed scientists to combine the study of physiological effects with biological effects. This led to the first major breakthrough when scientists used clinical pharmacology to discover insulin. Since that discovery clinical pharmacology has expanded to be a multidisciplinary field and has contributed to the understanding of drug interaction, therapeutic efficacy and safety in humans. Over time clinical pharmacologists have been able to make more exact measurements and personalize drug therapies.

Part 2 Aspects of therapeutics

Introduction to Pharmacology

A. Definitions:

1. **Pharmacology**: Pharmacology is the study of interaction of drugs with living organisms. It also includes history, source, physicochemical properties, dosage forms, and methods of Administration, absorption, distribution mechanism of action, biotransformation, Excretion, clinical uses and adverse effects of drugs.
2. **Clinical Pharmacology**: It evaluate the pharmacological action of drug preferred route of administration and safe dosage range in human by clinical trails.
3. **Drugs:** Drugs are chemicals that alter functions of living organisms. Drugs are generally given for the diagnosis, prevention, control or cure of disease.
4. **Pharmacy:** It is the science of identification, selection, preservation, standardization, Compounding and dispensing of medical substances.
5. **Pharmacodynamics:** The study of the biological and therapeutic effects of drugs (i.e, "what the drug does to the body").
6. **Pharmacokinetics:** Study of the absorption, distribution metabolism and excretion (ADME) of drugs ("i.e what the body does to the drug").
7. **Pharmacotherapeutics**: It deals with the proper selection and use of drugs for the Prevention and treatment of disease.
8. **Toxicology:** It's the science of poisons. Many drugs in larger doses may act as poisons. Poisons are substances that cause harmful, dangerous or fatal symptoms in living Substances.

9. **Chemotherapy:** It's the effect of drugs upon microorganisms, parasites and neoplastic Cells living and multiplying in living organisms.
10. **Pharmacopoeia**: An official code containing a selected list of the established drugs and Medical preparations with descriptions of their physical properties and tests for their Identity, purity and potency e.g. Indian Pharmacopoeia (I.P), British Pharmacopoeia (B.P).

B. Drugs are obtained from:

1. Minerals: Liquid paraffin, magnesium sulfate, magnesium trisilicate, kaolin, etc.
2. Animals: Insulin, thyroid extract, heparin and antitoxin sera, etc.
3. Plants: Morphine, digoxin, atropine, castor oil, etc.
4. Synthetic source: Aspirin, sulphonamides, paracetamol, zidovudine, etc.
5. Micro organisms: Penicillin, streptomycin and many other antibiotics.
6. Genetic engineering: Human insulin, human growth hormone etc.

Out of all the above sources, majority of the drugs currently used in therapeutics are from Synthetic source.

Principles of clinical Pharmacology

1. Pharmacodynamics and pharmacokinetics

2 Clinical trials and drug developments

Pharmacodynamics

Involves how the drugs act on target cells to alter cellular function.

A. Receptor and non-receptor mechanisms: Most of the drugs act by interacting with a

Cellular component called receptor. Some drugs act through simple physical or chemical

Reactions without interacting with any receptor.

• Receptors are protein molecules present either on the cell surface or with in the cell

E.g. adrenergic receptors, cholinoceptors, insulin receptors, etc.

• The endogenous neurotransmitters, hormones, autacoids and most of the drugs

Produce their effects by binding with their specific receptors.

• Aluminium hydroxide and magnesium trisilicate, which are used in the treatment of

Peptic ulcer disease act by non-receptor mechanism by neutralizing the gastric acid.

Many drugs are similar to or have similar chemical groups to the naturally occurring chemical

And have the ability to bind onto a receptor where one of two things can happen- either the

Receptor will respond or it will be blocked.

A drug, which is able to fit onto a receptor, is said to have affinity for that receptor. Efficacy is

The ability of a drug to produce an effect at a receptor. An agonist has both an affinity and

Efficacy whereas antagonist has affinity but not efficacy or intrinsic activity.

When a drug is able to stimulate a receptor, it is known as an agonist and therefore mimics the

Endogenous transmitter.

When the drug blocks a receptor, it is known as antagonist and therefore blocks the action of

The endogenous transmitter (i.e. it will prevent the natural chemical from acting on the receptor).

However, as most drug binding is reversible, there will be competition between the drug and the

Natural stimulus to the receptor.

The forces that attract the drug to its receptor are termed chemical bonds and they are (a)

Hydrogen bond (b) ionic bond (c) covalent bond (d) Vander walls force. Covalent bond is the

Strongest bond and the drug-receptor complex is usually irreversible.

K1 K3

DR Biological effect

D+R K2

Where D = Drug, R= receptor DR= Drug receptor complex (affinity)

K1 = association constant

K2 = dissociation constant

K3 = intrinsic activity

When first messengers like neurotransmitters, hormones, autacoids and most of drugs bind with

Their specific receptors, the drug receptor complex is formed which subsequently causes the synthesis and release of another intracellular regulatory molecule termed as second messengers e.g. cyclic AMP, calcium, cyclic GMP, inositol triphosphate (IP3), diacylglycerol and calmodulin which in turn produce subcellular or molecular mechanism of drug action.

B. Site of drug action:

- A drug may act:

(I) intracellular e.g.: osmotic diuretics, plasma expanders.

(ii) On the cell surface e.g.: digitalis, penicillin, catecholamines

(iii) Inside the cell e.g.: anti-cancer drugs, steroid hormones.

C. Dose Response relationship

The exact relationship between the dose and the response depends on the biological object under observation and the drug employed.

When a logarithm of dose as abscissa and responses as ordinate are constructed graphically, the “S” shaped or sigmoid type curve is obtained.

The lowest concentration of a drug that elicits a response is minimal dose, and the largest concentration after which further increase in concentration will not change the response is the maximal dose.

1. **Graded dose effect:**
   As the dose administered to a single subject or tissue increases, the Pharmacological response also increases in graded fashion up to ceiling effect.
   - It is used for characterization of the action of drugs. The concentration that is required to Produce 50 % of the maximum effect is termed as EC50 or ED50.
2. **Quantal dose effect:**
   - It is all or none response, the sensitive objects give response to small Doses of a drug while some will be resistant and need very large doses. The quantal doseeffect curve is often characterized by stating the median effective dose and the median lethal dose.

Median lethal dose or LD50:

This is the dose (mg/kg), which would be expected to kill one Half of a population of the same species and strain.

Median effective dose or ED50:

This is the dose (mg/kg), which produces a desired Response in 50 per cent of test population.

Therapeutic index:

It is an approximate assessment of the safety of the drug. It is the ratio of the median lethal dose and the median effective dose. Also called as therapeutic window

Or safety.

The larger the therapeutic index, the safer is the drug. Penicillin has a very high therapeutic Index, while it is much smaller for the digitalis preparation.

D. Structural activity relationship

The activity of a drug is intimately related to its chemical structure. Knowledge about the Chemical structure of a drug is useful for:

(i) Synthesis of new compounds with more specific actions and fewer adverse Reactions

(ii) Synthesis of competitive antagonist and

(iii) Understanding the mechanism of drug action.

Slight modification of structure of the compound can change the effect completely.

PHARMACOKINETICS

Pharmacokinetics deals with the absorption, distribution, metabolism and excretion drugs in the body.

A. **Biotransport of drug:** It is translocation of a solute from one side of the biological barrier to the other.

1. Structure of biological membrane:

The outer surface of the cell covered by a very thin structure known as plasma membrane. It is composmembrane proteins have many functions like (a) contributing structure to the membrane (b) acting as enzyme (c) acting as carrier for transport of substances (d) acting as receptors. The

plasma membrane is a semipermeable membrane allowing certain chemical substances to pass freely e.g. it allows water, glucose, etc. but it won't allow sucrose until it is converted into glucose and fructoseis converted into glucose and fructose.

2. Passage of drug across membrane:

(a) Passive transfer

I) Simple diffusion

ii) Filtration

(b) Specialized transport

I) Facilitated diffusion

ii) Active transport

iii) Endocytosis.

(a) I) Simple diffusion:

Movement of a solute through a biological barrier from the phase of higher concentration to phase of lower concentration. No need of energy e.g. highly Lipid soluble drugs

ii) Filtration:

Is the process by which water soluble drug of relatively low molecular weight crosses the plasma membrane through pores as a result of hydrodynamic pressure gradient across the membrane e.g. urea and ethylene glycol.

(b) I) Facilitated diffusion:

It means the passage of drug across the biological membrane along the concentration gradient by the protein carrier mediated system also called as carrier mediated diffusion. It depends on number of carrier e.g. tetracycline, pyrimidine

ii) Active transport:

The process by which drugs pass across the biological membrane most often against their gradient with the help of carriers along with the expenditure of energy e.g. alpha methyl dopa, levodopa, 5-fluoro-uracil, 5 bromouracil.

iii) Endocytosis:

It is the process by which the large molecules are engulfed by the cell
Membrane and releases them intracellularly e.g. protein, toxins (botulinum, diphtheria)

Characteristics	**Simple diffusion**	**Facilitated**	**Active transport**
Incidence	Commonest	Less common	Least common

Process	Slow	Quick	Very quick
Movement	Along concentration gradient	Along concentration gradient	Against concentration gradient
Carrier	Not needed	Needed	Needed
Energy	Not needed	Not required	Required

B. **Drug absorption**:

Absorption is the process by which the drug enters in to the systemic Circulation from the site of administration through biological barrier. In case of intravenous or Intra-arterial administration the drug bypasses absorption processes and it enters into the Circulation directly.

1. **Routes of drug administration**:

a) From the alimentary tract:
   (i) Buccal cavity: e.g. nitrates
   (ii) Stomach: e.g. aspirin, alcohol
   (iii) Intestine: e.g. most of non ionized and ionized drugs.
   (iv) Rectum: e.g. rectal suppositories, bisacodyl laxatives.

Advantages of oral route: This route is safe, convenient and economical.
Disadvantages of oral route: Onset of drug action is slow, irritant drugs cannot be Administered and it is not useful in vomiting and severe diarrhea, gastric acid and digestive Enzymes may destroy some drugs, and water soluble drugs are absorbed poorly.

1. Routes of drug administration:

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b) **From the parenteral route**:

   (i) **Intradermal**: This is given into the layers of the skin e.g. B.C.G. vaccine
   (ii) **Subcutaneous:** Non-irritant substances are given into subcutaneous tissue e.g. insulin
   (iii) **Intramuscular:** Soluble substances, mild irritants, suspensions and colloids can be injected by this route. These injections can be given to deltoid or gluteal muscle. This Route is one of the more common routes e.g. multivitamins, streptomycin, etc.

Advantages:

Rate of absorption is uniform, onset of action is faster than oral and It can be given in diarrhoea or vomiting.

Disadvantages:

Pain at local site of injection, the volume of injection should not Exceed 10 ml.

(iv) Intravenous: Drugs directly given into a vein, produce rapid action, no need of Absorption as they enter directly into blood, can be given as bolus e.g. furosemide, Morphine, dopamine or as continous infusion e.g. fluids during shock or Dehydration.

Advantages: It can be given in large volumes, production of desired blood Concentration can be obtained with a well designed dose.

Disadvantages: Drug effect cannot be halted if once the drug is injected, Expertise is needed to give injection.

(v)Intrathecal: Injected into subarachnoid space of spinal cord e.g. spinal anesthetics.

(vi) Intraperitoneal: Injections given into the abdominal cavity e.g. infant saline, glucose.

(vii) Intra-articular: Injected directly into a joint e.g. hydrocortisone.

C) Transcutaneous route:

I) Iontophoresis: Galvanic current is used for bringing about the penetration of drugs into the deeper tissue e.g. salicylates.

Ii) Inunctions: Absorbed when rubbed in to the skin e.g. nitroglycerin ointment in angina Pectoris.

Iii) Jet injection: With help of high velocity jet produced through a micro fine orifice; No Need of needle and therefore painless. E.g. mass inoculation programes.

Iv) Adhesive units: A transdermal therapeutic system produce prolonged effect e.g. scopolamine for motion sickness.

D) Topical/ local route:

The absorption through skin is a passive process. The absorption occurs more easily through the cell lining e.g. dusting powder, paste, lotion, drops, ointment, suppository for vagina and rectum.

E) Inhalation:

Drugs may be administered as dry powders, and nebulized particles when sprayed as fine Droplets get deposited over the mucous membrane producing local effects and may be absorbed for systemic effects e.g. salbutamol spray used in bronchial asthma and volatile General anesthetics.

2. **Bioavailability**:

It is the rate and amount of drug that is absorbed from a given dosage form and reaches the Systemic circulation following non-vascular administration. When the drug is given IV, the Bioavailability is 100%. It is important to know the manner in which a drug is absorbed. The Route of administration largely determines the latent period between administration and onset of Action.

Drugs given by mouth may be inactive for the following reasons:

a) Enzymatic degradation of polypeptides within the lumen of the gastrointestinal tract e.g. Insulin, ACTH.
b) Poor absorption through gastrointestinal tract e.g. aminoglycoside antibiotic.
c) Inactivation by liver e.g. testosterone during first passage through the liver before it reaches Systemic circulation.

3. Factors affecting drug absorption and bioavailability:

a) Physico-chemical properties of drug

b) Nature of the dosage form

c) Physiological factors

d) Pharmacogenetic factors

e) Disease states.

a) Physico-chemical properties of drug:

Physical state: Liquids are absorbed better than solids and crystalloids absorbed better Than colloids.

ii) Lipid or water solubility: Drugs in aqueous solution mix more readily than those in oily Solution. However at the cell surface, the lipid soluble drugs penetrate into the cell more Rapidly than the water soluble drugs.

iii) Ionization: Most of the drugs are organic compounds. Unlike inorganic compounds, the Organic drugs are not completely ionized in the fluid. Unionized component is Predominantly lipid soluble and is absorbed rapidly and an ionized is often water soluble Component which is absorbed poorly. Most of the drugs are weak acids or weak bases. It may be assumed for all practical purposes that the mucosal lining of the G.I.T is Impermeable to the ionized form of a weak organic acid or a weak organic base. These Drugs exist in two forms.

Acidic drugs:

Rapidly absorbed from the stomach e.g. salicylates and barbiturates.

Basic drugs:

Not absorbed until they reach to the alkaline environment i.e. small Intestine when administered orally e.g. pethidine and ephedrine.

Dosage forms:

Particle size: Small particle size is important for drug absorption.

Drugs given in a dispersed or emulsified state are absorbed better e.g. vitamin D and vitamin A.

Disintegration time and dissolution rate.

Disintegration time: The rate of break up of the tablet or capsule into the drug granules.

Dissolution rate: The rate at which the drug goes into solution.

Formulation: Usually substances like lactose, sucrose, starch and calcium phosphate

Are used as inert diluents in formulating powders or tablets. Fillers may not be totally

Inert but may affect the absorption as well as stability of the medicament. Thus a faulty

Formulation can render a useful drug totally useless therapeutically.

Physiological factors:

Gastrointestinal transit time: Rapid absorption occurs when the drug is given on empty stomach. However certain irritant drugs like salicylates and iron preparations are deliberately administred after food to minimize the gastrointestinal irritation. But some times the presence of food in the G.I tract aids the absorption of certain drugs e.g. griseofulvin, propranolol and riboflavin.

ii) Presence of other agents: Vitamin C enhances the absorption of iron from the G.I.T. Calcium present in milk and in antacids forms insoluble complexes with the tetracycline antibiotics and reduces their absorption.

Area of the absorbing surface and local circulation: Drugs can be absorbed better from the small intestine than from the stomach because of the larger surface area of the former. Increased vascular supply can increase the absorption.

Enterohepatic cycling: Some drugs move in between intestines and liver before they reach the site of action. This increases the bioavailability e.g. phenolphthalein.

Metabolism of drug/first pass effect: Rapid degradation of a drug by the liver during the first pass (propranolol) or by the gut wall (Isoprinosine) also affects the bioavailability. Thus a drug though absorbed well when given orally may not be effective because of its extensive first pass metabolism.

Pharmacogenetic factors:

Individual variations occur due to the genetically mediated reason in drug absorption and response.

Disease states:

Absorption and first pass metabolism may be affected in conditions like malabsorption, thyrotoxicosis, achlorhydria and liver cirrhosis.

Bioavailability curves

Single dose bioavailability test involves an analysis of plasma or serum concentration of the drug at various time intervals after its oral administration and plotting a serum concentration time crave.

C) Distribution of drugs

Definition: Penetration of a drug to the sites of action through the walls of blood vessels from the administered site after absorption is called drug distribution. Drugs distribute through various body fluid compartments such as

Plasma

Interstitial fluid compartment

Trans-cellular compartment.

Apparent Volume of distribution (VD): The volume into which the total amount of a drug in the body would have to be uniformly distributed to provide the concentration of the drug actually measured in the plasma. It is an apparent rather than real volume.

Factors determining the rate of distribution of drugs:

1. Protein binding of drug: A variable and other significant portion of absorbed drug may become reversibly bound to plasma proteins. The active concentration of the drug is that Part which is not bound, because it is only this fraction which is free to leave the plasma and Site of action.
   (a) Free drug leave plasma to site of action
   (b) Binding of drugs to plasma Proteins assists absorption
   (c) Protein binding acts as a temporary store of a drug and tendsTo prevent large fluctuations in concentration of unbound drug in the body fluids
   (d) Protein Binding reduces diffusion of drug into the cell and there by delays its metabolic degradation

E.g. high protein bound drug like phenylbutazone is long acting.

Low protein bound drug like thiopental sodium is short acting.

2. **Plasma concentration of drug (PC):** It represents the drug that is bound to the plasma Proteins (albumins and globulins) and the drug in free form. It is the free form of drug that is distributed to the tissues and fluids and takes part in producing pharmacological effects.

The concentration of free drug in plasma does not always remain in the same level e.g.

i) After I.V. administration plasma concentration falls sharply

ii) After oral administration plasma concentration rises and falls gradually.

iii) After sublingual administration plasma concentration rise sharply and falls gradually.

3. Clearance: Volume of plasma cleared off the drug by metabolism and excretion per unit time.

Protein binding reduces the amount of drug available for filtration at the glomeruli and hence

Delays the excretion, thus the protein binding reduces the clearance.

4. Physiological barriers to distribution: There are some specialized barriers in the body due

To which the drug will not be distributed uniformly in all the tissues.

These barriers are:

a) Blood brain barrier (BBB) through which thiopental sodium is easily crossed but not

Dopamine.

b) Placental barrier: which allows non-ionized drugs with high lipid/water partition

Coefficient by a process of simple diffusion to the foetus e.g. alcohol, morphine.

5. Affinity of drugs to certain organs: The concentration of a drug in certain tissues after a Single dose may persist even when its plasma concentration is reduced to low. Thus the Hepatic concentration of mepacrine is more than 200 times that of plasma level. Their Concentration may reach a very high level on chronic administration. Iodine is similarly concentrated in the thyroid tissue.

D. metabolism of drugs: Drugs are chemical substances, which interact with living organisms and produce some Pharmacological effects and then, they should be eliminated from the body unchanged or by Changing to some easily excretable molecules. The process by which the body brings about Changes in drug molecule is referred as drug metabolism or biotransformation.

Enzymes responsible for metabolism of drugs:

a) Microsomal enzymes: Present in the smooth endoplasmic reticulum of the liver, kidney And GIT e.g. glucuronyl transferase, dehydrogenase, hydroxylase and cytochrome P450.

b) Non-microsomal enzymes: Present in the cytoplasm, mitochondria of different organs. E.g. esterases, amidase, hydrolase.

Types of biotransformation: The chemical reactions involved in biotransformation are classified as phase-I and phase – II (conjugation) reactions. In phase-I reaction the drug is Converted to more polar metabolite. If this metabolite is sufficiently polar, then it will be excreted in urine. Some metabolites may not be excreted and further metabolised by phase –II reactions.

Phase-I: Oxidation, reduction and hydrolysis.

Phase-II: Glucuronidation, sulfate conjugation, acetylation, glycine conjugation and Methylation reactions.

PHASE – I REACTIONS

a) **Oxidation:** Microsomal oxidation involves the introduction of an oxygen and/or the removal of A hydrogen atom or hydroxylation, dealkylation or demethylation of drug molecule e.g. Conversion of salicylic acid into gentisic acid.

b) **Reduction:** The reduction reaction will take place by the enzyme reeducates which catalyze the reduction of ado (-N=N-) and nitro (-NO2) compounds e.g. prontosil converted to Sulfonamide.

c) **Hydrolysis**: Drug metabolism by hydrolysis is restricted to esters and amines (by esterase's and amides) are found in plasma and other tissues like liver. It means splitting of drug Molecule after adding water e.g. pethidine undergoes hydrolysis to form pethidinic acid. Other drugs which undergo hydrolysis are atropine and acetylcholine.

Phase – II reactions (conjugation reactions):

This is synthetic process by which a drug or its metabolite is combined with an endogenous Substance resulting in various conjugates such as glucoronide, ethereal sulfate, methylated Compound and amino acid conjugates.

Glucuronide conjugation: It is the most common and most important conjugation reaction of Drugs. Drugs which contain

a) Hydroxyl, amino or carboxyl group undergo this process e.g. phenobarbitone.
b) Sulfate conjugation: Sulfotransferase present in liver, intestinal mucosa and kid
c) Acetyl conjugation: The enzyme acetyl transferase, which is responsible for acetylation, is present in the kupffer cells of liver. Acetic acid is conjugated to drugs via its activation By CoA to form acetyl CoA. This acetyl group is then transferred to-NH2 group of drug e.g. dapsone, isoniazid.
d) Glycine conjugation: Glycine conjugation is characteristic for certain aromatic acids

E.g. salicylic acid, isonicotinic acid, p-amino salicylic acid. These drugs are also metabolized by other path ways.

e) Methylation: Adrenaline is methylated to metanephrine by catechol-o-methyl transferase.

Here the source of methyl group is s – adenosyl methionine.

E. Excretion of drugs

Excretion of drugs means the transportation of unaltered or altered form of drug out of theBody. The major processes of excretion include renal excretion, hepatobiliary excretion and pulmonary excretion. The minor routes of excretion are saliva, sweat, tears, breast milk, vaginal Fluid, nails and hair. The rate of excretion influences the duration of action of drug. The drug that is excreted slowly, the concentration of drug in the body is maintained and the effects of the drug will continue for longer period.

Different routes of drug excretion

a) **Renal excretion**: A major part of excretion of chemicals is metabolically unchanged or changed. The excretion of drug by the kidney involves.

i) Glomerular filtration

ii) Active tubular secretion

iii) Passive tubular reabsorption.

The function of glomerular filtration and active tubular secretion is to remove drug out of theBody, while tubular reabsorption tends to retain the drug.

i) **Glomerular filtration:** It is a process, which depends on
(1) The concentration of drug in the Plasma
(2) Molecular size, shape and charge of drug
(3) Glomerular filtration rate.

Only the Drug which is not bound with the plasma proteins can pass through glomerulus. All the drugs which have low molecular weight can pass through glomerulus e.g. digoxin, ethambutol, etc. In congestive cardiac failure, the glomerular filtration rate is reduced due to decrease in renal Blood flow.

ii) Active tubular secretion:

The cells of the proximal convoluted tubule actively transport drugs from the plasma into the lumen of the tubule e.g. acetazolamide, benzyl penicillin, dopamine, pethidine, thiazides, histamine.

iii) Tubular reabsorption:

The reabsorption of drug from the lumen of the distal convoluted tubules into plasma occurs either by simple diffusion or by active transport. When the urine is acidic, the degree of ionization of basic drug increase and their reabsorption decreases. Conversely, when the urine is more alkaline, the degree of ionization of acidic drug increases and the reabsorption decreases.

b) **Hepatobiliary excretion**: the conjugated drugs are excreted by hepatocytes in the bile. Molecular weight more than 300 Daltons and polar drugs are excreted in the bile. Excretion Of drugs through bile provides a back up pathway when renal function is impaired. After Excretion of drug through bile into intestine, certain amount of drug is reabsorbed into portal Vein leading to an enterohepatic cycling which can prolong the action of drug e.g. Chloramphenicol, oral estrogen are secreted into bile and largely reabsorbed and have long Duration of action. Tetracycline's which are excreted by biliary tract can be used for treatment of biliary tract infection.
c) **Gastrointestinal excretion:** When a drug is administered orally, a part of the drug is not Absorbed and excreted in the faeces. The drugs which do not undergo enterohepatic cycle After excretion into the bile are subsequently passed with stool e.g. aluminium hydroxide Changes the stool into white colour, ferrous sulfate changes the stool into black and Rifampicin into orange red.
d) **Pulmonary excretion:** Drugs that are readily vaporized, such as many inhalation Anesthetics and alcohols are excreted through lungs. The rate of drug excretion through Lung depends on the volume of air exchange, depth of respiration, rate of pulmonary blood Flow and the drug concentration gradient.
e) **Sweat**: A number of drugs are excreted into the sweat either by simple diffusion or active Secretion e.g. rifampicin, metalloids like arsenic and other heavy metals.
f) **Mammary excretion**:
Many drugs mostly weak basic drugs are accumulated into the milk. Therefore lactating mothers should be cautious about the intake of these drugs because they may enter into baby through breast milk and produce harmful effects in the baby e.g. Ampicillin, aspirin, chlordiazepoxide, coffee, diazepam, furosemide, morphine, streptomycin Etc.

Clearance of a drug: It is the volume of plasma cleared of the drug by metabolism (hepatic) and excretion (renal) and other organs.

Total clearance will be calculated by Ct = Ch + Cr + C others

Ct = total clearance

Ch = hepatic clearance

R = Renal clearance

IV. Theoretical Pharmacokinetics

Information about the time course of drug absorption, distribution and elimination (pharmacokinetics) can be expressed in mathematical terms and has contributed to our Understanding and planning of drug regimens. Pharmacokinetic principles aid in the selection and adjustment of drug-dose schedules.

Half life:

Half life (t1/2) of a drug is the time taken for the concentration of drug in the blood or plasma to Decline to half of original value or the amount of drug in the body to be reduced by 50%. It has two phases' i.e. half-life of distribution and half-life of elimination. A half-life value can be readily determined for most drugs by administering a dose of the drug to A subject, taking blood samples at various time intervals and then assaying the samples., For Example if a blood level of drug A is 8.6 mg/ml at 10 minutes and 4.3 mg/ml at 60 minutes, so

The half – life of that drug is 50 minutes.

In most of the cases the rate of disappearance of a drug from the body is reflected in the rate of Lowering of its plasma concentration following a single intravenous dose, the plasma Concentration of the drug is focused to fall exponentially. With drugs whose elimination is Exponential, the biological half – life is independent of the dose, the route of administration and the plasma concentration. It depends on VD as well as on the metabolism and renal excretion of the drug.

Order of kinetics

Drugs are used for the treatment of diseases but the modes of administration of drugs are different. For example atenolol is administered once daily where as paracetamol needs 3-4times administration daily. Morphine is more effective in intramuscular route, and insulin is in subcutaneous route. The mode of administration is designed on the basis of absorption, distribution, metabolism and excretion (ADME) of drugs. Drugs usually follow two processes for their pharmacokinetic behavior in the body. These are first order and zero order process.

First order:

This is the most common process for many drugs. The rate at which absorption, distribution, metabolism and excretion occur are proportional to the concentration of drugs i.e. constant fraction of this drug in the body disappears in each equal interval of time.

Zero order kinetic:

It is independent of the amount of drug present at the particular sites of drug absorption or elimination. Few drugs follow this process e.g. ethanol, phenytoin. Here constant amount of the drug is eliminated in each equal interval of time. On repeated administration of drug after certain stage it goes on accumulating in the body and leads to toxic reactions.

Steady state plasma concentration:

When a drug dose is given repeatedly over a given period, a steady state is eventually reached, at which point the amount of drug absorbed is in equilibrium with that eliminated from the body. Steady

state is achieved after 4 to 5 half –lives for most of the drugs which follow first order kinetics. For example a drug with half life of 6 hours will be expected to be at steady state after more than 24 hours of administration. The pattern of drug accumulation during repeated administration of drug at intervals equal to its elimination half-life. For some drugs, the effects are difficult to measure, toxicity and lack of efficacy are both Potential dangers, and/or the therapeutic window is narrow. In these circumstances doses must be adjusted carefully to a desired steady- state concentration by giving loading and Maintenance doses.

Loading dose: The loading dose is one or a series of doses that may be given at the onset of Therapy with the aim of achieving the target concentration rapidly.

Maintenance dose: To maintain the chosen steady-state or target concentration, the rate of drug Administration is adjusted such that the rate of input equals to rate of loss.

V. Drug safety and effectiveness

A. Factors modifying the dosage and action of drugs :

Individuals differ both in the degree and the character of the response that a drug may elicit and therefore the optimum dose of a drug which produces the desired therapeutic effect varies from Person to person. The important factors which influence the effect of a drug are:

1. **Drug intolerance:** It is a quantitative deviation from the anticipated response to a given dose of a drug. Thus drug intolerance is inability of the individual to tolerate a drug. It is also called as hyper susceptibility.
2. **Sex difference**: Special care should be exercised when drugs are administrated during Menstruation, pregnancy and lactation.
    a) **Menstruation**: Drugs producing pelvic congestion should be avoided during menstruation e.g. drastic purgatives.
    b) **Pregnancy**: During pregnancy, the use of all drugs except those essential to maintain Pregnancy should be used with caution. Drugs which may stimulate the uterine smooth Muscle, are contraindicated during pregnancy. Further, many drugs administered to Mother are capable of crossing the placenta and affecting the foetus. Most of drugs can produce teratogenicity when they are used in pregnancy. Teratogenicity means Congenital malformation
        i) Drugs known to produce teratogenicity e.g thalidomide, Cyclophosphamide, methotrexate, tetracycline, phenytoin, carbamazepine and Progestogens.
        ii) Ii) Drugs may be teratogenicity e.g Warfarin, lithium, quinine, primaquine, Trimethoprim, rifampicin, anesthetic agents.
    c) **Breast feeding:** Nearly all agents received by mother are likely to be found in her milk and could theoretically harm the infant. Most of the lipid soluble drugs get into breast Milk. Therefore the drugs, which are excreted in the milk and harm the infant health should be, avoided by breast-feeding mothers e.g. sulphonamides, tetracycline's, Nalidixic acid, isoniazid, diazepam, lithium, Indomethacin, aspirin, etc.

3. **Body Weight:** The average dose is mentioned either in terms of mg per kg body weight or as the total single dose for an adult weighing between 50-100kg. However, dose expressed in this fashion may not apply in cases of excessively obese individuals or those suffering from Edema, or dehydration nutritional factors can sometimes alter drug metabolizing capacity and this should be kept in mind in malnourished patients.
4. **Age**: The pharmacokinetics of many drugs changes with age. Thus gastric emptying is Prolonged and the gastric pH fluctuates in neonates and infant, further the liver capacity to Metabolize drugs is low, renal function is less developed and the proportion of body water is Higher in the newborn and the neonates. Hence children may not react to all drugs in the same fashion as young adults. With a few exceptions, drugs are more active and more toxic in the new born than the adults. The pediatric doses are expressed in terms of body weight (mg/kg per dose or day) or in terms Of body surface area (mg/m2Per day). The body surface area can be calculated from the height and weight of the child. Like children, old people also present problems in dosage adjustment and this may vary widely with different people. The metabolism of drugs may diminish in the elderly and the renal function Declines with age. Elderly are sensitive to the drugs like hypnotics, tranquilizers, Phenylbutazone, diazepam, pethidine, etc.

5. Disease state: Some antimicrobial agents penetrate the cerebrospinal fluid well across the meninges while other antimicrobials penetrate well only when the meninges are inflamed (meningitis) e.g. sulphonamides, metronidazole, chloramphenicol, isoniazid and rifampicin penetrate well through the normal meninges and other antimicrobial agents like benzyl penicillin, ampicillin, tetracycline, streptomycin, gentamicin and cephalosporin penetrate only when the meninges are inflamed. Acute or chronic liver diseases markedly modify the rate and extent of biotransformation of drugs. The t1/2 of chlordiazepoxide and diazepam in patients with liver cirrhosis is greatly increased with corresponding prolongation of their effects. Cardiac disease by limiting blood flow to the liver may impair disposition of those drugs whose biotransformation is flow limited e.g. imipramine, isoniazid, lignocaine, morphine and propranolol. Similarly renal and pulmonary diseases may modify the biotransformation of drugs like insulin or Isoprinosine. Excretion of drug is impaired in chronic renal disease.

6. **Pharmacogenetic**: The science Pharmacogenetic is concerned with the genetically mediated variations in drug responses. Some examples of genetically mediated variations are:

Acetylation and hydroxylation of drugs: The rate of acetylation of INH, dapsone, hydralazine procainamide and some sulfonamides is controlled by an autosomal recessive gene and the dosage of these drugs depends up on the acetylator status of individuals.

7) Drug interactions:

It is usual for patients to receive a number of drugs at the same time. It is a phenomenon which occurs when the effects of one drug are modified by the prior or concurrent administration of another drug(s). A drug interaction may result in beneficial or harmful effects and may be classified into:

a) Pharmaceutical drug interactions:

Serious loss of potency can occur from incompatibility between an infusion fluid and a drug that is added to it.

For example diazepam if added to infusion fluid there will be a precipitate formation → loss of therapeutic effect.

b) Pharmacokinetic drug interactions:

1) Interaction during absorption: Drugs may interact in the gastrointestinal tract resulting in either decreased or increased absorption.

E.g. Tetracycline + Calcium → Decreased absorption of tetracycline.

2) Interaction during distribution: A drug which is extensively bound to plasma protein can be displaced from its binding sites by another drug or displacement from other tissue binding sites.

e.g. (I) Sulfonamide can be displaced by salicylates from plasma proteins and it leads to sulfonamide toxicity.

(ii) Quinidine displaces digoxin from binding sites in tissues and plasma and leads to digoxin toxicity.

3) Interactions during biotransformation: This can be explained by two mechanisms:

(i) Enzyme induction.
(ii) Enzyme inhibition.

(i) **Enzyme induction:** By this the biotransformation of drugs is accelerated and is a cause of Therapeutic failure. If the drug A is metabolized by the microsomal enzymes, then concurrent Administration with a microsomal inducer (drug B) will result in enhanced metabolism of drug
A.

E.g. Warfarin (anticoagulant) + Barbiturate (enzyme inducer) → decreased anticoagulation.

Enzyme inducers: Rifampicine, phenytoin, sulfonamides, etc.

(iii) **Enzyme inhibition:** By this the biotransformation of drugs is delayed and is a cause of increased intensity, duration of action and some times toxicity.

E.g. Warfarin + Metronidazole (enzyme inhibitor) → Haemorrhage.

Enzyme inhibitors: Disulfiram, isoniazid, allopurinol, cimetidine, etc.

f) Interactions during excretion: Some drugs interacts with others at the site of excretion i.e. in kidneys.

E.g. Penicillin (antibiotic) + Probenecid (antigout drug) → Increases the duration of action of

Penicillin (Both drugs excreted through tubular secretion).

B. Pharmacodynamic interactions:

(i) Drug Synergism: When the therapeutic effect of two drugs are greater than the effect of Individual drugs, it is said to be drug synergism.It is of two types.

(a) Additive effect: When the total pharmacological action of two or more drugs administered

Together is equivalent to the summation of their individual pharmacological actions is called

Additive effect.

I.e. A + B = AB

E.g. Combination of ephedrine and aminophyllin in the treatment of bronchial asthma.

(b) Potentiation effect: When the net effect of two drugs used together is greater than the sum of

d) Check liver and kidney function before and during drug administration, as even an otherwise non-cumulative drug would produce cumulation in the presence of hepatic and renal damage.

9) Drug tolerance:

When an unusually large dose of a drug is required to elicit an effect ordinarily produced by the normal therapeutic dose of the drug, the phenomenon is termed as drug tolerance.

Tachyphylaxis: Rapid development of tolerance on repeated administration is called tachyphylaxis e.g. Ephedrine, amphetamine and nitroglycerine which produce tachyphylaxis on repeated administration.

10) Emotional factors.

E.g. Placebo response.

Placebo: It is a Latin word meaning" I shall please" and it is a tablet looking exactly like the active treatment but containing no active component. It refers originally to substances merely to please the patient when no specific treatment was available.

B. Adverse drug reactions:

The drugs that produce useful therapeutic effect may also produce unwanted or toxic effects. It been estimated that about 0.5% of patients who die in hospitals do so as a result of their treatment rather than the condition for which they were treated. Serious systemic drug toxicity may result from overdoses. If is always an exaggeration of its pharmacological actions and some times it is predictable. E.g. Hypotension following antihypertensive drugs. Hypoglycaemia following insulin. An adverse drug reaction is defined as any response to a drug that is noxious and unintended and that occurs at doses used in man for prophylaxis, diagnosis or therapy (WHO).

The adverse effects are

1) Side effects

2) Untoward effects

3) Allergic reactions

4) Idiosyncratic reactions and

5) Teratogenicity effects.

C. **1) Side effects:** Side effects are infact pharmacological effects produced with therapeutic dose
D. Of the drug.
E. e.g: Dryness of mouth with atropine which is troublesome in peptic ulcer patients and useful
F. When used as a preanaesthetic medication.

2) Untoward effects: Untoward effects develop with therapeutic dose of a drug. They are Undesirable and if very severe, may necessitate the cessation of treatment.

e.g: Diarrhoea with ampicillin and potassium loss with diuretics.

3) Allergic reactions: Most of the drugs and sera used in therapeutics are capable of causing Allergic or hypersensitive reactions. These reactions may be mild or very severe like. When an individual has been sensitized to an antigen (allergen) further contact with that antigen can some times lead to tissue damaging reactions. These allergic reactions

Are 4 types.

- Type-I reactions or anaphylactic reactions (Immediate hypersensitive reaction).
- Type-II reactions or cytotoxic reactions.
- Type-III reactions or immune complex mediated reactions.
- Type-IV reactions or cell mediated reactions (Delayed hypersensitive reactions).

4) Idiosyncratic reactions: The term idiosyncrasy means one's peculiar response to drugs. With the increasing knowledge of Pharmacogenetic, many idiosyncratic reactions have been found to be genetically determined.

e.g: Drugs like primaquine, sulfonamides and dapsone may cause hemolysis in patients with glucose - 6 phosphate dehydrogenase deficiency.

5) Teratogenic effect: Some drugs given in the first three months of pregnancy may cause congenital abnormalities and are said to be teratogenic. The best known example is Thalidomide which results in early easily recognizable abnormalities such as absent or grossly abnormal limbs.

Other drugs with teratogenic potential are androgens, steroids, anti consultants, anti neoplastic Drugs, cortisone, lithium, pencillamine, tricyclic antidepressants and warfarin.

V) Development and evaluation of new drugs:

The ultimate aim of pharmacological studies in animals is to find out a therapeutic agent suitable for clinical evaluation in man. No doubt, animal studies provide analogies and serve as useful Models. The administration of biologically active agent to human beings is associated with an Element of risk, which cannot be predicted by even the most careful and exhaustive animal Experiments.

Scientists all over the world are in a continuous effort to develop new drugs although drug Development is an extremely technical and enormously expensive operation. Among the contributors to new drug development, pharmacologists are more concerned in evaluating "new

Chemical entities" (NCE). Synthesis and evaluation of thousands of NCEs are usually necessary for new drugs to be introduced in the market. Research and development of new drugs have been done under strict government regulations which have greatly increased over the past couple of decades.

Drug development comprises of two steps.

a) Preclinical development and

b) Clinical development

A) Preclinical development: Synthesis of new chemical entities is done as per research policy decision which is based on:

(I) Random synthesis

(ii) Structure activity relationship (SAR)

(iii) Biochemical and pharmacological insight and

(iv) Chance finding.

The aim of the preclinical development phase for a potential new medicine is to explore the drug's efficacy and safety before it is administrated to patients. In this preclinical phase, varying drug doses are tested on animals and/or in vitro systems.

If active compounds are found, then studies on animals are done which include pharmacodynamics, pharmacokinetics, toxicology and special toxicological studies (mutagenicity and carcinogenicity) have to be done. In this study single dose is used for acute toxicity and repeated doses for sub chronic and chronic toxicity studies. Most of the preclinical tests have to be conducted in accordance with the standards prescribed.

B) Clinical development: About one in 1000 NCEs reach this stage. The steps to be studied in

This stage include:

a) Pharmaceutical study

b) Pharmacological study

c) Clinical trial.

a) Pharmaceutical study covers stability of formulation and compatibility of the NCEs with other tablet or infusion ingredients.

b) Pharmacological study includes further chronic toxicological study in animal, initially animal Metabolic and pharmacokinetic study. When studies in animals predict that a NCE may be Useful medicine i.e. effective and safe in relation to its benefits, then the time has come to put it to the test in man i.e. clinical trial.

c) Studies on human or Clinical Trial: Clinical trial is a means by which the efficacy of drug is tested on human being. It may also give some idea about the risk involved. It is divided into 4 phases. With each phase, the safety and Efficacy of the compound are tested progressively.

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Annexure - III

Assessment Form

Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry.

Course code: VAC04/AHS/2019-18/11

Multiple Choice Question 12x2=24

1. Type I ADR reactions is_____

A) Caused when T-cells bind to a specific antigen
b) Caused by tissue injury
c) IgE mediated
d) Caused by cytotoxic antibodies

2. Average time period for phase II clinical trials study is _____

a) Up to 4 year
b) Up to few month
c) Up to Two year
d) Up to several year

3. _____ drug can cause lactic acidosis.

a) Metformin
b) Pioglitazone
c) Repaginate
d) Glibenclamide

4. The incidence ADR is highest in _____.

a) Children
b) Elderly
c) Women
d) Men

5. _____ antihypertensive therapy should be avoided in type-1 diabetes mellitus

a) ACE inhibitors
b) High dose diuretics
c) Centrally acting
d) Calcium channel blockers

6. _____ is an example of Category X drugs

a) Diclofenac
b) Ranitidine
c) Lorazepam
d) Paracetamol

7. _____ is indicated in agitation and restlessness in the elderly, despite the high incidence Of extrapyramidal side-effects.

a) Prochlorperazine
b) Clozapine
c) Haloperidol
d) Flupentixol

8. _____ is contraindicated during pregnancy due to its Teratogenicity.

a) Folic acid
b) Calcium
c) Retinol
d) Iron

9. _____ commonly reported ADR of diuretic class of drugs.

a) Hypokalaemia
b) Alopecia
c) Skin disorder
d) Rhinitis

10. Which of the following responsibility of the clinical pharmacist is in direct patient care area?

a) Supervision of drug administration techniques.
b) Providing drug information to physicians and nurses.
c) Identify drugs brought into the hospital by patients.
d) Reviewing of each patient's drug administration forms periodically to ensure all doses have been administered.

11. Which of the following responsibility of community pharmacist is in dispensing area?

a) Reviews all doses missed, reschedule the doses as necessary & signs all drugs not given notices.
b) Supervision of drug administration.
c) Ensures that establishes policies & procedures are followed.
d) Reviewing of each patient's drug administration forms periodically to ensure all doses have been administered.

12. The most specific & sensitive method for assessment of compliance can be used to Detect potent therapeutic agent in body fluids is

a) Drug analysis.
b) Interrogation.
c) Urine marker.
d) Residual Tablet counting.

Qamqp-UAH1801142

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - III

Assessment Form

Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry.

Course code: VAC04/AHS/2019-18/11

Multiple Choice Question 12x2=24

1. Type I ADR reactions is_____

A) Caused when T-cells bind to a specific antigen
b) Caused by tissue injury
c) IgE mediated
d) Caused by cytotoxic antibodies

2. Average time period for phase II clinical trials study is _____

a) Up to 4 year
b) Up to few month
c) Up to Two year
d) Up to several year

3. _____ drug can cause lactic acidosis.

a) Metformin
b) Pioglitazone
c) Repaginate
d) Glibenclamide

4. The incidence ADR is highest in _____.

a) Children
b) Elderly
c) Women
d) Men

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

5. _____ antihypertensive therapy should be avoided in type-1 diabetes mellitus

a) ACE inhibitors
b) High dose diuretics
c) Centrally acting
d) Calcium channel blockers

6. _____ is an example of Category X drugs

a) Diclofenac
b) Ranitidine
c) Lorazepam
d) Paracetamol

7. _____ is indicated in agitation and restlessness in the elderly, despite the high incidence Of extrapyramidal side-effects.

a) Prochlorperazine
b) Clozapine
c) Haloperidol
d) Flupentixol

8. _____ is contraindicated during pregnancy due to its Teratogenicity.

a) Folic acid
b) Calcium
c) Retinol
d) Iron

9. _____ commonly reported ADR of diuretic class of drugs.

a) Hypokalaemia
b) Alopecia
c) Skin disorder
d) Rhinitis

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

10. Which of the following responsibility of the clinical pharmacist is in direct patient care area?

a) Supervision of drug administration techniques.
b) Providing drug information to physicians and nurses.
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SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

METHINE - UAH1801145

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - III

Assessment Form

Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry.

Course code: VAC04/AHS/2019-18/11

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Annexure- V

Student Feedback Form

Course Name: "CLINICAL PHARMACOLOGY"

Subject Code: VAC04/AHS/2019-18/11

Name of Student: _____ Roll No.: _____

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Feedback Form

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. The course met my expectations.	○	○	○	○	○
2.I will be able to apply the knowledge learned.	○	○	○	○	○
3.The course objectives for each topic were identified and followed.	○	○	○	○	○
4.The content was organised and easy to follow.	○	○	○	○	○
5.The quality of instruction was good.	○	○	○	○	○
6.Class participation and interaction were encouraged.	○	○	○	○	○
7.Adequate time was provided for questions and discussion.	○	○	○	○	○

8.How do you rate the course overall?

- ○ Excellent
- ○ Good
- ○ Average
- ○ Poor
- ○ Very poor

9. The aspects of the course could be improved?

10. Other comments?

Signature of the student:
Date:

Annexure- V

Student Feedback Form

Course Name: "CLINICAL PHARMACOLOGY"

Subject Code: VAC04/AHS/2019-18/11

Name of Student: AJITH KUMAR Roll No.: VAH18011130.

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Feedback Form

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. The course met my expectations.	●	○	○	○	○
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- ○ Good
- ○ Average
- ○ Poor
- ○ Very poor

9. The aspects of the course could be improved? Good enough its more intellectual

10. Other comments? overall teaching level Good.

Signature of the student: V. Ajithkumar

Date: 13/12/2019

Annexure- V

Student Feedback Form

Course Name: "CLINICAL PHARMACOLOGY"

Subject Code: VAC04/AHS/2019-18/11

Name of Student: Alaguri Sandeep Roll No.: UAH1801189.

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Feedback Form

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5.The quality of instruction was good.	●	○	○	○	○
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7.Adequate time was provided for questions and discussion.	●	○	○	○	○

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9. The aspects of the course could be improved? -

10. Other comments? over all teaching was Good.

Signature of the student:
Date: 13/12/2019.

Annexure- V

Student Feedback Form

Course Name: "CLINICAL PHARMACOLOGY"

Subject Code: VAC04/AHS/2019-18/11

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Date:

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Signature of the student:
Date: 13/12/2019.

Date: 13.12.2019

From

Dr.G. Somasundaram
Principal of Allied Health Science,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To

The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: CLINICAL PHARMACOLOGY

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: **CLINICAL PHARMACOLOGY** November to December 2019 for 30 AHS Students. We solicit your kind action to send certificates for the participants that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards,

Dr. G. Somasundaram

Encl: Certificates

Photographs



Sri Lakshmi Narayana Institute of Medical Sciences

Date: 09.12.2020

From

Dr. G. Somasundaram
Principal of Allied Health Sciences,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

To

The Dean,
Sri Lakshmi Narayana Institute of Medical College
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: CLINICAL MICROBIOLOGY

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled **CLINICAL MICROBIOLOGY** from January to February 2020. We solicit your kind permission for the same.

Kind Regards

Dr.G. Somasundaram

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: **Dr. Balagurunathan. K**

The HOD: **Dr. Somasundram. G**

The Expert: **Dr. Arvind.**

The committee has discussed about the course and is approved.

Dean	Subject Expert	HOD
(Sign & Seal)	(Sign & Seal)	(Sign & Seal)

DEAN
Prof.K.BALAGURUNATHAN,M.S
(General surgeon)
SRI LAKSHMI NARAYANA
INSTITUTE OF MEDICAL SCIENCES
OSUDU PONDICHERRY

PRINCIPAL
Allied Health Sciences
Sri Lakshmi Narayana Institute of Allied Health Sciences
Osudu, Agaram Post, Puducherry - 605 502.

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affliated to Bharath University, Chennai - TN]

Circular

23.12.2020

Sub: Organizing Value-added Course: CLINICAL MICROBIOLOGY .reg

With reference to the above-mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research** is organizing "**CLINICAL MICROBIOLOGY"**. The course content and registration form is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before January to February 2020. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

DEAN
Prof.K.BALAGURUNATHAN,M.S
(General surgeon)
SRI LAKSHMI NARAYANA
INSTITUTE OF MEDICAL SCIENCES
OSUDU PONDICHERRY

Encl: Copy of Course content

VALUE ADDED COURSE

1. Name of the programme & Code

"CLINICAL MICROBIOLOGY". & VAC05/AHS/2020-06/01

2. Duration & Period

30 hrs. & January to February 2020

3. Information Brochure and Course Content of Value-Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Assessment - *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

1-time January to February 2020

8. Year of discontinuation: 2021

9. Summary report of each program year-wise

Value Added Course- January to February 2020					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	VAC05/AHS/2020-06/01	"CLINICAL MICROBIOLOGY"	**Dr. Arvind**	AHS	30 students June to August 2020

10. Course Feed Back

Enclosed as Annexure- V

RESOURCE PERSON

COORDINATOR
Dr.G.Somasundram

PRINCIPAL
Allied Health Sciences
Sri Lakshmi Narayana Institute of Allied Health Sciences
Osudu, Agaram Post, Puducherry - 605 502.

Course Proposal

Course Title: "CLINICAL MICROBIOLOGY"

Course Objective:

1. To enhance the performance skill in Clinical Microbiology.
2. To assess the objectives and protocols in Clinical Microbiology.
3. To assess the reaction of target allied Health students towards the Clinical Microbiology getting their feedback.

Course Outcome: Improvement in the "CLINICAL MICROBIOLOGY"

Course Audience: Students of AHS Batch 20
Course Coordinator: Dr. G. Somasundaram
Course Faculties with Qualification and Designation:
1.Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Time	Hours
1.	06.01.2020	Introduction to Clinical microbiology	4-5p.m	1
2.	07.01.2020	Taxonomic classification of organisms	2-3p.m	1
3.	08.01.2020	binomial nomenclature	4-5p.m	1
4.	09.01.2020	Bacterial species	4-5p.m	1
5.	10.01.2020	eukaryotic cell and prokaryotic cell	4-5p.m	1
6.	11.01.2020	Bacterial Cell and Bacterial structure	4-5p.m	1
7.	13.01.2020	Bacterial structure and Cell envelope proper	4-5P.M	1
8.	17.01.2020	Components of cell wall of Gram-negative bacteria	4-5p.m	1
9.	18.01.2020	Functions of cell wall	4-5p.m	1
10.	20.01.2020	Cell membrane and Function of cell membrane	4-5p.m	1
11.	21.01.2020	Polyamines and Function of polyamines	4-5p.m	2
12.	22.01.2020	Cytoplasmic granules and Nuclear apparatus	4-5p.m	1
13.	23.01.2020	Flagellum and Flagellar arrangements	2-3p.m	1
14.	24.01.2020	Spores and Arrangements of spores	4-5p.m	1
15.	25.01.2020	Morphology of bacteria	4-5p.m	1

16.	27.01.2020	Staining of bacteria	3-5p.m	2
17.	28.01.2020	Why are stains not taken up by every microorganism? and Why are stains not taken up by every microorganism?	3-5p.m	2
18.	30.01.2020	General methods of staining	4-5p.m	1
19.	31.01.2020	Differentiation (decolorization)	4-5p.m	1
20.	01.02.2020	Types of microbiological stains and staining methods	3-5p.m	2
21.	03.02.2020	Ziehl-Neelson staining method and Procedure for Ziehl-Neelson staining method	4-5p.m	1
22.	04.02.2020	Cultivation of bacteria in culture media	4-5p.m	1
23.	05.02.2020	Assessment procedure and giving feedback in weaker areas	1-5p.m	4
		Total		**30hrs**

REFERENCE BOOKS:

1. *Thomson, R. B.; Wilson, M. L.; Weinstein, M. P. (2010). "The Clinical Microbiology Laboratory Director in the United States Hospital Setting". Journal of Clinical Microbiology. **48** (10): 3465–3469. doi:10.1128/JCM.01575-10. PMC 2953135. PMID 20739497.*
2. *Frank N. Egerton (2006). "A History of the Ecological Sciences, Part 19: Leeuwenhoek's Microscopic Natural History". Bulletin of the Ecological Society of America. **87**: 47–58. doi:10.1890/0012-9623(2006)87[47: AHOTES]2.0.CO;2.*
3. *Madigan M; Martinko J, eds. (2006). Brock Biology of Microorganisms (13th ed.). Pearson Education. p. 1096. ISBN 978-0-321-73551-5.*
4. *Brock TD (1999). Robert Koch: a life in medicine and bacteriology. Washington DC: American Society of Microbiology Press. ISBN 978-1-55581-143-3.*
5. Jump up to :*[a] [b] Willey, Joanne; Sandman, Kathleen; Wood, Dorothy (2020). Prescott's Microbiology. 2 Penn Plaza, New York, NY 10121: McGraw-Hill Education. p. 188. ISBN 978-1-260-21188-7.*

CLINICAL MICROBIOLOGY

INTRODUCTION TO MICROBIOLOGY

Microbiology is a subject which deals with living organisms that are Individually too small to be seen with the naked eye. It considers the microscopic forms of life and deals about their Reproduction, physiology, and participation in the process of nature, Helpful and harmful relationship with other living things, and Significance in science and industry. Subdivision of microbiology Bacteriology deals about bacteria. Mycology deals about fungi. Virology deals about viruses.

THE MICROBIAL WORLD

TAXONOMIC CLASSIFICATION OF ORGANISMS

TAXONOMY is the science of organismal classification. Classification is the assignment of organisms (species) into unorganized scheme of naming. ideally these schemes are based on evolutionary relationships (i.e the more similar the name, the closer the evolutionary relationships). Thus, classification is concerned with: -

The establishment of criteria for identifying organisms & assignment to groups (what belongs where)

The arrangement of organisms into groups of organisms of organism (e.g. At what level of diversity should a single species be split in to two or more species?).

Consideration of how evolution resulted in the formation these groups.

TAXON: -

A group or category of related organisms.

Two key characteristics of taxa are:

-Members of lower level taxa (e.g. Species) are more similar to each other than are members of higher-level taxa (e.g. Kingdom or domain).

-Member of specific taxa are more similar to each other than any are to members of different specific taxa found at the same hierarchical level (e.g. Humans are more similar to apes, i.e., comparison between species, than either is similar to, for example, Escherichia coli). Thus, once you know that two individuals are member of the same taxon, you can inter certain similarities between the two organisms. NOTE that taxa are dynamic, changing as our knowledge of organism and evolutionary relationships change

BINOMIAL NOMENCLATURE

Organisms are named using binomial nomenclature (viruses are exceptions)

Binomial nomenclature employs the names of the two-level taxa, genus and species, to name a specie.

Binomial nomenclature includes:

Genus comes before species (e.g., Escherichia coli)

Genus name is always capitalized (e.g., Escherichia)

Species name is never capitalized (e.g., coli)

Both names are always either italicized or underlined

(e.g. Escherichia coli)

The genus name may be used alone, but not the species name (i.e saying or writing "Escherichia "alone is legitimate while saying or writing "coli" is not) Strain

A strain in some ways is equivalent to a breed or

subspecies among plants or animal. Strain is the level

below the species

Two members of the same strain are more similar to each other than either is to an individual that is a member of a different strain, even if all three organisms are members of the same species

Bacterial species

- A bacterial species is defined by the similarities found among its members. Properties such as biochemical reactions, chemical composition, cellular structures, genetic characteristics, and immunological features are used in defining a bacterial species. Identifying a species and determining its limits presents the most challenging aspects of biological classification for any type of organism. A formal means of species is by employing a dichotomous key to guide the selection of test used to efficiently determine those bacterial properties most relevant to bacterial identification the five-kingdom system the five-kingdom system was first proposed in 1969 and is showing its age

The five kingdoms include:

- Plantae (the plants)
- Fungi (the fungi)
- Animalia (the animals)
- Protista (the unicellular eukaryotes)
- Monera (the prokaryotes)
- Kingdom of Monera

Three categories:

- Eubacteria Are our common, everyday bacteria, some of which are disease – causing; also, the taxon from which mitochondria originated.
- Cyanobacteria

Are photosynthetic eubacteria, the taxon from which chloroplast

Archaebacterial

Are distinctive in their adaptation to extreme environments (e.g., very hot, salty, or acidic) though not all archaebacterial live in extreme environments. These distinctions are more phenotypic than they are evolutionary

(i.e., a cyanobacteria are eubacteria, and neither is an

archaebacterial).

Kingdom Protista

Protista like Monera consist mostly of unicellular organisms. Distinctively, however, the members of Kingdom Protista are all eukaryotic while the members of kingdom Monera are all prokaryotic. Some members of protista are multicellular, however Kingdom protista represents a grab bag, essentially the place where the species are classified when they are not classified as either fungi, animals or plants.

Kingdom Fungi

Unlike protests, the eukaryotic fungi are typically non – aquatic species. They traditionally are nutrients absorbers plus have additional distinctive features. They do exist unicellular fungi, which we call yeast

DOMAIN

The domain is a taxonomic category that, depending on point of view, is either above the level of kingdom or supercedes the kingdom. The domain system contains three members

¾ Eukaryotes (domain Eukarya)

¾ Eubacteria (domain Bacteria)

¾ Archaebacteria (domain Archaea)

Viral classification

Classification of viruses is not nearly as well developed as the classification of cellular organisms. Today viruses tend to be classified by their chemical, morphological and physiological attributes (e.g. genome = DNA vs RNA, virion particle = enveloped vs non-enveloped and myriad details of their intracellular infection cycles). Binomial nomenclature is not employed to name viruses;

instead viruses are named by their common names (e.g., Human Immunodeficiency Virus a.m. HIV) Dichotomous key A means of assigning an organism to a specific taxonomic category typically involves the use of specific criteria that may posed as questions (e.g. What does the organism look like etc.). Relevant criteria may be arranged as a dichotomous key. In a dichotomous

key questions are arranging hierarchically with more general questions are asked first, with questions becoming more specific asked subsequently

EUKARYOTIC CELL

Eu- true

Karyote- nucleus

The eukaryotic cell has a true membrane bound nucleus, usually containing multiple chromosomes, a mitotic apparatus, a well-defined endoplasmic reticulum and mitochondria.

PROKARYOTIC CELL

Pro- primitive

Karyote- nucleus

The prokaryotic cell possesses naked DNA with out associated basic proteins, divides a mitotically by binary fission and bounded by a semi rigid cell wall.

Bacterial Cell

General property:

- Typical prokaryotic cell
- Contain both DNA and RNA
- Most grow in artificial media
- Replicate by binary fission
- Almost all contain rigid cell wall
- Sensitive to antimicrobial agent

STRUCTURE OF BACTERIA

Bacterial structure is considered at three levels.

1. Cell envelope proper: Cell wall and cell membrane.
2. Cellular element enclosed with in the cell envelope: Mesosomes, ribosomes, nuclear apparatus, polyamines and cytoplasmic granules.
3. Cellular element external to the cell envelope: Flagellum, Pilus and Glycocalyx.

Cell envelope proper

A. Cell wall Multi layered structure and constitutes about 20% of the bacterial dry weight. Average thickness is 0.15-0.5 am. Young and rapidly growing bacteria has thin cell wall but old and slowly dividing bacteria has thick cell wall.

It is composed of N-acetyl Muramic acid and N-acetyl Glucosamine back bones cross linked with peptide chain and pentaglycine bridge.

Components of cell wall of Gram-negative bacteria

1. Peptidoglycan
2. Lipoprotein
3. Phospholipid

4. Lipopolysaccharide

Components of cell wall of Gram-positive bacteria

1. Peptidoglycan
2. Teichoic acid

Functions of cell wall

1. Provides shape to the bacterium
2. Gives rigidity to the organism

3. Protects from environment

4. Provides staining characteristics to the bacterium

5. Contains receptor sites for phages/complements

6. Site of action of antibody and colicin

7. Contains toxic components to host Bacteria with defective cell walls Bacteria with out cell wall can be induced by growth in the presence of antibiotics and a hypertonic environment to prevent lysis.

They are of three types:

1. Protoplasts: Derived from Gram-positive bacteria and totally lacking cell walls; unstable and osmotically

fragile; produced artificially by lysozyme and hypertonic medium: require hypertonic conditions for maintenance.

2. Spherules: Derived from Gram-negative bacteria;

retain some residual but non-functional cell wall material; osmotically fragile; produced by growth with penicillin and must be maintained in hypertonic medium.

L- forms: Cell wall-deficient forms of bacteria usually produced in the laboratory but sometimes spontaneously formed in the body of patients treated with penicillin; more stable than protoplasts or spherulites, they can replicate in ordinary media.

B. Cell membrane

Also named as cell membrane or cytoplasmic membrane

It is a delicate trilaminar unit membrane.

It accounts for 30% of the dry weight of bacterial cell.

It is composed of 60% protein, 20-30% lipids and 10-20% carbohydrate.

Function of cell membrane

1. Regulates the transport of nutrients and waste products into and out of the cell.
2. Synthesis of cell wall components
3. Assists DNA replication
4. Secrets proteins
5. Carries on electron transport system
6. Captures energy in the form of ATP
7. Cellular element enclosed with in the cell envelope

A. Mesosomes

Convoluted invagination of cytoplasmic membrane often at sites of septum formation.

It is involved in DNA segregation during cell division and respiratory enzyme activity.

B. Ribosomes

Cytoplasmic particles which are the sites of protein synthesis.

It is composed of RNA (70%) and proteins (30%) and constitutes 90% of the RNA and 40% of the total protein.

The ribosome monomer is 70s with two subunits, 30s and 50s.

Polyamines

They are of three types

- Putrescin
- Spermidine
- Spermine

It is found in association with bacterial DNA, ribosomes and cell membrane.

Function of polyamines

1. Antimutagenic
2. Prevent dissociation of 70s ribosome into subunits.
3. Increase resistance of protoplast lysis.

Cytoplasmic granules

represent accumulated food reserves.

- Nature of granules
- Glycogen
- Poly-beta hydroxy butyrate
- Babes-Ernst (Volutid)

Nuclear apparatus

Well defined nucleus and nuclear membrane, discrete chromosome and mitotic apparatus are not present in bacteria; so nuclear region of bacteria is named as nuclear body, nuclear apparatus and nucleoid.

Bacterial genome consists of single molecule of double stranded DNA arranged in a circular form.

Besides nuclear apparatus, bacteria may have extra chromosomal

genetic material named as plasmids. Plasmids do not play any role in the normal function of the bacterial cell but may confer certain additional properties (E.g. Virulence, drug

resistance) which may facilitate survival and propagation of the micro- organism.

3. Cellular element external to the cell envelope

A. Glycocalyx (capsule and slime layer) Capsule is gel firmly adherent to cell envelope. Slime is gel easily washed off from cell envelope.

All bacteria have at least a thin slime layer.

Capsule is composed of polysaccharide and protein (D-Glutamate of Bacillus anthracis)

Features of capsule

1. Usually weakly antigenic.
2. Not necessary for viability.
3. Endows virulence.
4. Protects from phagocytosis.
5. Capsulated strains are invariably non-motile.
6. Visualized by negative staining and capsule staining.
7. Detected by quelling phenomenon.

B. Flagellum

It is the organ of locomotion in bacterial cell and consists of thee parts. These are. The filament

- The hook
- The basal body

The basal body and hook are embedded in the cell surface while the filament is free on the surface of bacterial cell.

Their presence in bacterial cell is detected by

- Hanging drop preparation
- Swarming phenomenon on surface of plate agar
- Motility media
- Special staining methods
- Silver impregnation methods
- Dark –field microscopy
- Electron microscopy

Size: 3-20µm in length and 0.01-0.013µm in diameter.

It is composed of protein named as flagellin.

The flagellar antigen in motile bacterium is named as H (Haunch) antigen.

Flagellar arrangements

1. Atrichias: Bacteria with no flagellum.

2. Monoicous: Bacteria with single polar flagellum.

3. Ophiotrichids: Bacteria with bunch of flagella at one pole.

4. Amphitricha: Bacteria with flagella at both poles.

5. Peritrichous: Bacteria with flagella all over their surface.

End flagella (axial filament)

It is the organ of motility found in periplasmic space of spirochetes.

C. Pili (fimbriae)

It is hair like structure composed of protein (pilin)

Two types (Based on function)

- . Common pili: The structure for adherence to cell surface.
- Sex pili: The structure for transfer of genetic material from the

donor to the recipient during the process of conjugation.

D. Spores

Resting cells which are capable of surviving under adverse environmental conditions like heat, drying, freezing, action of toxic chemicals and radiation. Bacterial spore is smooth walled and oval or spherical in shape. It does not take up ordinary stains. It looks like areas of high refractivity under light microscope.

It is significant in spread of disease and indicator of sterility of

materials.

Spores are detected by

- . Simple staining methods
- Special staining methods

Arrangements of spores

1. No bulging of cell wall

- . Oval central
- . Oval sub terminal
- Spherical central

2. Bulging of cell wall

- Oval sub terminal
- Oval terminal
- Spherical terminal
- Free spore

Classification of bacteria

Bacterial classification depends on the following characteristics.

1. Morphology and arrangement

2. Staining

3. Cultural characteristics

4. Biochemical reactions

5. Antigenic structure

6. Base composition of bacterial DNA

Morphology and staining of bacteria are the commonly used characteristics to classify bacteria.

1. Morphology of bacteria

When bacteria are visualized under light microscope, the following morphology is seen.

1. Cocci (singular coccus): Round or oval bacteria measuring about 0.5-1.0µmb in diameter. They are found in single, pairs, chains or clusters.

2. Bacilli (singular bacillus): Stick-like bacteria with rounded, tapered, square or swollen ends; with a size measuring 1-10µm in length by 0.3-1.0µm in width.

3. Coccobacilli (singular coccobacillus): Short rods.

4. Spiral: Spiral shaped bacteria with regular or irregular distance between twisting.

E.g. Spirilla and spirochetes

Staining of bacteria

Bacterial staining is the process of coloring of colorless bacterial structural components using stains (dyes). The principle of staining is to identify microorganisms selectively by using dyes, fluorescence and radioisotope emission. Staining reactions are made possible because of the physical phenomena of capillary osmosis, solubility, adsorption, and absorption of stains or dyes by cells of microorganisms. Individual variation in the cell wall constituents among different groups of bacteria will consequently produce variations in

colors during microscopic examination. Nucleus is acidic in character and hence, it has greater affinity for basic dyes. Whereas, cytoplasm is basic in character and
has greater affinity for acidic dyes.

There are many types of affinity explaining this attraction force:

1. hydrophobic bonding
2. reagent-cell interaction
3. reagent-reagent interaction
4. ionic bonding
5. hydrogen bonding
6. covalent bonding

Why are stains not taken up by every microorganism?

Factors controlling selectivity of microbial cells are:

1. number and affinity of binding sites
2. rate of reagent uptake
3. rate of reaction
4. rate of reagent loss (differentiation or regressive staining)

Properties of dyes

Why dyes color microbial cells?

Because dyes absorb radiation energy in visible region of electromagnetic spectrum i.e., "light" (wave length 400-650). And absorption is anything outside this range it is colorless. E.g., acid
fuchsin absorbs blue green and transmit red.

General methods of staining

1. Direct staining

Is the process by which microorganisms are stained with simple?
dyes. E.g., methylene blue

2. Indirect staining – is the process which needs mordants. A mordant is the substance which, when taken up by the microbial cells helps make dye in return, serving as a link or bridge to make the staining recline possible. It combines with a dye to form a colored "lake", which in turn combines with the microbial cell to form a "cell-mordant-dye complex". It is an integral part of the staining reaction itself, without which no staining could possibly occur. E.g., iodine.

A mordant may be applied before the stain or it may be included as part of the staining technique, or it may be added to the dye solution itself.

An accentuator, on the other hand is not essential to the chemical union of the microbial cells and the dye. It does not participate in the staining reaction, but merely accelerate or hasten the speed of the staining reaction by increasing the staining power and selectivity of the dye. Progressive staining - is the process whereby microbial cells are stained in a definite sequence, in order that a satisfactory differential coloration of the cell may be achieved at the end of the correct time with the staining solution. Regressive staining - with this technique, the microbial cell is first over stained to obliterate the cellular desires, and the excess stain is removed or decolorized from unwanted part. **Differentiation (decolorization)**

- is the selective removal of excess stain from the tissue from microbial cells during regressive staining in order that a specific substance may be stained differentially from the surrounding cell. Differentiation is usually controlled visually by examination under the microscope

Uses

1. To observe the morphology, size, and arrangement of bacteria.
2. To differentiate one group of bacteria from the other group.

Biological stains are dyes used to stain micro-organisms.

Types of microbiological stains

- Basic stains
- Acidic stains
- Neutral stains

NB: This classification is not based on PH

of stains.

Basic stains are stains in which the coloring substance is contained in the base part of the stain. The acidic part is colorless. E.g. Acidic stains are stains in which the coloring substance is contained in the acidic part of the stain. The base part is colorless. It is not commonly used in microbiology laboratory.

E.g. Eosin stain

Neutral stains are stains in which the acidic and basic components of stain are colored.

Neutral dyes stain both nucleic acid and cytoplasm. E.g. Giemsa stain

Types of staining methods

1. Simple staining method
2. Differential staining method
3. Special staining method

1. Simple staining method

It is type of staining method in which only a single dye is used. Usually used to demonstrate bacterial morphology and arrangement

Two kinds of simple stains

1. Positive staining: The bacteria or its parts are stained by the

dye.

E.g. Carbol fuchsin stain

Methylene blue stain

Crystal violet stain

Procedure:

- . Make a smear and label it.
- . Allow the smear to dry in air.
- . Fix the smear over a flame.
- . Apply a few drops of positive simple stain like 1% methylene blue, 1% carbolfuchsin or 1% gentian violet for 1 minute.
- Wash off the stain with water.
- Air-dry and examine under the oil immersion objective.

2. Negative staining: The dye stains the background and the

bacteria remain unstained. E.g. Indian ink stain Negros in stain

Differential staining method Multiple stains are used in differential staining method to distinguish different cell structures and/or cell types. E.g. Gram stain and ZiehlNeelson stain

A. Gram staining method

Developed by Christian Gram. Most bacteria are differentiated by their gram reaction due to differences in their cell wall structure. Gram-positive bacteria are bacteria that stain purple with crystal violet after decolorizing with acetone-alcohol. Gram-negative bacteria

are bacteria that stain pink with the counter stain (safranin) after losing the primary stain (crystal violet) when treated with acetone-alcohol.

Required reagents:

- Gram's Iodine
- Acetone-Alcohol
- Safranin

Procedure:

1. Prepare the smear from the culture or from the specimen.
2. Allow the smear to air-dry completely.
3. Rapidly pass the slide (smear upper most) three times through the flame.
4. Cover the fixed smear with crystal violet for 1 minute and wash with distilled water.
5. Tip off the water and cover the smear with gram's iodine for 1 minute.
6. Wash off the iodine with clean water.
7. Decolorize rapidly with acetone-alcohol for 30 seconds.
8. Wash off the acetone-alcohol with clean water.
9. Cover the smear with safranin for 1 minute.
10. Wash off the stain wipe the back of the slide. Let the smear to air-dry.
11. Examine the smear with oil immersion objective to look for bacteria.

Interpretation:

- Gram-positive bacterium ……Purple
- Gram-negative bacterium ……. Pink

B. Ziehl-Neelson staining method

Developed by Paul Ehrlichin1882, and modified by Ziehl and Nelson Ziehl-Neelson stain (Acid-fast stain) is used for staining Mycobacteria which are hardly stained by gram staining method. Once the Mycobacteria is stained with primary stain it can not be decolorized with acid, so named as acid-fast bacteria.

Reagents required:

- Carbol-fuchsin
- Acid-Alcohol
- Methylene blue/Malachite green

Procedure for Ziehl-Neelson staining method

1. Prepare the smear from the primary specimen and fix it by passing through the flame and label clearly
2. Place fixed slide on a staining rack and cover each slide with concentrated carbol fuchsin solution.
3. Heat the slide from underneath with sprit lamp until vapor rises (do not boil it) and wait for 3-5 minutes.
4. Wash off the stain with clean water.
5. Cover the smear with 3% acid-alcohol solution until all color is removed (two minutes).
6. Wash off the stain and cover the slide with 1% methylene blue. For one minute.
7. Wash off the stain with clean water and let it air-dry.
8. Examine the smear under the oil immersion objective to look for acid fast bailli.

Interpretation:

Acid fast bacilli……. Red

Back ground……Blue

Reporting system

0 AFB/100 field ……No AFB seen

1-2 AFB/ 300 field……. Scanty

1-10 AFB/100 field……1+

11-100AFB/100 field.……2+

1-10 AFB/field…… ……3+

>10 AFB/field…… ….4+

NB: AFB means number of acid-fast bacilli seen.

3. Special stains

a. Spore staining method

b. Capsule staining method

Procedure:

1. Prepare smear of the spore-forming bacteria and fix in flame.

2. Cover the smear with 5% malachite green solution and heat over steaming water bath for 2-3 minutes.

3. Wash with clean water.

4. Apply 1% safranin for 30 seconds.

5. Wash with clean water.

6. Dry and examine under the oil immersion objective.

b. Capsule staining method: Welch method

Procedure:

1. Prepare smear of capsulated bacteria.

2. Allow smear to air-dry; do not fix the smear.

3. Cover the smear with 1% aqueous crystal violet for 1 minute over steaming water bath.

4. Wash with 20% copper sulfate solution. Do not use water.

5. examine under the oil immersion objective.

CULTIVATION OF BACTERIA IN CULTURE MEDIA

Culture media

It is the media containing the required nutrients for bacterial growth.

Uses: Isolation and identification of micro-organisms

- Performing anti-microbial sensitivity tests Common ingredients of culture media
- Peptone
- Meat extract
- Yeast extract
- Mineral salts
- Carbohydrates
- Agar
- Water

Peptone: Hydrolyzed product of animal and plant proteins: Free amino acids, peptides and proteases (large sized peptides).

It provides nitrogen; as well carbohydrates, nucleic acid fractions, minerals and vitamins.

Meat extract: supply amino acids, vitamins and mineral salts.

Yeast extract: It is bacterial growth stimulants.

Mineral salts: these are: Sulfates as a source of sulfur.

- Phosphates as a source of phosphorus.
- Sodium chloride
- Other elements

Carbohydrates: Simple and complex sugars are a source of carbon and energy.

- Assist in the differentiation of bacteria.

E.g. Sucrose in TCBS agar differentiates vibrio species.

Lactose in MacConkey agar differentiates enterobacteria.

Agar: It is an inert polysaccharide of seaweed.

It is not metabolized by micro-organism.

Property

It has high gelling strength

high melting temperature (90-95 o

c) . low gelling temperature

- It forms firm gel at 1.5% W/V concentration.
- It forms semisolid gel at 0.4-0.5% W/V concentration.

Uses:

Solidify culture media

May provide calcium and organic ions to inoculated bacteria. Water Deionized or distilled water must be used in the preparation of culture media.

Types of culture media

- Basic /Simple /. To prepare enriched media
- . To maintain stock cultures of control bacterial strains
- . To subculture pathogenic All-purpose media

It is a media that supports the growth of micro-organisms that do not require special nutrients.

Uses:

bacteria from selective/differential medium prior to performing biochemical or serological tests.

E.g. Nutrient Broth, Nutrient Agar

2. Enriched media

Media that are enriched with whole blood, lazed blood, serum, special extracts or vitamins to support the growth of pathogenic bacteria.

E.g. Blood Agar, Chocolate Agar

3. Enrichment media

Fluid media that increases the numbers of a pathogen by containing enrichments and/or substances that discourage the multiplication of unwanted bacteria.

E.g. Selenite F broth media Alkaline peptone water

4. Selective media

Media which contain substances (E.g. Antibiotics) that prevent or slow down the growth of bacteria other than pathogens for which the media are intended.

E.g. Modified Thayer –Martin Agar

Salmonella-Shigella (SS) agar

1. Differential media

Media to which indicator substances are added to differentiate bacteria.

E.g. TCBS Agar differentiates sucrose fermenting yellow colonies of Vibrio cholerae to non-sucrose fermenting blue colonies other Vibrio species.

NB: Most differential media distinguish between bacteria by an indicator which changes color when acid is produced following carbohydrate fermentation.

2. Transport media

Media containing ingredients to prevent the overgrowth of commensals and ensure the survival of pathogenic bacteria when specimens cannot be cultured soon after collection.

3. Enrichment media

Fluid media that increases the numbers of a pathogen by containing enrichments and/or substances that discourage the multiplication of unwanted bacteria.

E.g. Selenite F broth media Alkaline peptone water

4. Selective media

Media which contain substances (E.g. Antibiotics) that prevent or slow down the growth of bacteria other than pathogens for which the media are intended.

E.g. Modified Thayer –Martin Agar Salmonella-Shigella (SS) agar

Choice of culture media

The selection culture media will depend on:

1. The major pathogens to be isolated, their growth requirements and the features by which they are recognized.

2. Whether the specimens being cultured are from sterile sites or from sites having normal microbial flora.

3. The cost, availability and stability of media.

4. The training and experience of laboratory staff in preparing, using and controlling culture media.

Forms of culture media

1. solid culture media

2. semisolid culture media

3. Fluid culture media

1. solid culture media

. Plate cultures in petri dishes

. stab/slope cultures in tubes and bottles

Uses: Description of bacterial colonies

- size: diameter in mm
- Out line: circular, entire, wavy, indented

  Elevation: flat, raised, low convex and dome shaped.
- Transparency: transparent, opaque, and translucent.
- Surface: smooth (mucoid) and shiny, rough and dull.
- Color: colorless, white, pink, and pigmented
- changes in medium

E.g. Hemolysis in Blood Agar

Blackening of medium due to hydrogen sulfide production.

2. Semisolid culture media

Uses:

. as an enrichment media

. as motility media

3. Fluid culture media

Bacterial growth in fluid media is shown by a turbidity in the medium.

Uses:

. as an enrichment media

. as biochemical testing media

. as blood culture media

Preparation of culture media

Culture media contains essential ingredients for microbial growth requirements. For successful isolation of pathogens, culture media must be prepared carefully.

Most culture media are available commercially in ready –made dehydrated form.

The major processes during preparation of culture media

- Weighing and dissolving of culture media ingredients
- Sterilization and sterility testing
- Addition of heat-sensitive ingredients
- Dispensing of culture media
- pH testing of culture media
- Quality assurance of culture media
- Storage of culture media

1. Weighing and dissolving of culture media ingredients

Apply the following while weighing and dissolving of culture media ingredients

- Use ingredients suitable for microbiological use.
- Use clean glass ware, plastic or stainless-steel equipment.
- Use distilled water from a glass still.

- Do not open new containers of media before finishing previous ones.
- Weigh in a cool, clean, dry and draught-free atmosphere.
- Weigh accurately using a balance.
- Wear a facemask and glove while weighing and dissolving toxic chemicals.
- Do not delay in making up the medium after weighing.
- Add powdered ingredients to distilled water and mix by rotating or stirring the flask.
- Stir while heating if heating is required to dissolve the medium.
- Autoclave the medium when the ingredients are dissolved.

2. Sterilization and sterility testing

Always sterilize a medium at the correct temperature and for the correct length of time as instructed in the method of preparation.

Methods used to sterilize culture media

A) . Autoclaving

B) . Steaming to 100 OC

C) . Filtration

A) Autoclaving

Autoclaving is used to sterilize most agar and fluid culture media.

B) Steaming at 100 OC

It is used to sterilize media containing ingredients that would be inactivated at temperature over 100 OC and re-melt previously bottled sterile agar media.

C) Filtration

It is used to sterilize additives that are heat-sensitive and cannot be autoclaved.

Sterility testing

The simplest way to test for contamination is to incubate the prepared sample media At 35-37 OC for 24 hours. Turbidity in fluid media and microbial growth in solid media confirm contamination.

3. Addition of heat-sensitive ingredients Refrigerated-heat sensitive ingredients should be warmed at room temperature before added to a molten agar medium. Using an aseptic technique, the ingredients should be added when the medium has cooled to 50 OC, and should be distributed immediately unless further heating is required.

4. pH testing

The pH of most culture media is near neutral, and can be tested using pH papers or pH meter.

5. Dispensing of culture media

Media should be dispensed in a clean draught-free room using aseptic technique and sterile container.

Dispensing agar media in Petridis

- Lay out the sterile Petri dishes on a level surface.
- Mix the medium gently by rotating the flask or bottle.
- Flame sterilize the neck of flask or bottle.
- Pour 15 ml of medium in each Petridis.
- Stack the plates after the medium has gelled or cooled.

Store the plates in a refrigerator.

NB: Agar plates should be of an even depth and of a firm gel.

The surface of the medium should be smooth and free from bubbles.

6. Quality control

• Inoculate quarter plates of the medium with a five hours broth culture for each control organism.

• Use a straight wire to inoculate and wire loop to spread the inoculum.

• Depending on the species, incubate aerobically, CO2-enriched atmosphere and anaerobically at 35-37 OC for 24 hours.

• Examine for the degree of growth, morphology and other characteristics of microbial colonies.

• Record the result of each control species and compare to your standard reading.

Storage of culture media

• Dehydrated culture media and dry ingredients should be stored at an even temperature in a cool dry place away from direct light.

• Plates of culture media, and additives like serum, blood and antimicrobials in solid form require storage at 2-8 OC.

• Antimicrobials in solution form should be stored at –20 OC.

• All culture media and additives should be labeled with the name and date of preparation.

Inoculation of culture media

When inoculating culture media, an aseptic technique must be used to prevent contamination of specimens and culture media, and laboratory worker and the environment.

Aseptic technique during inoculation of culture media

• Decontaminate the workbench before and after the work of the day.

• Use facemask and gloves during handling highly infectious specimens.

• Flame sterilize wire loops, straight wires, and metal forceps before and after use.

• Flame the neck of specimen and culture bottles, and tubes after removing and before replacing caps and plugs.

Inoculation of media in Petri dishes

The inoculation of media in Petri dishes is named as 'plating out' or 'looping out'. Before inoculating a plate of culture media, dry the surface of the media by incubating at 37 OC for 30 minutes. To inoculate a plate, apply the inoculum to a small area of the plate ('the well') using sterile wire loop and then spread and thin out the inoculum to ensure single colony growth. Inoculation of butt and slant media to inoculate butt and slant media, use a sterile straight wire to stab into the butt and then streak the slant in a zigzag pattern.

Inoculation of slant media

To inoculate slant media, use a straight wire to streak the inoculum down the center of the slant and then spread the inoculum in a zigzag pattern.

Inoculation of stab media

To inoculate stab media, use a straight wire to stab through the center of the medium and withdraw the wire along the line of inoculum. Inoculation of fluid media to inoculate fluid media, use straight wire or wire loops.

Incubation of cultures

Inoculated media should be incubated as soon as possible.

Optimal temperature, humidity and gaseous atmosphere should be provided for microorganisms to grow best. The temperature selected for routine culturing is 35-37 OC. Some pathogens require CO2-enriched atmosphere to grow in culture media, and the simplest way to provide CO2-enriched atmosphere is to enclose a lighted candle in an airtight jar which provides 3-5% CO2 by the time the candle is extinguished. Anaerobic atmosphere is essential for the growth of strict anaerobes, and the techniques for obtaining anaerobic conditions are the following:

. Anaerobic jar with a gas generating kit.

. Reducing agents in culture media.

BACTERIAL NUTRITION

Bacteria, like all cells, require nutrients for the maintenance of their metabolism and for cell division. Bacterial structural components and the macromolecules for the metabolism are synthesized from the elements. The four most important elements of bacteria are carbon, hydrogen, oxygen and nitrogen. Carbon Organisms require a source of carbon for the synthesis of numerous organic compounds that comprise protoplast.

Depending on their requirements, bacteria can be classified as

1. Autotrophs: Free-living, non-parasitic bacteria which use carbon dioxide as carbon source.

The energy needed for their metabolism can be obtained from: Sun Light-Photoautotrophs

. Inorganic compounds by oxidation-Chemoautotrophs

3. Heterotrophs: Parasitic bacteria require more complex organic compounds as their source of carbon and energy. Human pathogenic bacteria are heterotrophs. The principal source of carbon is carbohydrate which are degraded either by oxidation, in the presence of oxygen, or by fermentation, in the absence of oxygen, to provide energy in the form of ATP.

Hydrogen and oxygen

- Obtained from water.
- Essential for the growth and maintenance of cell.

Nitrogen

- Constitutes 10% of dry weight of bacterial cell.
- Obtained from organic molecules like proteins and inorganic molecules like ammonium salts and nitrates.

NB: Main source of nitrogen is ammonia, in the form of ammonium salt.

Growth factors

Growth factors are organic compounds that are required by microorganisms in small amounts which the cell cannot synthesize from other carbon source. These are amino acids, purines and pyrimidines, and vitamins.

Prototroph: Wild-type bacteria with normal growth requirements.

Auxotroph's: Mutant bacteria, which require an additional growth factor not needed by the parental or wild type strain.

SRI LAKSHMI NARAYANA INSTITUTE OF ALLIED HEALTH SCIENCE

MEDICAL EDUCATIONAL PROJECT

CLINICAL MICROBIOLOGY- VAC05/AHS/2020-06/01

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S.No.	Name of the Students	University Register Number	Signature
1	PAVITHRA S	UAH1901114	
2	POOVARASAN P	UAH1901115	
3	PRAVEEN KUMAR E	UAH1901116	
4	RAMYA R	UAH1901117	
5	SANJAI B	UAH1901118	
6	SELVAKUMAR R	UAH1901119	
7	SENTHIL RAJA D	UAH1901120	
8	SHALINI R	UAH1901121	
9	SHURUTHY S	UAH1901122	
10	SINDHUJA P	UAH1901123	
11	SHIVA JOTHI S	UAH1901124	
12	SOUNDARYA M	UAH1901125	
13	SRIRAM A	UAH1901126	
14	THIRUMURUGAN A	UAH1901127	
15	TIOLEODOSS A	UAH1901128	
16	UMAMAHESWARI S	UAH1901129	
17	YOGASRI V	UAH1901130	
18	AMARNATH K	UAH1906101	
19	CHANDRA SEKAR M	UAH1906102	
20	EZHILARASAN M	UAH1906103	
21	JEEVA J	UAH1906104	
22	PAVITHRA P	UAH1906105	
23	PRAVEEN KUMAR R	UAH1906106	
24	SANTHIYA S	UAH1906107	
25	SELVAPRIYA S	UAH1906108	
26	SHAJAKHAN	UAH1906109	
27	SOORIYA A	UAH1906110	
28	SUJITH G	UAH1906111	
29	THULASIRAMAN	UAH1906112	
30	VIGNESH S	UAH1906113	

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - III

Assessment Form

Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry

COURSE CODE: VAC05/AHS/2020-06/01

Multiple Choice Question ***15x2=30***

1. Which of these bacterial components is least likely to contain useful antigens?

a. Cell wall
b. Flagella
c. Ribosomes
d. Capsule

2. Which of the following contains structures composed of N-acetylmuramic acid and N-acetylglucosamine?

a. Mycoplasmas
b. Amoeba
c. E.coli
d. Spheroplast

3. The association of endotoxin in gram-negative bacteria is due to the presence of

a. Steroids
b. Peptidoglycan
c. Lipopolysaccharides
d. Polypeptide

4. The prokaryotic cell membrane

a. Contains metabolic enzymes
b. Is selectively permeable
c. Regulates the entry and exit of materials
d. Contains proteins and phospholipids

5. Which of the statements regarding gram staining is wrong?

a. *Mycobacterium tuberculosis* stains blue because of the thick lipid layer
b. *Streptococcus pyogenes* stains blue because of a thick peptidoglycan layer
c. *Escherichia coli* stains pink because of a thin peptidoglycan layer
d. *Mycoplasma pneumoniae* is not visible in the Gram's stain because it has no cell wall

6. Which of the following is not a recognised cause of diarrhoea?

a. *Vibrio cholerae*
b. *Escherichia coli*
c. *Clostridium perfringens*
d. *Enterococcus faecalis*

7. Which of the following is a gram-positive eubacteria?

a. *Actinomyces*
b. *Clostridium*
c. *Rhizobium*
d. *Clostridium, Actinomyces*

8. Which of the following microorganisms is not responsible for urinary tract infection?

a. *Proteus mirabilis*
b. *Escherichia coli*
c. *Klebsiella pneumoniae*
d. *Bacteroides fragilis*

9. Which of the following is diagnosed by serologic means?

a. Actinomycosis
b. Q-fever
c. Pulmonary tuberculosis
d. Gonorrhoea

10. Diarrhoea is not caused by

a. *Shigella dysenteries*
b. *Streptococcus pyogenes*
c. *Clostridium difficile*
d. *Salmonella enteritis*

11. The coagulase is done to differentiate

a. *Staphylococcus aureus* from *Staphylococcus epidermidis*
b. *Staphylococcus epidermidis* from *Neisseria meningitidis*
c. *Streptococcus pyogenes* from *Enterococcus faecalis*
d. *Streptococcus pyogenes* from *Staphylococcus aureus*

12. Prokaryotic cells are more resistant to osmotic shock than eukaryotic cells because

a. Their cell wall is composed of peptidoglycan
b. They are selectively permeable
c. They contain osmoregulation porins
d. They block water molecules from entering the cell

13. The bacterial genus where sterols are present in the cell membrane is

a. *Vibrio*
b. *Mycoplasma*
c. *Escherichia*
d. *Chlamydia*

14. The bacterium that infects other gram-negative bacteria is

a. *Proteus mirabilis*
b. *Haemophilus influenza*
c. *Bdellovibrio*
d. *Pseudomonas putida*

15. Which phage is used for phage display technique?

a. T7
b. M13
c. ƛ-phage
d. ϕ6

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

DAMYA .R. UAH1901117

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - III

Assessment Form

Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry

COURSE CODE: VAC05/AHS/2020-06/01

Multiple Choice Question ***15x2=30***

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   c. E.coli
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   d. Polypeptide

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SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

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SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

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c. λ-phage
d. ϕ6

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

SELVAKUMAR . K . UAH19011I9

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - III

Assessment Form

Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry

COURSE CODE: VAC05/AHS/2020-06/01

Multiple Choice Question ***15x2=30***

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SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON
AND RESEARCH

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SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON
AND RESEARCH

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c. *Bdellovibrio*
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c. λ-phage
d. ϕ6

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that **Poovarasan P(UAH1901115)** has actively participated in the Value Added Course on **CLINICAL MICROBIOLOGY(VAC05/AHS/2020-06/01)** held during January 2020 – February 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

RESOURCE PERSON

Dr. G.Somasundram

COORDINATOR

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that **PAVITHRA S(UAH1901114)** has actively participated in the Value Added Course on **CLINICAL MICROBIOLOGY(VAC05/AHS/2020-06/01)** held during January 2020 – February 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. G.Somasundram

COORDINATOR

RESOURCE PERSON

Annexure- V

Student Feedback Form

Course Name: "CLINICAL MICROBIOLOGY"

Subject Code: VAC05/AHS/2020-06/01

Name of Student: _____ Roll No.: _____

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Feedback Form

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. The course met my expectations.	○	○	○	○	○
2.I will be able to apply the knowledge learned.	○	○	○	○	○
3.The course objectives for each topic were identified and followed.	○	○	○	○	○
4.The content was organised and easy to follow.	○	○	○	○	○
5.The quality of instruction was good.	○	○	○	○	○
6.Class participation and interaction were encouraged.	○	○	○	○	○
7.Adequate time was provided for questions and discussion.	○	○	○	○	○

8.How do you rate the course overall?

- ○ Excellent
- ○ Good
- ○ Average
- ○ Poor
- ○ Very poor

9. The aspects of the course could be improved?

10. Other comments?

Annexure- V

Student Feedback Form

Course Name: "CLINICAL MICROBIOLOGY"

Subject Code: VAC05/AHS/2020-06/01

Name of Student: R. Selvakumar Roll No.: UAH190111 9,

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Feedback Form

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. The course met my expectations.	✓	○	○	○	○
2.I will be able to apply the knowledge learned.	○	✓	○	○	○
3.The course objectives for each topic were identified and followed.	✓	○	○	○	○
4.The content was organised and easy to follow.	○	✓	○	○	○
5.The quality of instruction was good.	✓	○	○	○	○
6.Class participation and interaction were encouraged.	○	○	✓	○	○
7.Adequate time was provided for questions and discussion.	○	○	✓	○	○

8.How do you rate the course overall?

- ○ Excellent
- ✓ Good
- ○ Average
- ○ Poor
- ○ Very poor

9. The aspects of the course could be improved? Good.

10. Other comments? –

Signature of the student: Selvak R-

Date: 5/2/2020

Annexure- V

Student Feedback Form

Course Name: "CLINICAL MICROBIOLOGY"

Subject Code: VAC05/AHS/2020-06/01

Name of Student: S. SANTHIYA Roll No.: UAH1906107

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Feedback Form

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. The course met my expectations.	○	✓	○	○	○
2.I will be able to apply the knowledge learned.	✓	○	○	○	○
3.The course objectives for each topic were identified and followed.	○	✓	○	○	○
4.The content was organised and easy to follow.	✓	○	○	○	○
5.The quality of instruction was good.	○	✓	○	○	○
6.Class participation and interaction were encouraged.	○	○	✓	○	○
7.Adequate time was provided for questions and discussion.	○	○	✓	○	○

8.How do you rate the course overall?

- ○ Excellent
- ✓ Good
- ○ Average
- ○ Poor
- ○ Very poor

9. The aspects of the course could be improved? improved my knowledge.

10. Other comments? Good.

Signature of the student: Santhiya

Date: 5/02/2020

Date: 05.02.2020

From

Dr.G.Somasundram
Department of Pharmacology,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To

The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: CLINICAL MICROBIOLOGY

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: **CLINICAL MICROBIOLOGY** January to February 2020 for 30 AHS Students. We solicit your kind action to send certificates for the participants that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards,

Dr.G.Somasundram

Encl: Certificates

Photographs



Sri Lakshmi Narayana Institute of Medical Sciences

Date:16-03-2020

From

Dr.G.SOMASUNDRAM
Principal of Allied Health Sciences,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

To

The Dean,
Sri Lakshmi Narayana Institute of Medical College
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: CSSD

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled CSSD from April to May 2020 . We solicit your kind permission for the same.

Kind Regards

Dr.G.Somasundram

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: **Dr. Balagurunathan. K**

The HOD: **Dr. Somasundram. G**

The Expert: **Dr. Manjunath**

The committee has discussed about the course and is approved.

Dean	Subject Expert	HOD
(Sign & Seal)	(Sign & Seal)	(Sign & Seal)

Dr. G. JAYALAKSHMI, BSC., MBBS., DTCD., M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Agaram, Kudapakkam Post,
Villianur Commune, Puducherry - 605502.

PRINCIPAL
Allied Health Sciences
Sri Lakshmi Narayana Institute of Allied Health Sciences
Osudu, Agaram Post, Puducherry - 605 502.

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affliated to Bharath University, Chennai - TN]

Circular

01.03.2020

Sub: Organizing Value-added Course: "sterilization techniques ".reg

With reference to the above-mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research** is organizing **"CSSD"**. The course content and registration form is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before April to May 2020 Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

Dr. G. JAYALAKSHMI, BSC., MBBS., DTCD., M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Agaram, Kudapakkam Post,
Villianur Commune, Puducherry - 605502.

Encl: Copy of Course content

VALUE ADDED COURSE

1. Name of the programme & Code

"Sterilization techniques"

2. Duration & Period

30 hrs. &

3. Information Brochure and Course Content of Value-Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Assessment - *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

1 time July to August 2017

8. Year of discontinuation:

9. Summary report of each program year-wise

Value Added Course- July to August 2017					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1		Sterilization techniques	**DR.MANJUNATH**	AHS	25 & APRIL TO MAY 2020

10. Course Feed Back

Enclosed as Annexure- V

RESOURCE PERSON

COORDINATOR
Dr.G. Somasundaram

PRINCIPAL
Allied Health Sciences
Sri Lakshmi Narayana Institute of Allied Health Sciences
Osudu, Agaram Post, Puducherry - 605 502.

Course Proposal

Course Title: "**sterilization techniques"**

Course Objective:

1. To enhance the performance skill in sterilization techniques.
2. To assess the objectives and protocols in sterilization techniques.
3. To assess the reaction of target allied Health students towards the Basic and Advanced cardiac life support by getting their feedback.

Course Outcome: Improvement in the "sterilization techniques"
Course Audience: Students of AHS Batch
Course Coordinator: Dr.G. Somasundaram
Course Faculties with Qualification and Designation:
1.Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Time	Hours
1.	16.04.2020	Introduction to sterilization techniques, Background, Objectives,	4-5p.m	1
2.	17.04.2020	Ionizing sterilizers	2-3p.m	1
3.	18.04.2020	Dry heat sterilizers	4-6p.m	2
4.	21.04.2020	Liquid chemicals used for sterilization	4-6p.m	2
5.	22.04.2020	microwave	4-6p.m	2
6.	23.04.2020	Gas bead sterilizers	4-5p.m	2
7.	24.04.2020	conventional didactic lecture and video	4-5P.M	1
8.	25.04.2020	Vaporized hydrogen peroxide	4-5p.m	1
9.	23.04.2020	Formaldehyde steam	4-6p.m	1
10.	27.04.2020	Gaseous chloride dioxide	4-6p.m	2
11.	28.04.2020	Safe Handling of Sharps, needles and management of needle stick injuries	4-6p.m	1
12.	29.04.2020	Infrared radiation	4-6p.m	2
13.	30.04.2020	Pre course and Post Course evaluation	2-5p.m	3
		Practical Class I		
13.	02.05.2020	Steps model explanation and various performance assessment methods		1
14.	04.05.2020	Orientation of the students about the training program and assessment methodology by DOPS		1
15.	05.05.2020	Video demonstration of sterilization techniques		2

16.	06.05.2020	Sterilization techniques procedure by STEPS model		2
17.	9.05.2020	Assessment by DOPS procedure and giving feedback in weaker areas	2-6p.m	4
		Total		30 hrs

REFERENCE BOOKS:

1. Miller GE(1990), The assessment of clinical skills/competence/performance. Academic medicine, 65(9), 63-67.

2. Syndneysmee ABC of skill learning BMJ 2003; 326.703-706.

3. Biomedical Waste Management & Handling Rules (2016) with Amendment, updated on 2018.

4. BangBangal V. Training and assessment of medical interns using “direct observation of procedural skills (DOPS)” tool in obstetrics and gynecology.*MOJ Womens Health.* 2018;7(4):120–123. DOI: 10.15406/mojwh.2018.07.00181al V. Training and assessment of medical interns using “direct observation of procedural skills (DOPS)” tool in obstetrics and gynecology. *MOJ Womens Health.* 2018;7(4):120–123. DOI: 10.15406/mojwh.2018.07.00181

CSSD

- **Sterilization** refers to any process that removes, kills, or deactivates all forms of life (in particular referring to microorganisms such as fungi, bacteria, spores, unicellular eukaryotic organisms such as Plasmodium, etc.) and other biological agents like prions present in a specific surface, object or fluid, for example food or biological culture media.
- Sterilization can be achieved through various means, including heat, chemicals, irradiation, high pressure, and filtration. Sterilization is distinct from disinfection, sanitization, and pasteurization, in that those methods reduce rather than eliminate all forms of life and biological agents present. After sterilization, an object is referred to as being sterile or aseptic.

Ionizing Radiation

- Sterilization by ionizing radiation, primarily by cobalt 60 gamma rays or electron accelerators, is a low-temperature sterilization method that has been used for a number of medical products (e.g., tissue for transplantation, pharmaceuticals, medical devices).
- There are no FDA-cleared ionizing radiation sterilization processes for use in healthcare facilities.
- Because of high sterilization costs, this method is an unfavorable alternative to ETO and plasma sterilization in healthcare facilities but is suitable for large-scale sterilization.
- Some deleterious effects on patient-care equipment associated with gamma radiation include induced oxidation in polyethylene and delamination and cracking in polyethylene knee bearings.

Dry-Heat Sterilizers

- This method should be used only for materials that might be damaged by moist heat or that are impenetrable to moist heat (e.g., powders, petroleum products, sharp instruments).
- The advantages for dry heat include the following: it is nontoxic and does not harm the environment; a dry heat cabinet is easy to install and has relatively low operating costs; it penetrates materials; and it is noncorrosive for metal and sharp instruments.
- The disadvantages for dry heat are the slow rate of heat penetration and microbial killing makes this a time-consuming method. In addition, the high temperatures are not suitable for most materials
- The most common time-temperature relationships for sterilization with hot air sterilizers are 170°C (340°F) for 60 minutes, 160°C (320°F) for 120 minutes, and 150°C (300°F) for 150 minutes. *B. atrophaeus* spores should be used to monitor the sterilization process for dry heat because they are more resistant to dry heat than are *G. stearothermophilus* spores.
- The primary lethal process is considered to be oxidation of cell constituents.
- There are two types of dry-heat sterilizers: the static-air type and the forced-air type.
- The static-air type is referred to as the oven-type sterilizer as heating coils in the bottom of the unit cause the hot air to rise inside the chamber via gravity convection.
- This type of dry-heat sterilizer is much slower in heating, requires longer time to reach sterilizing temperature, and is less uniform in temperature control throughout the chamber than is the forced-air type.
- The forced-air or mechanical convection sterilizer is equipped with a motor-driven blower that circulates heated air throughout the chamber at a high velocity, permitting a more rapid transfer of energy from the air to the instruments

Liquid Chemicals

- Several FDA-cleared liquid chemical sterilants include indications for sterilization of medical devices
- The indicated contact times range from 3 hours to 12 hours. However, except for a few of the products, the contact time is based only on the conditions to pass the AOAC Sporicidal Test as a sterilant and not on simulated use testing with devices.
- These solutions are commonly used as high-level disinfectants when a shorter processing time is required. Generally, chemical liquid sterilants cannot be monitored using a biological indicator to verify sterility
- The survival kinetics for thermal sterilization methods, such as steam and dry heat, have been studied and characterized extensively, whereas the kinetics for sterilization with liquid sterilants are less well understood.
- The information that is available in the literature suggests that sterilization processes based on liquid chemical sterilants, in general, may not convey the same sterility assurance level as sterilization achieved using thermal or physical method.
- The data indicate that the survival curves for liquid chemical sterilants may not exhibit log-linear kinetics and the shape of the survivor curve may vary depending of the formulation, chemical nature and stability of the liquid chemical sterilant. In addition, the design of the AOAC Sporicidal Test does not provide quantification of the microbial challenge. Therefore, sterilization with a liquid chemical sterilant may not convey the same sterility assurance as other sterilization methods.
- One of the differences between thermal and liquid chemical processes for sterilization of devices is the accessibility of microorganisms to the sterilant.
- Heat can penetrate barriers, such as biofilm, tissue, and blood, to attain organism kill, whereas liquids cannot adequately penetrate these barriers.
- In addition, the viscosity of some liquid chemical sterilants impedes their access to organisms in the narrow lumens and mated surfaces of devices.
- Another limitation to sterilization of devices with liquid chemical germicides is the post-processing environment of the device. Devices cannot be wrapped or adequately contained during processing in a liquid chemical sterilant to maintain sterility following processing and

during storage. Furthermore, devices may require rinsing following exposure to the liquid chemical sterilant with water that typically is not sterile.

- Therefore, due to the inherent limitations of using liquid chemical sterilants, their use should be restricted to reprocessing critical devices that are heat-sensitive and incompatible with other sterilization methods.

Performic Acid

Performic acid is a fast-acting sporicide that was incorporated into an automated endoscope reprocessing system[400]. Systems using performic acid are not currently FDA cleared

Filtration

Although filtration is not a lethality-based process and is not an FDA-cleared sterilization method, this technology is used to remove bacteria from thermolabile pharmaceutical fluids that cannot be purified by any other means. In order to remove bacteria, the membrane pore size (e.g., 0.22 mm) must be smaller than the bacteria and uniform throughout[923]. Some investigators have appropriately questioned whether the removal of microorganisms by filtration really is a sterilization method because of slight bacterial passage through filters, viral passage through filters, and transference of the sterile filtrate into the final container under aseptic conditions entail a risk of contamination

Microwave

- Microwaves are used in medicine for disinfection of soft contact lenses, dental instruments, dentures, milk, and urinary catheters for intermittent self-catheterization.
- However, microwaves must only be used with products that are compatible (e.g., do not melt).
- Microwaves are radio-frequency waves, which are usually used at a frequency of 2450 MHz.

- The microwaves produce friction of water molecules in an alternating electrical field.
- The intermolecular friction derived from the vibrations generates heat and some authors believe that the effect of microwaves depends on the heat produced while others postulate a nonthermal lethal effect.
- The initial reports showed microwaves to be an effective microbicide.
- The microwaves produced by a “home-type” microwave oven (2.45 GHz) completely inactivate bacterial cultures, mycobacteria, viruses, and *G. stearothermophilus* spores within 60 seconds to 5 minutes depending on the challenge organism.
- Another study confirmed these results but also found that higher power microwaves in the presence of water may be needed for sterilization [2].
- Complete destruction of *Mycobacterium bovis* was obtained with 4 minutes of microwave exposure (600W, 2450 MHz).
- The effectiveness of microwave ovens for different sterilization and disinfection purposes should be tested and demonstrated as test conditions affect the results (e.g., presence of water, microwave power). Sterilization of metal instruments can be accomplished but requires certain precautions.
- Of concern is that home-type microwave ovens may not have even distribution of microwave energy over the entire dry device (there may be hot and cold spots on solid medical devices); hence there may be areas that are not sterilized or disinfected.
- The use of microwave ovens to disinfect intermittent-use catheters also has been suggested. Researchers found that test bacteria (e.g., *E. coli*, *Klebsiella pneumoniae*, *Candida albicans*) were eliminated from red rubber catheters within 5 minutes
- Microwaves used for sterilization of medical devices have not been FDA cleared.

Glass Bead “Sterilizer”

- Glass bead “sterilization” uses small glass beads (1.2-1.5 mm diameter) and high temperature (217 °C -232°C) for brief exposure times (e.g., 45 seconds) to inactivate microorganisms. These devices have been used for several years in the dental profession[0].
- FDA believes there is a risk of infection with this device because of potential failure to sterilize dental instruments and their use should be discontinued until the device has received FDA clearance.

Vaporized Hydrogen Peroxide

- Hydrogen peroxide solutions have been used as chemical sterilants for many years.
- However, the VHPâ was not developed for the sterilization of medical equipment until the mid-1980s.
- One method for delivering VHP to the reaction site uses a deep vacuum to pull liquid hydrogen peroxide (30-35% concentration) from a disposable cartridge through a heated vaporizer and then, following vaporization, into the sterilization chamber.
- A second approach to VHP delivery is the flow-through approach in which the VHP is carried into the sterilization chamber by a carrier gas such as air using either a slight negative pressure (vacuum) or slight positive pressure.
- Applications of this technology include vacuum systems for industrial sterilization of medical devices and atmospheric systems for decontaminating for large and small areas[853]. VHP offers several appealing features that include rapid cycle time (e.g., 30-45 minutes); low temperature; environmentally safe by-products (H_2O, oxygen [O_2]); good material compatibility; and ease of operation, installation and monitoring.
- VHP has limitations including that cellulose cannot be processed; nylon becomes brittle; and VHP penetration capabilities are less than those of ETO. VHP has not been cleared by FDA for sterilization of medical devices in healthcare facilities.
- The feasibility of utilizing vapor-phase hydrogen peroxide as a surface decontaminant and sterilizer was evaluated in a centrifuge decontamination application. In this study, vapor-phase hydrogen peroxide was shown to possess significant sporicidal activity.

- In preliminary studies, hydrogen peroxide vapor decontamination has been found to be a highly effective method of eradicating MRSA, *Serratia marcescens, Clostridium botulinum spores*and *Clostridium difficile* from rooms, furniture, surfaces and/or equipment; however, further investigation of this method to demonstrate both safety and effectiveness in reducing infection rates are required

Ozone

- Ozone has been used for years as a drinking water disinfectant. Ozone is produced when O_2 is energized and split into two monatomic (O_1) molecules.
- The monatomic oxygen molecules then collide with O_2 molecules to form ozone, which is O_3.
- Thus, ozone consists of O_2 with a loosely bonded third oxygen atom that is readily available to attach to, and oxidize, other molecules. This additional oxygen atom makes ozone a powerful oxidant that destroys microorganisms but is highly unstable (i.e., half-life of 22 minutes at room temperature).
- A new sterilization process, which uses ozone as the sterilant, was cleared by FDA in August 2003 for processing reusable medical devices.
- The sterilizer creates its own sterilant internally from USP grade oxygen, steam-quality water and electricity; the sterilant is converted back to oxygen and water vapor at the end of the cycle by a passing through a catalyst before being exhausted into the room.
- The duration of the sterilization cycle is about 4 h and 15 m, and it occurs at 30-35°C. Microbial efficacy has been demonstrated by achieving a SAL of $10^{-6}$with a variety of microorganisms to include the most resistant microorganism, *Geobacillus stearothermophilus*.
- The ozone process is compatible with a wide range of commonly used materials including stainless steel, titanium, anodized aluminum, ceramic, glass, silica, PVC, Teflon, silicone, polypropylene, polyethylene and acrylic. In addition, rigid lumen devices of the following diameter and length can be processed: internal diameter (ID): > 2 mm, length ≤ 25 cm; ID > 3 mm, length ≤ 47 cm; and ID > 4 mm, length ≤ 60 cm.

- The process should be safe for use by the operator because there is no handling of the sterilant, no toxic emissions, no residue to aerate, and low operating temperature means there is no danger of an accidental burn. The cycle is monitored using a self-contained biological indicator and a chemical indicator. The sterilization chamber is small, about 4 ft^3 (Written communication, S Dufresne, July 2004).
- A gaseous ozone generator was investigated for decontamination of rooms used to house patients colonized with MRSA. The results demonstrated that the device tested would be inadequate for the decontamination of a hospital room

Formaldehyde Steam

- Low-temperature steam with formaldehyde is used as a low-temperature sterilization method in many countries, particularly in Scandinavia, Germany, and the United Kingdom.
- The process involves the use of formalin, which is vaporized into a formaldehyde gas that is admitted into the sterilization chamber.
- A formaldehyde concentration of 8-16 mg/l is generated at an operating temperature of 70-75°C. The sterilization cycle consists of a series of stages that include an initial vacuum to remove air from the chamber and load, followed by steam admission to the chamber with the vacuum pump running to purge the chamber of air and to heat the load, followed by a series of pulses of formaldehyde gas, followed by steam.
- Formaldehyde is removed from the sterilizer and load by repeated alternate evacuations and flushing with steam and air.
- This system has some advantages, e.g., the cycle time for formaldehyde gas is faster than that for ETO and the cost per cycle is relatively low.
- However, ETO is more penetrating and operates at lower temperatures than do steam/formaldehyde sterilizers. Low-temperature steam formaldehyde sterilization has been found effective against vegetative bacteria, mycobacteria, *B. atrophaeus* and *G. stearothermophilus* spores and *Candida albicans*

- Formaldehyde vapor cabinets also may be used in healthcare facilities to sterilize heat-sensitive medical equipment.
- Commonly, there is no circulation of formaldehyde and no temperature and humidity controls.
- The release of gas from paraformaldehyde tablets (placed on the lower tray) is slow and produces a low partial pressure of gas. The microbicidal quality of this procedure is unknown
- Reliable sterilization using formaldehyde is achieved when performed with a high concentration of gas, at a temperature between 60° and 80°C and with a relative humidity of 75 to 100%.
- Studies indicate that formaldehyde is a mutagen and a potential human carcinogen, and OSHA regulates formaldehyde.
- The permissible exposure limit for formaldehyde in work areas is 0.75 ppm measured as a 8-hour TWA. The OSHA standard includes a 2 ppm STEL (i.e., maximum exposure allowed during a 15-minute period). As with the ETO standard, the formaldehyde standard requires that the employer conduct initial monitoring to identify employees who are exposed to formaldehyde at or above the action level or STEL.
- If this exposure level is maintained, employers may discontinue exposure monitoring until there is a change that could affect exposure levels or an employee reports formaldehyde-related signs and symptoms.
- The formaldehyde steam sterilization system has not been FDA cleared for use in healthcare facilities.

Gaseous Chlorine Dioxide

- A gaseous chlorine dioxide system for sterilization of healthcare products was developed in the late 1980s.
- Chlorine dioxide is not mutagenic or carcinogenic in humans. As the chlorine dioxide concentration increases, the time required to achieve sterilization becomes progressively shorter.
- For example, only 30 minutes were required at 40 mg/l to sterilize the 10^{6} *B. atrophaeus* spores at 30° to 32°C[954]. Currently, no gaseous chlorine dioxide system is FDA cleared.

Vaporized Peracetic Acid

The sporicidal activity of peracetic acid vapor at 20, 40, 60, and 80% relative humidity and 25°C was determined on *Bacillus atrophaeus* spores on paper and glass surfaces. Appreciable activity occurred within 10 minutes of exposure to 1 mg of peracetic acid per liter at 40% or higher relative humidity[955]. No vaporized peracetic acid system is FDA cleared

Infrared Radiation

- An infrared radiation prototype sterilizer was investigated and found to destroy *B. atrophaeus* spores. Some of the possible advantages of infrared technology include short cycle time, low energy consumption, no cycle residuals, and no toxicologic or environmental effects.
- This may provide an alternative technology for sterilization of selected heat-resistant instruments but there are no FDA-cleared systems for use in healthcare facilities
- The other sterilization technologies mentioned above may be used for sterilization of critical medical items if cleared by the FDA and ideally, the microbicidal effectiveness of the technology has been published in the scientific literature.
- The selection and use of disinfectants, chemical sterilants and sterilization processes in the healthcare field is dynamic, and products may become available that are not in existence when this guideline was written.
- As newer disinfectants and sterilization processes become available, persons or committees responsible for selecting disinfectants and sterilization processes should be guided by products cleared by FDA and EPA as well as information in the scientific literature

Moist heat sterilization

- A widely used method for heat sterilization is the autoclave, sometimes called a converter or steam sterilizer.

- Autoclaves use steam heated to 121–134 °C (250–273 °F) under pressure. To achieve sterility, the article is placed in a chamber and heated by injected steam until the article reaches a temperature and time setpoint.
- Almost all the air is removed from the chamber, because air is undesired in the moist heat sterilization process (this is one trait that differs from a typical pressure cooker used for food cooking).
- The article is held at the temperature setpoint for a period of time which varies depending on what bioburden is present on the article being sterilized and its resistance (D-value) to steam sterilization.
- A general cycle would be anywhere between 3 and 15 minutes, (depending on the generated heat) at 121 °C (250 °F) at 100 kPa (15 psi), which is sufficient to provide a sterility assurance level of 10^{-4} for a product with a bioburden of 10^{6} and a D-value of 2.0 minutes
- Following sterilization, liquids in a pressurized autoclave must be cooled slowly to avoid boiling over when the pressure is released. This may be achieved by gradually depressurizing the sterilization chamber and allowing liquids to evaporate under a negative pressure, while cooling the contents.
- Proper autoclave treatment will inactivate all resistant bacterial spores in addition to fungi, bacteria, and viruses, but is not expected to eliminate all prions, which vary in their resistance.
- For prion elimination, various recommendations state 121–132 °C (250–270 °F) for 60 minutes or 134 °C (273 °F) for at least 18 minutes.
- The 263K scrapie prion is inactivated relatively quickly by such sterilization procedures; however, other strains of scrapie, and strains of Creutzfeldt-Jakob disease (CKD) and bovine spongiform encephalopathy (BSE) are more resistant.
- Using mice as test animals, one experiment showed that heating BSE positive brain tissue at 134–138 °C (273–280 °F) for 18 minutes resulted in only a 2.5 log decrease in prion infectivity

Dry heat

- Dry heat was the first method of sterilization and is a longer process than moist heat sterilization.
- The destruction of microorganisms through the use of dry heat is a gradual phenomenon.
- With longer exposure to lethal temperatures, the number of killed microorganisms increases.
- Forced ventilation of hot air can be used to increase the rate at which heat is transferred to an organism and reduce the temperature and amount of time needed to achieve sterility.
- At higher temperatures, shorter exposure times are required to kill organisms.
- This can reduce heat-induced damage to food products.
- The standard setting for a hot air oven is at least two hours at 160 °C (320 °F).
- A rapid method heats air to 190 °C (374 °F) for 6 minutes for unwrapped objects and 12 minutes for wrapped objects.
- Dry heat has the advantage that it can be used on powders and other heat-stable items that are adversely affected by steam (e.g. it does not cause rusting of steel objects)

Flaming

- Flaming is done to inoculation loops and straight-wires in microbiology labs for streaking.
- Leaving the loop in the flame of a Bunsen burner or alcohol burner until it glows red ensures that any infectious agent is inactivated. This is commonly used for small metal or glass objects, but not for large objects (see Incineration below).
- However, during the initial heating, infectious material may be sprayed from the wire surface before it is killed, contaminating nearby surfaces and objects.

- Therefore, special heaters have been developed that surround the inoculating loop with a heated cage, ensuring that such sprayed material does not further contaminate the area.
- Another problem is that gas flames may leave carbon or other residues on the object if the object is not heated enough.
- A variation on flaming is to dip the object in a 70% or more concentrated solution of ethanol, then briefly touch the object to a Bunsen burner flame. The ethanol will ignite and burn off rapidly, leaving less residue than a gas flame

Incineration

- Incineration is a waste treatment process that involves the combustion of organic substances contained in waste materials.
- This method also burns any organism to ash. It is used to sterilize medical and other biohazardous waste before it is discarded with non-hazardous waste. Bacteria incinerators are mini furnaces that incinerate and kill off any microorganisms that may be on an inoculating loop or wire

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14	RAMANAN.V	UAH1805202	
15	SARATH P S	UAH1805203	
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18	JAYABHAVANI.J	UAH1804195	
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SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure III

Assessment Form

Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry

MCQ

1. **……** refers to any process that removes, kills, or deactivates all forms of life
    a) Disinfection
    b) Sterilization
    c) Infection
    d) None of the above
2. Sterilization can be achieved through
    a) Heat
    b) Chemical
    c) Both a&b
    d) Only a
3. After sterilization, an object is referred to as
    a) Aseptic
    b) Infected
    c) Non sterile
    d) None of the above
4. Sterilization by ionizing radiation, primarily by
    a) Cobalt 60 Gama rays
    b) Cobalt 20 Gama rays
    c) Cobalt 30 Gama rays

d) Cobalt 40 Gama rays

5. Ionizing radiation is used to sterilization of
    a) Pharmaceuticals
    b) OT table
    c) Instruments
    d) Heart lung machine
6. Dry heat sterilizers are used to sterilization of
    a) Sharp instruments
    b) Pharmaceuticals
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    d) None of the above
7. One of the advantages of dry heat
    a) Toxic & harm the environment
    b) Non toxic & does not harm the environment
    c) Non toxic
    d) None of the above
8. The disadvantages for dry heat is
    a) Slow rate of heat penetration
    b) Fast rate of heat penetration
    c) Rapid rate of heat penetration
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9. Temperature for hot air sterilizers
    a) 170*c for 60 minutes
    b) 180*c for 60 minutes
    c) 120*c for 60 minutes
    d) 130*c for 60 minutes
10. Time period for liquid chemical sterilization
    a) 3 to 12 hours
    b) 4 to 12 hours
    c) 6 to 12 hours
    d) 2 to 12 hors
11. Microwaves are radio-frequency waves, which are usually used at a frequency of
    a) 2450MHz

b) 2670 MHz
c) 2756 MHz
d) 2130 MHz

12. Glass beds use temperature of
a) 217*c – 232*c
b) 321* - 345 *c
c) 117*c – 135*c
d) 312 *c – 325*c

13. Hydrogen peroxide solutions have been used as
a) Chemical
b) Radiation
c) Heat
d) Moist heat

14. Ozone has been used for years as a ……. disinfectant
a) Drinking water
b) Cold water
c) Mineral water
d) None of the above

15. …….. is used as low temperature sterilizer
a) Aldehyde
b) Formaldehyde steam
c) Ozone
d) None of the above

16. A gaseous chlorine dioxide system for sterilization of healthcare products was developed in the late
a) 1980
b) 1990
c) 2000
d) 2001

17. An infrared radiation ……. Sterilizer
a) Prototype
b) Genotype
c) Monotype

d) None of the above

18. Example for moist heat sterilization
    a) Hot air oven
    b) Autoclave
    c) Both a & b
    d) None of the above
19. Autoclave uses the temperature of
    a) 121 – 134*c
    b) 131 – 144*c
    c) 123 - 143 *c
    d) 121- 135*c
20.……. Is a waste treatment process
    a) Incineration
    b) Insemination
    c) Inclination
    d) inseration

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    c) Both a & b
    d) None of the above

19. Autoclave uses the temperature of
    a) 121 – 134*c
    b) 121 – 144*c
    c) 121 - 143 *c
    d) 121-135*c

20..... is a waste treatment process
    a) Incineration
    b) Insemination
    c) Inclination
    d) inseration

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that_**MINNU MATHACHAN_UAH1803186**_has actively participated in the Value Added Course on **CSSD** held during month April to May 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. G.Somasundram

COORDINATOR

RESOURCE PERSON

5Annexure- V

Student Feedback Form

Course Name: CSSD

Subject Code: VAC06/AHS/2020-16/04

Name of Student: _____Roll No.:

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Feedback Form

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. The course met my expectations.	○	○	○	○	○
2. I will be able to apply the knowledge learned.	○	○	○	○	○
3. The course objectives for each topic were identified and followed.	○	○	○	○	○
4. The content was organised and easy to follow.	○	○	○	○	○
5. The quality of instruction was good.	○	○	○	○	○
6. Class participation and interaction were encouraged.	○	○	○	○	○
7. Adequate time was provided for questions and discussion.	○	○	○	○	○

8. How do you rate the course overall?
   - ○ Excellent
   - ○ Good
   - ○ Average
   - ○ Poor
   - ○ Very poor

9. The aspects of the course could be improved?

10. Other comments?

Signature of the student:
Date:

5Annexure- V

Student Feedback Form

Course Name: CSSD

Subject Code: VAC06/AHS/2020-16/04

Name of Student: Gokul Roll No.: UAH1803184

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Feedback Form

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. The course met my expectations.	o	o	o	o	o
2. I will be able to apply the knowledge learned.	o	o	o	o	o
3. The course objectives for each topic were identified and followed.	o	o	o	o	o
4. The content was organised and easy to follow.	o	o	o	o	o
5. The quality of instruction was good.	o	o	o	o	o
6. Class participation and interaction were encouraged.	o	o	o	o	o
7. Adequate time was provided for questions and discussion.	o	o	o	o	o

8. How do you rate the course overall?
   - o Excellent
   - o Good
   - o Average
   - o Poor
   - o Very poor

9. The aspects of the course could be improved? yes

10. Other comments?

Signature of the student: Gokul

Date: 9/5/2020

5Annexure- V

Student Feedback Form

Course Name: CSSD

Subject Code: VAC06/AHS/2020-16/04

Name of Student: DONALD MORRISON Roll No.: UAH1805199

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Feedback Form

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. The course met my expectations.	o	o	o	o	o
2. I will be able to apply the knowledge learned.	o	o	o	o	o
3. The course objectives for each topic were identified and followed.	o	o	o	o	o
4. The content was organised and easy to follow.	o	o	o	o	o
5. The quality of instruction was good.	o	o	o	o	o
6. Class participation and interaction were encouraged.	o	o	o	o	o
7. Adequate time was provided for questions and discussion.	o	o	o	o	o

8. How do you rate the course overall?
   - o Excellent
   - o Good
   - o Average
   - o Poor
   - o Very poor

9. The aspects of the course could be improved? yes

10. Other comments?

Signature of the student: Donaldmorrison
Date: 9-5-2020

Date: 11.05.2020

From

Dr.G.Somasundram
Department of Pharmacology,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To

The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: CSSD

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: "**CSSD "** APRIL TO MAY 2020 for 25 AHS Students . We solicit your kind action to send certificates for the participants that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards,

Dr.G.Somasundram

Encl: Certificates :

Photographs:



Sri Lakshmi Narayana Institute of Medical Sciences

Date: 18-04-2020

From

Dr.G.SOMASUNDRAM
Principal of Allied Health Sciences,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

To

The Dean,
Sri Lakshmi Narayana Institute of Medical College
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: Genetic disorders

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **genetic disorders** from May to June 2020. We solicit your kind permission for the same.

Kind Regards

Dr.G.Somasundram

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: **Dr. Balagurunathan. K**

The HOD: **Dr. Somasundram. G**

The Expert: **Dr. Kabilan**

The committee has discussed about the course and is approved.

Dean	Subject Expert	HOD
(Sign & Seal)	(Sign & Seal)	(Sign & Seal)

Dr. G. JAYALAKSHMI, BSC., MBBS., DTCD., M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Agaram, Kudapakkam Post,
Villianur Commune, Puducherry - 605502.

PRINCIPAL
Allied Health Sciences
Sri Lakshmi Narayana Institute of Allied Health Sciences
Osudu, Agaram Post, Puducherry - 605 502.

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.

[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affliated to Bharath University, Chennai - TN]

Circular

29.04.2020

Sub: Organizing Value-added Course: "genetic disorders ".reg

With reference to the above-mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research** is organizing **"genetic disorders"**. The course content and registration form is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before May to June 2020. Applications received after the mentioned date shall not be entertained under any circumstances.

DEAN

Encl: Copy of Course content

Dr. G. JAYALAKSHMI, BSC., MBBS., DTCD., M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Agaram, Kudapakkam Post,
Villianur Commune, Puducherry - 605502.

VALUE ADDED COURSE

1. Name of the programme & Code

"Genetic disorders" & VAC07/AHS/2020-18/05

2. Duration & Period

30 hrs. & May to June 2020

3. Information Brochure and Course Content of Value-Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Assessment - *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

1 time May to June 2020

8. Year of discontinuation: 2021

9. Summary report of each program year-wise

Value Added Course- May to June 2020					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	**VAC07/AHS/2020-18/05**	**Genetic disorders**	**DR . KABILAN**	AHS	25 students May to June 2020

10. Course Feed Back

Enclosed as Annexure- V

RESOURCE PERSON

COORDINATOR

Dr.G.Somasundram

PRINCIPAL
Allied Health Sciences
Sri Lakshmi Narayana Institute of Allied Health Sciences
Osudu, Agaram Post, Puducherry - 605 502.

Course Proposal

Course Title: "**Genetic disorder"**

Course Objective:

1. To enhance the performance skill in Genetic disorders.
2. To assess the objectives and protocols in Genetic disorder.
3. To assess the reaction of target allied Health students towards the Genetic disorder by getting their feedback.

Course Outcome: Improvement in the "Genetic disorder"
Course Audience: Students of AHS Batch 2020
Course Coordinator: Dr.G. Somasundaram
Course Faculties with Qualification and Designation:
1.Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Time	Hours
1.	18.05.2020	Introduction to Genetic disorders, Background, Objectives,	4-5p.m	1
2.	20.05.2020	Types of genetic disorders	2-3p.m	1
3.	21.05.2020	Single gene disorder	4-6p.m	2
4.	22.05.2020	Explanation about autosomal dominant and receive	4-6p.m	2
5.	25.05.2020	X linked dominant & receive	4-6p.m	2
6.	28.05.2020	Examples for the genetic disorders	4-5p.m	2
7.	30.05.2020	conventional didactic lecture and video	4-5P.M	1
8.	02.06.2020	Multifractional disorders	4-5p.m	1
9.	03.06.2020	Explanation about chromosomal disorders	4-6p.m	1
10.	04.06.2020	Common genetic disorders	4-6p.m	2
11.	05.06.2020	Causes of genetic disorders	4-6p.m	1
12.	08.06.2020	Symptoms of genetic disorders	4-6p.m	2
13.	09.06.2020	Pre course and Post Course evaluation, Feedback analysis from Likert scale	2-5p.m	3
		Practical Class I		
13.	10.06.2020	Steps model explanation and various performance assessment methods		1
14.	11.06.2020	Orientation of the students about the training program and assessment methodology by DOPS		1

15.	12.06.2017	Video demonstration of genetic disorders		2
16.	13.06.2017	Genetic disorders procedure by STEPS model		2
17.	15.06.2017	Assessment by DOPS procedure and giving feedback in weaker areas	2-6p.m	4
		Total		30 hrs

REFERENCE BOOKS:

1.GIRISH C & YATHISH K.R, Genetics Made Easy.

2.Dr. Ropali Forta, An Easy Approach to Human Genetics

3. Pranab Kr Banerjee , Problems on Genetics , Molecular Genetics and Evolutionary Genetics

GENETIC DISORDERS

- A genetic disorder is a health problem caused by one or more abnormalities in the genome.
- It can be caused by a mutation in a single gene (monogenic) or multiple genes (polygenic) or by a chromosomal abnormality.
- Although polygenic disorders are the most common, the term is mostly used when discussing disorders with a single genetic cause, either in a gene or chromosome.
- The mutation responsible can occur spontaneously before embryonic development (a *de novo* mutation), or it can be inherited from two parents who are carriers of a faulty gene (autosomal recessive inheritance) or from a parent with the disorder (autosomal dominant inheritance).
- When the genetic disorder is inherited from one or both parents, it is also classified as a **hereditary disease**.
- Some disorders are caused by a mutation on the X chromosome and have X-linked inheritance.
- Very few disorders are inherited on the Y chromosome or mitochondrial DNA
- There are well over 6,000 known genetic disorders, and new genetic disorders are constantly being described in medical literature.
- More than 600 genetic disorders are treatable.
- Around 1 in 50 people are affected by a known single-gene disorder, while around 1 in 263 are affected by a chromosomal disorder.
- Around 65% of people have some kind of health problem as a result of congenital genetic mutations.
- Due to the significantly large number of genetic disorders, approximately 1 in 21 people are affected by a genetic disorder classified as "rare" (usually defined as affecting less than 1 in 2,000 people). Most genetic disorders are rare in themselves

- Genetic disorders are present before birth, and some genetic disorders produce birth defects, but birth defects can also be developmental rather than hereditary.
- The opposite of a hereditary disease is an acquired disease.
- Most cancers, although they involve genetic mutations to a small proportion of cells in the body, are acquired diseases. Some cancer syndromes, however, such as *BRCA* mutations, are hereditary genetic disorders

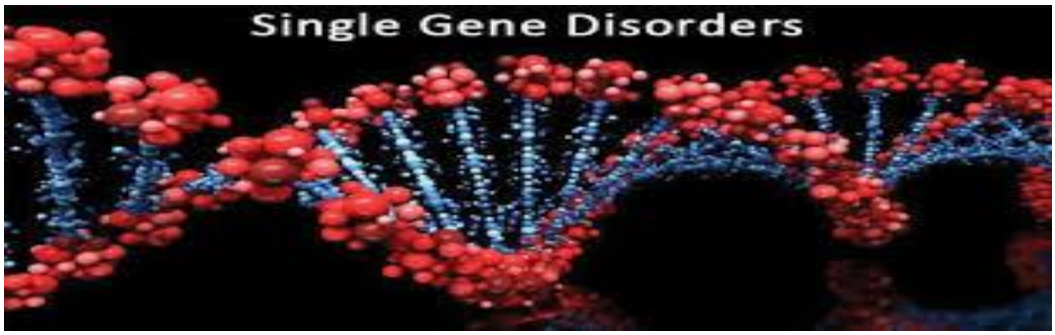


Single-gene

- A **single-gene disorder** (or **monogenic disorder**) is the result of a single mutated gene.
- Single-gene disorders can be passed on to subsequent generations in several ways. Genomic

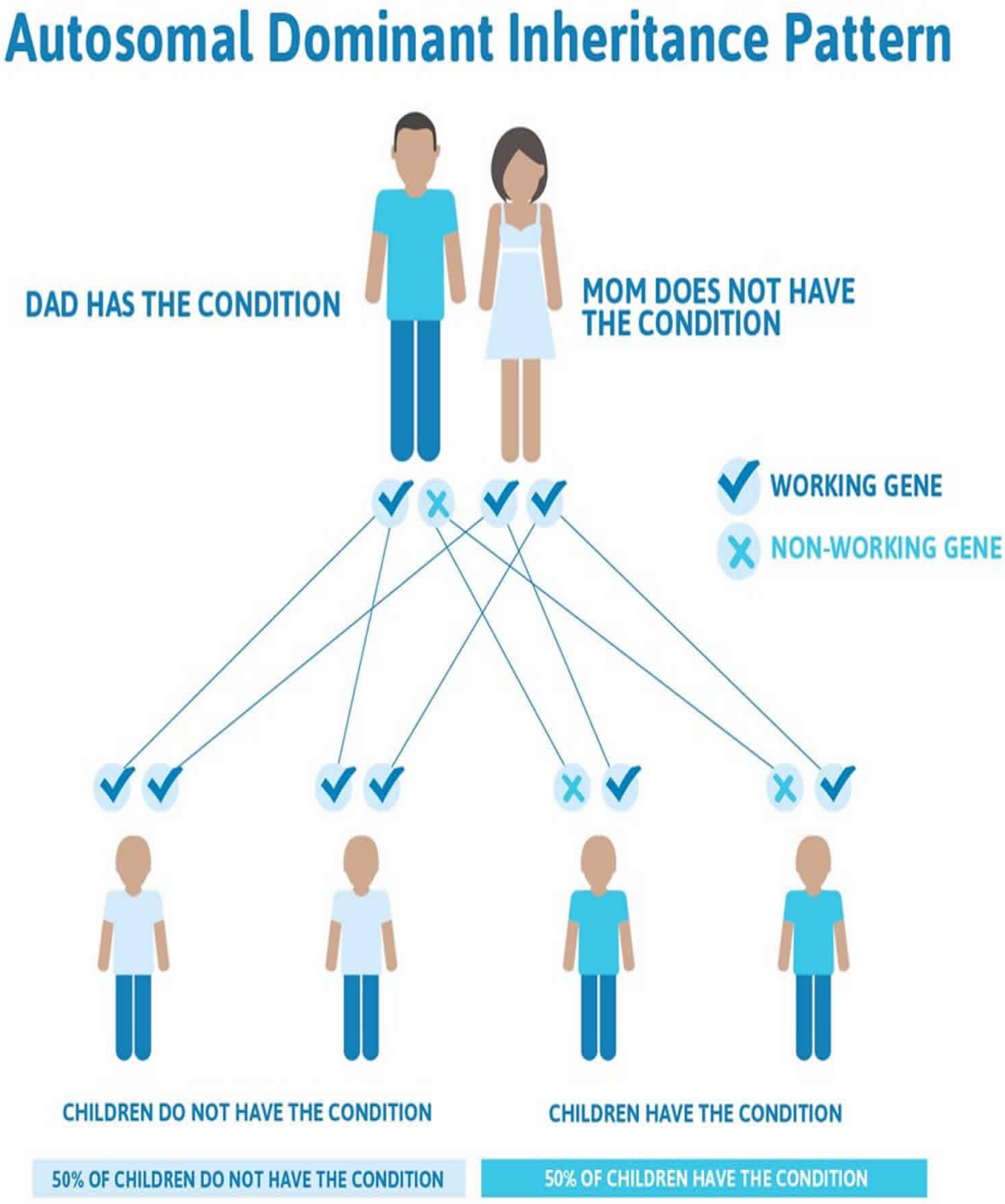
imprinting and uniparental disomy, however, may affect inheritance patterns

- . The divisions between recessive and dominant types are not "hard and fast", although the divisions between autosomal and X-linked types are (since the latter types are distinguished purely based on the chromosomal location of the gene).
- For example, the common form of dwarfism, achondroplasia, is typically considered a dominant disorder, but children with two genes for achondroplasia have a severe and usually lethal skeletal disorder, one that achondroplasics could be considered carriers for. Sickle-cell anemia is also considered a recessive condition, but heterozygous carriers have increased resistance to malaria in early childhood, which could be described as a related dominant condition. When a couple where one partner or both are sufferers or carriers of a single-gene disorder wish to have a child, they can do so through *in vitro* fertilization, which enables preimplantation genetic diagnosis to occur to check whether the embryo has the genetic disorder.
- Most congenital metabolic disorders known as inborn errors of metabolism result from single-gene defects.
- Many such single-gene defects can decrease the fitness of affected people and are therefore present in the population in lower frequencies compared to what would be expected based on simple probabilistic calculations



Autosomal dominant

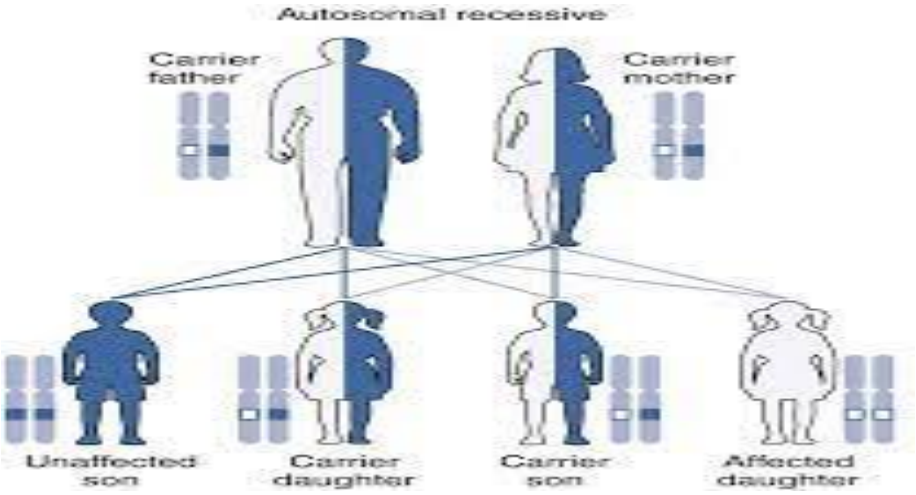
- Only one mutated copy of the gene will be necessary for a person to be affected by an autosomal dominant disorder. Each affected person usually has one affected parent.
- The chance a child will inherit the mutated gene is 50%. Autosomal dominant conditions sometimes have reduced penetrance, which means although only one mutated copy is needed, not all individuals who inherit that mutation go on to develop the disease.
- Examples of this type of disorder are Huntington's disease, neurofibromatosis type 1, neurofibromatosis type 2, Marfan syndrome, hereditary nonpolyposis colorectal cancer, hereditary multiple exostoses (a highly penetrant autosomal dominant disorder), tuberous sclerosis, Von Willebrand disease, and acute intermittent porphyria. Birth defects are also called congenital anomalies



Autosomal recessive

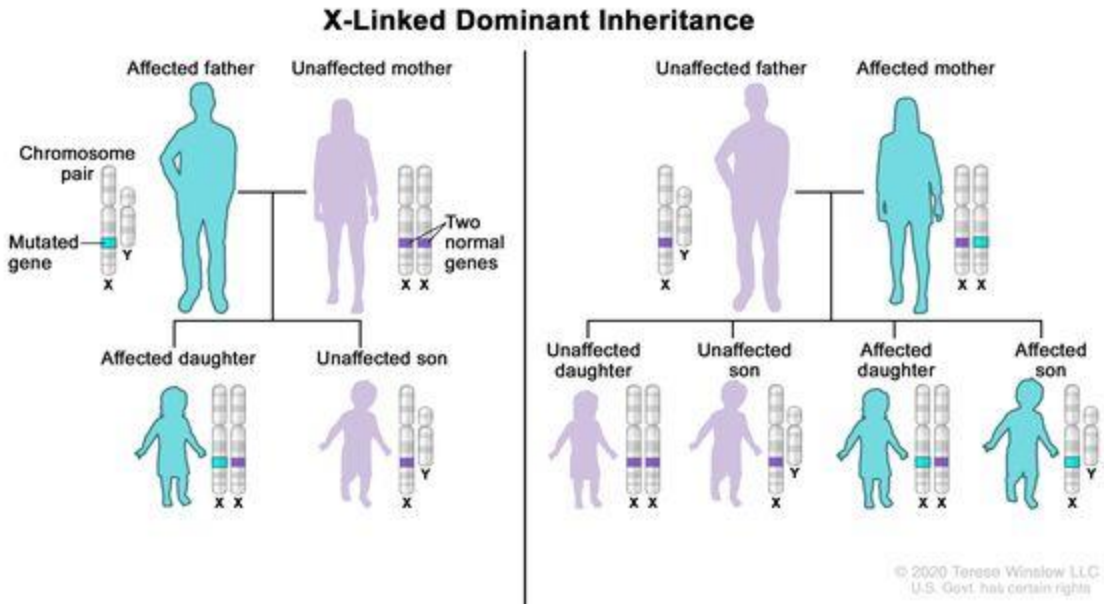
- Two copies of the gene must be mutated for a person to be affected by an autosomal recessive disorder.
- An affected person usually has unaffected parents who each carry a single copy of the mutated gene and are referred to as genetic carriers

- Each parent with a defective gene normally do not have symptoms.
- Two unaffected people who each carry one copy of the mutated gene have a 25% risk with each pregnancy of having a child affected by the disorder.
- Examples of this type of disorder are albinism, medium-chain acyl-CoA dehydrogenase deficiency, cystic fibrosis, sickle cell disease, Tay–Sachs disease, Niemann–Pick disease, spinal muscular atrophy, and Roberts syndrome.
- Certain other phenotypes, such as wet versus dry earwax, are also determined in an autosomal recessive fashion.
- Some autosomal recessive disorders are common because, in the past, carrying one of the faulty genes led to a slight protection against an infectious disease or toxin such as tuberculosis or malaria. Such disorders include cystic fibrosis,[1] sickle cell disease, phenylketonuria and thalassaemia.



X-linked dominant

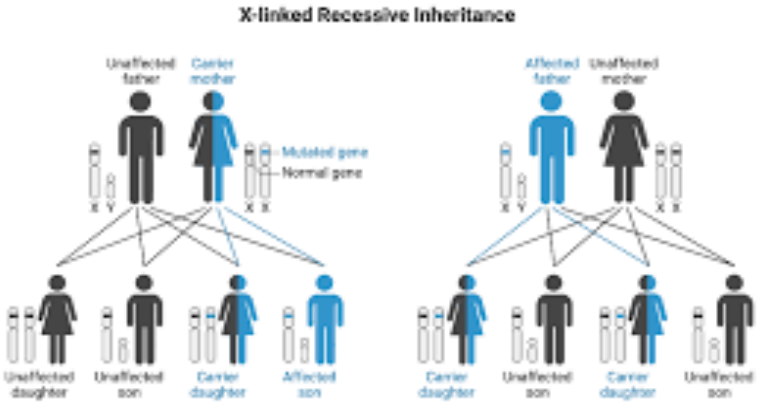
- x-linked dominant disorders are caused by mutations in genes on the X chromosome. Only a few disorders have this inheritance pattern, with a prime example being X-linked hypophosphatemic rickets.
- Males and females are both affected in these disorders, with males typically being more severely affected than females.
- Some X-linked dominant conditions, such as Rett syndrome, incontinentia pigmenti type 2, and Aicardi syndrome, are usually fatal in males either *in utero* or shortly after birth, and are therefore predominantly seen in females.
- Exceptions to this finding are extremely rare cases in which boys with Klinefelter syndrome (44+xxy) also inherit an X-linked dominant condition and exhibit symptoms more similar to those of a female in terms of disease severity
- The chance of passing on an X-linked dominant disorder differs between men and women.
- The sons of a man with an X-linked dominant disorder will all be unaffected (since they receive their father's Y chromosome), but his daughters will all inherit the condition
- A woman with an X-linked dominant disorder has a 50% chance of having an affected fetus with each pregnancy, although in cases such as incontinentia pigmenti, only female offspring are generally viable.



X-linked recessive

- X-linked recessive conditions are also caused by mutations in genes on the X chromosome. Males are much more frequently affected than females, because they only have the one X chromosome necessary for the condition to present.
- The chance of passing on the disorder differs between men and women.
- The sons of a man with an X-linked recessive disorder will not be affected (since they receive their father's Y chromosome), but his daughters will be carriers of one copy of the mutated gene.
- A woman who is a carrier of an X-linked recessive disorder (X^RX^r) has a 50% chance of having sons who are affected and a 50% chance of having daughters who are carriers of one copy of the mutated gene.

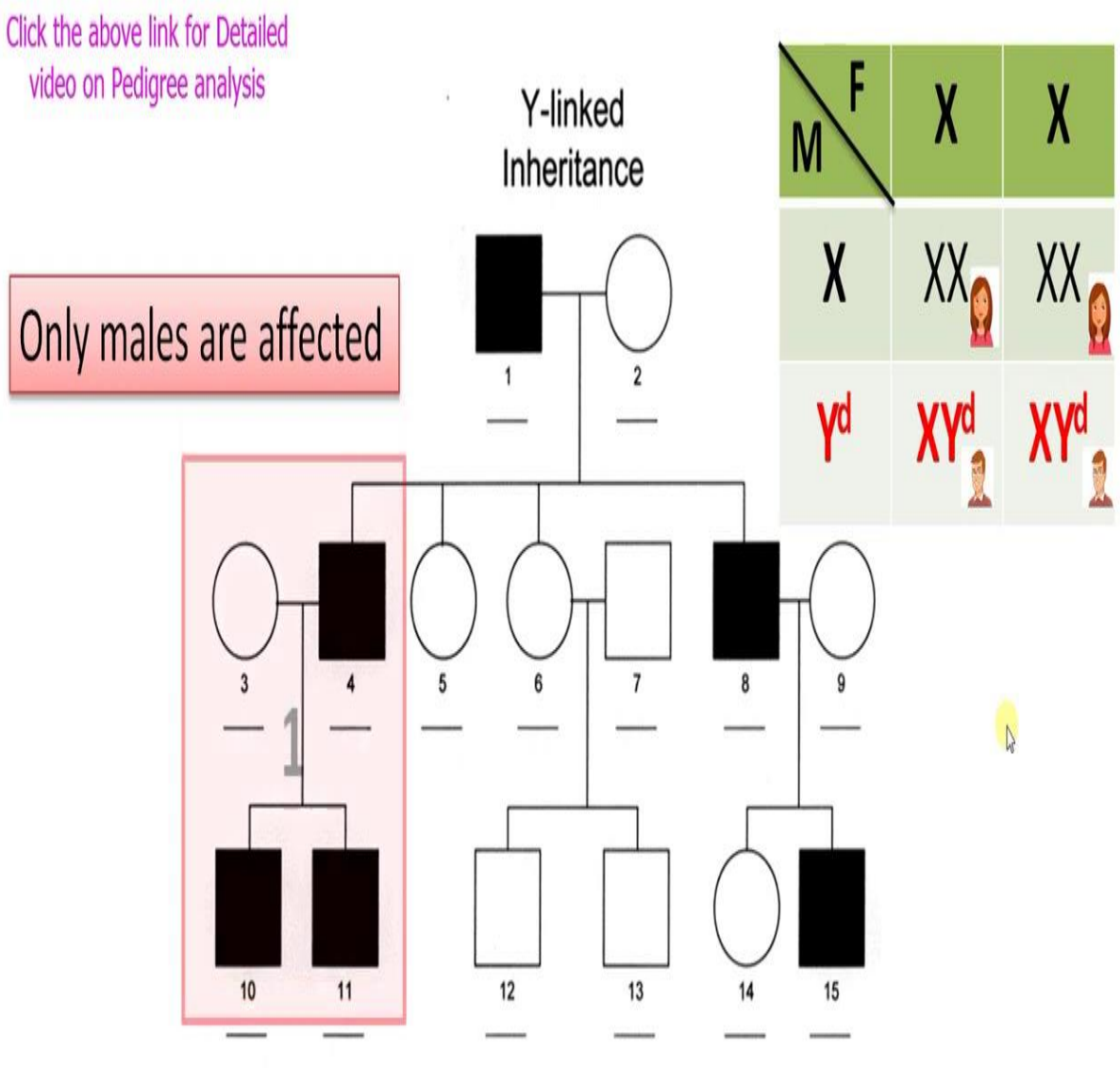
- X-linked recessive conditions include the serious diseases hemophilia A, Duchenne muscular dystrophy, and Lesch–Nyhan syndrome, as well as common and less serious conditions such as male pattern baldness and red–green color blindness.
- X-linked recessive conditions can sometimes manifest in females due to skewed X-inactivation or monosomy X (Turner syndrome).



Y-linked

- Y-linked disorders are caused by mutations on the Y chromosome. These conditions may only be transmitted from the heterogametic sex (e.g. male humans) to offspring of the same sex.
- More simply, this means that Y-linked disorders in humans can only be passed from men to their sons; females can never be affected because they do not possess Y-allosomes.
- Y-linked disorders are exceedingly rare but the most well-known examples typically cause infertility.

- Reproduction in such conditions is only possible through the circumvention of infertility by medical intervention.



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Mitochondrial

- This type of inheritance, also known as maternal inheritance, is the rarest and applies to the 13 genes encoded by mitochondrial DNA.
- Because only egg cells contribute mitochondria to the developing embryo, only mothers (who are affected) can pass on mitochondrial DNA conditions to their children. An example of this type of disorder is Leber's hereditary optic neuropathy.
- It is important to stress that the vast majority of mitochondrial diseases (particularly when symptoms develop in early life) are actually caused by a nuclear gene defect, as the mitochondria are mostly developed by non-mitochondrial DNA. These diseases most often follow autosomal recessive inheritance

Multifactorial disorder

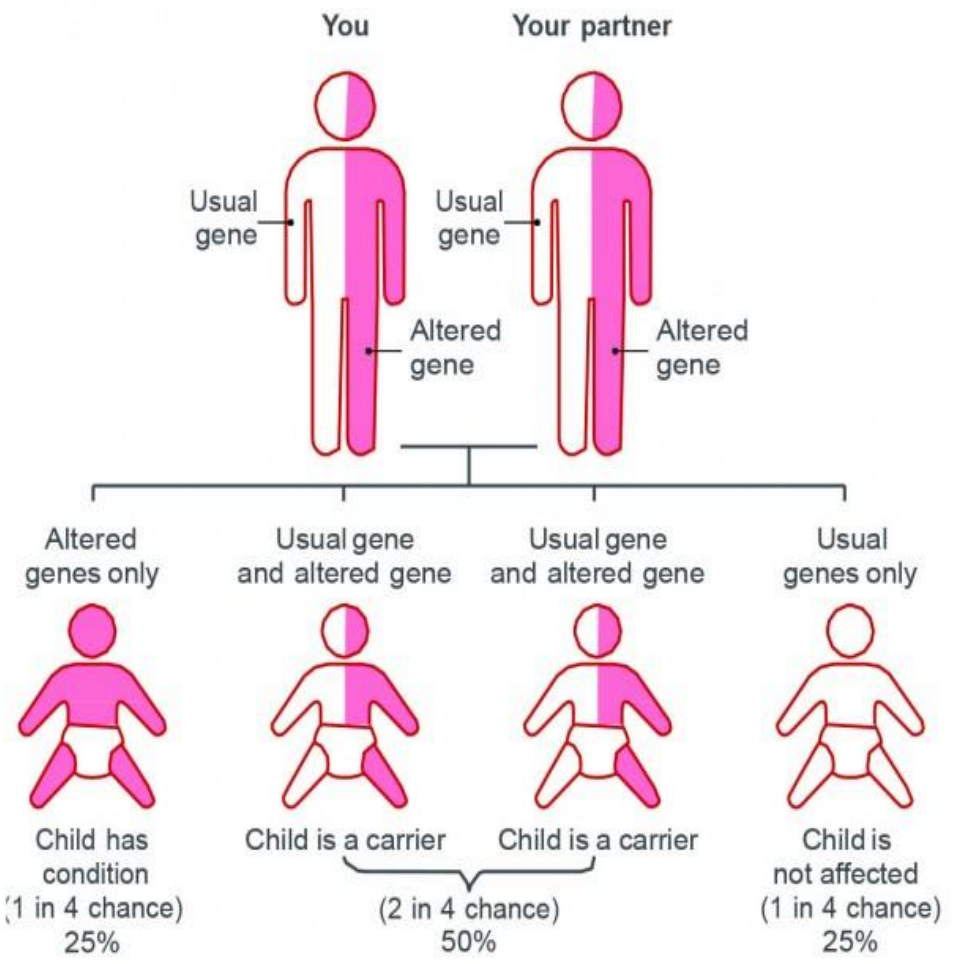
- Genetic disorders may also be complex, multifactorial, or polygenic, meaning they are likely associated with the effects of multiple genes in combination with lifestyles and environmental factors.
- Multifactorial disorders include heart disease and diabetes. Although complex disorders often cluster in families, they do not have a clear-cut pattern of inheritance.
- This makes it difficult to determine a person's risk of inheriting or passing on these disorders.
- Complex disorders are also difficult to study and treat because the specific factors that cause most of these disorders have not yet been identified. Studies that aim

to identify the cause of complex disorders can use several methodological approaches to determine genotype–phenotype associations.

- One method, the genotype-first approach, starts by identifying genetic variants within patients and then determining the associated clinical manifestations.
- This is opposed to the more traditional phenotype-first approach, and may identify causal factors that have previously been obscured by clinical heterogeneity, penetrance, and expressivity

Chromosomal disorder

- A chromosomal disorder is a missing, extra, or irregular portion of chromosomal DNA.
- It can be from an atypical number of chromosomes or a structural abnormality in one or more chromosomes. An example of these disorders is trisomy 21 (Down syndrome), in which there is an extra copy of chromosome 21.



What are common genetic disorders?

- There are many types. They include:
- **Chromosomal disorders**

- Down syndrome (Trisomy 21).
- FragileX syndrome.
- Klinefelter syndrome.
- Triple-X syndrome.
- Turner syndrome.
- Trisomy 18.

- Trisomy 13.

Multifactorial disorders

- Late-onset Alzheimer's disease.
- Arthritis.
- Autism spectrum disorder, in most cases.
- Cancer, in most cases.
- Coronary artery disease.
- Diabetes.
- Migraine headaches.
- Spina bifida.

Monogenic disorders

- Cystic fibrosis.
- Deafness that's present at birth (congenital).
- Duchenne muscular dystrophy.
- Familial hypercholesterolemia, a type of high cholesterol disease.
- Hemochromatosis (iron overload).
- Neurofibromatosis type 1 (NF1).
- Sickle cell disease.
- Tay-Sachs disease.

Are there other types of genetic disorders?

Genetic disorders may also cause rare diseases. This group of conditions affects fewer than 200,000 people in the U.S. According to experts, there may be as many as 7,000 of these diseases.

Rare genetic disorders include:

- AA amyloidosis.
- Adrenoleukodystrophy (ALD).
- Ehlers-Danlos syndrome.

- Mitochondrial diseases.
- Usher syndrome.

What are the causes of genetic disorders?

- To understand genetic disorder causes, it's helpful to learn more about how your genes and DNA work.
- Most of the DNA in your genes instructs the body to make proteins. These proteins start complex cell interactions that help you stay healthy.
- When a mutation occurs, it affects the genes' protein-making instructions. There could be missing proteins.
- Or the ones you have do not function properly. Environmental factors (also called mutagens) that could lead to a genetic mutation include:

- Chemical exposure.
- Radiation exposure.
- Smoking.
- UV exposure from the sun

What are the symptoms of genetic disorders?

Symptoms vary depending on the type of disorder, organs affected and how severe it is.

- Behavioral changes or disturbances.
- Breathing problems.
- Cognitive deficits, when the brain can't process information as it should.

- Developmental delays that include challenges with speech or social skills.
- Eating and digestive issues, such as difficulty swallowing or an inability to process nutrients.
- Limb or facial anomalies, which include missing fingers or a cleft lip and palate.
- Movement disorders due to muscle stiffness or weakness.
- Neurological issues such as seizures or stroke.
- Poor growth or short stature.
- Vision or hearing loss.

How are genetic disorders identified?

If you have a family history of a genetic disorder, you may wish to consider genetic counseling to see if genetic testing is appropriate for you.

Lab tests can typically show whether you have gene mutations responsible for that condition. In many cases, carrying the mutation does not always mean you'll end up with it.

Genetic counselors can explain your risk and if there are steps you can take to protect your health.

If there's a family history, DNA testing for genetic disorders can be an important part of starting a family. Options include:

- **Carrier testing:** This blood test shows whether you or your partner carry a mutation linked to genetic disorders. This is recommended for everyone considering pregnancy, even if there is no family history.
- **Prenatal screening:** This testing usually involves blood testing from a pregnant woman that tells a person how likely it is that an unborn child could have a common chromosome condition.

- **Prenatal diagnostic testing:** You can find out whether your unborn child faces a higher risk for certain genetic disorders. Prenatal testing uses a sample of fluid from the womb (amniocentesis).
- **Newborn screening:** This test uses a sample of your newborn baby's blood and is performed on all babies born in Ohio. Detecting genetic disorders early in life can help your child receive timely care if needed.

What is treatment for genetic disorders like?

Most genetic disorders do not have a cure. Some have treatments that may slow disease progression or lessen their impact on your life. The type of treatment that's right for you depends on the type and severity of the disease. With others, we may not have treatment but we can provide medical surveillance to try to catch complications early.

You may need:

- Medications to manage symptoms or chemotherapy to slow abnormal cell growth.
- Nutrition counseling or dietary supplements to help you get the nutrients your body needs.
- Physical, occupational or speech therapy to maximize your abilities.
- Blood transfusion to restore levels of healthy blood cells.
- Surgery to repair abnormal structures or treat complications.
- Specialized treatments, such as radiation therapy for cancer.
- Organ transplant, which is a procedure to replace a nonfunctioning organ with one from a healthy donor.

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Assessment Form

Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry

Multiple choice questions

1. Genetic disorder caused by abnormalities in
   a) Chromosome
   b) b) genome
   c) c) cells
   d) d) none of above
2. The mutation responsible can occur spontaneously before
   a) Embryonic development
   b) b) foetal
   c) c) growth
   d) d) birth
3. The opposite of a hereditary disease is an
   a) Acquired disease
   b) b) mutation
   c) c) inherited
   d) d) by birth
4. A single-gene disorder is the result of
   a) single muted gene
   b) double muted
   c) triple gene
   d) four gene
5. single gene disorder also called as
   a) monogenic disorder
   b) myogenic disorder
   c) cytogenic disorder
   d) minogenic disorder

6. Example for single genome disorder
    a) dwarfism
    b) marfan syndrome
    c) Willebrand disease
    d) TB
7. Example for autosomal dominant disorder
    a) Huntington's disease
    b) dwarfism
    c) typhoid
    d) sickle cell anemia
8. An effected person usually has unaffected parents who each carry a single copy of the mutated gene and are referred to as
    a) Genetic carriers
    b) mutation carriers
    c) chromosome carriers
    d) cells carriers
9. Example for Autosomal recessive
    a) Albinism
    b) Rett syndrome
    c) porphyria
    d) dwarfism
10. X-linked dominant disorders are caused by mutations in genes on the
    a) x chromosome
    b) y chromosome
    c) mutation
    d) genome
11. Example for x linked dominant
    a. Klinefelter syndrome
    b. Roberts syndrome
    c. colorectal cancer
    d. malaria
12. Y-linked disorders are caused by mutations on the
    a. Y chromosome
    b. gene
    c. X chromosome

d. mutation

13. mitochondrial inheritance also called as

a) maternal inheritance

b) eternal

c) paternal

d) genome

14. Example for mitochondrial inheritance

a) lebers hereditary optic neuropathy

b) hemophilia A

c) color blindness

d) turner syndrome

15. chromosomal disorder is missing of

a) chromosome

b) gene

c) mutation

d) genome

16. Example for trisomy 21

a) down syndrome

b) hemophilia

c) arthritis

d) Alzheimer disease

17. identify any multifractional disease

a) spina difidia

b) fragile x syndrome

c) triple x syndrome

d) cystic fibrosis

18. identify the non-environmental factor that leads to genetic disorder

a) chemical exposure

b) radiation exposure

c) genetics

d) smoking

19. Test used to diagnosis genetic disorder

a) Prenatal screening

b) Newborn screening

c) both a & b

d) none of the above

20. which of the following not a rare genetic disorder

a) AA amyloidosis

b)Adrenoleukodystrophy (ALD)

c)Ehlers-Danlos syndrome

d) AIDS

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Assessment Form

ANNEXURE - III

Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry

COURSE CODE :- VAC07/AHS/2020-18/05

Multiple choice questions

1. Genetic disorder caused by abnormalities in
   a) Chromosome
   b) b) genome
   c) c) cells
   d) d) none of above
2. The mutation responsible can occur spontaneously before
   a) Embryonic development
   b) b) foetal
   c) c) growth
   d) d) birth
3. The opposite of a hereditary disease is an
   a) Acquired disease
   b) b) mutation
   c) c) inherited
   d) d) by birth
4. A single-gene disorder is the result of
   a) single muted gene
   b) double muted
   c) triple gene
   d) four gene
5. single gene disorder also called as
   a) monogenic disorder
   b) myogenic disorder
   c) cytogenic disorder
   d) minogenic disorder

6. Example for single genome disorder
   a) dwarfism
   b) marfan syndrome
   c) Willebrand disease
   d) TB
7. Example for autosomal dominant disorder
   a) Huntington's disease
   b) dwarfism
   c) typhoid
   d) sickle cell anemia
8. An effected person usually has unaffected parents who each carry a single copy of the mutated gene and are referred to as
   a) Genetic carriers
   b) mutation carriers
   c) chromosome carriers
   d) cells carriers
9. Example for Autosomal recessive
   a) Albinism
   b) Rett syndrome
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10. X-linked dominant disorders are caused by mutations in genes on the
   a) x chromosome
   b) y chromosome
   c) mutation
   d) genome
11. Example for x linked dominant
   a. Klinefelter syndrome
   b. Roberts syndrome
   c. colorectal cancer
   d. malaria
12. Y-linked disorders are caused by mutations on the
   a. Y chromosome
   b. gene
   c. X chromosome

d. mutation

13. mitochondrial inheritance also called as

a) maternal inheritance

b) eternal

c) paternal

d) genome

14. Example for mitochondrial inheritance

a) lebers hereditary optic neuropathy

b) hemophilia A

c) color blindness

d) turner syndrome

15. chromosomal disorder is missing of

a) chromosome

b) gene

c) mutation

d) genome

16. Example for trisomy 21

a) down syndrome

b) hemophilia

c) arthritis

d) Alzheimer disease

17. identify any multifractional disease

a) spina difidia

b) fragile x syndrome

c) triple x syndrome

d) cystic fibrosis

18. identify the non-environmental factor that leads to genetic disorder

a) chemical exposure

b) radiation exposure

c) genetics

d) smoking

19. Test used to diagnosis genetic disorder

a) Prenatal screening

b) Newborn screening

c) both a & b

d) none of the above

20. which of the following not a rare genetic disorder

a) AA amyloidosis

b)Adrenoleukodystrophy (ALD)

c)Ehlers-Danlos syndrome

d) AIDS

GD

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Assessment Form ANNEXURE - IV

Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry

COURSE CODE - VAC07/AHS/2020-18/05

Multiple choice questions

1. Genetic disorder caused by abnormalities in
   a) Chromosome
   b) b) genome
   c) c) cells
   d) d) none of above
2. The mutation responsible can occur spontaneously before
   a) Embryonic development
   b) b) foetal
   c) c) growth
   d) d) birth
3. The opposite of a hereditary disease is an
   a) Acquired disease
   b) b) mutation
   c) c) inherited
   d) d) by birth
4. A single-gene disorder is the result of
   a) single muted gene
   b) double muted
   c) triple gene
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5. single gene disorder also called as
   a) monogenic disorder
   b) myogenic disorder
   c) cytogenic disorder
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6. Example for single genome disorder
   a) dwarfism
   b) marfan syndrome
   c) Willebrand disease
   d) TB
7. Example for autosomal dominant disorder
   a) Huntington's disease
   b) dwarfism
   c) typhoid
   d) sickle cell anemia
8. An effected person usually has unaffected parents who each carry a single copy of the mutated gene and are referred to as
   a) Genetic carriers
   b) mutation carriers
   c) chromosome carriers
   d) cells carriers
9. Example for Autosomal recessive
   a) Albinism
   b) Rett syndrome
   c) porphyria
   d) dwarfism
10. X-linked dominant disorders are caused by mutations in genes on the
    a) x chromosome
    b) y chromosome
    c) mutation
    d) genome
11. Example for x linked dominant
    a. Klinefelter syndrome
    b. Roberts syndrome
    c. colorectal cancer
    d. malaria
12. Y-linked disorders are caused by mutations on the
    a. Y chromosome
    b. gene
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d) genome

14. Example for mitochondrial inheritance

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16. Example for trisomy 21

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a) AA amyloidosis

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c)Ehlers-Danlos syndrome

d) AIDS



Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that **GOKUL A UAH1803184** has actively participated in the Value Added Course on **Genetic disorder VAC07/AHS/2020-18/05** held during May to June 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. G.Somasundram

COORDINATOR

RESOURCE PERSON

5Annexure- V

Student Feedback Form

Course Name : GENITIC DISORDER

Subject Code: VAC07/AHS/2020-18/05

Name of Student: _____Roll No.:

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Feedback Form

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. The course met my expectations.	○	○	○	○	○
2. I will be able to apply the knowledge learned.	○	○	○	○	○
3. The course objectives for each topic were identified and followed.	○	○	○	○	○
4. The content was organised and easy to follow.	○	○	○	○	○
5. The quality of instruction was good.	○	○	○	○	○
6. Class participation and interaction were encouraged.	○	○	○	○	○
7. Adequate time was provided for questions and discussion.	○	○	○	○	○

8. How do you rate the course overall?
   - ○ Excellent
   - ○ Good
   - ○ Average
   - ○ Poor
   - ○ Very poor

9. The aspects of the course could be improved?

10. Other comments?

Signature of the student:
Date:

Student Feedback Form

Course Name : GENITIC DISORDER

Subject Code: VAC07/AHS/2020-18/05

Name of Student: DONALD MORRIS Roll No.: UAH1805199

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Feedback Form

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. The course met my expectations.	o	✓	o	o	o
2. I will be able to apply the knowledge learned.	✓	o	o	o	o
3. The course objectives for each topic were identified and followed.	o	✓	o	o	o
4. The content was organised and easy to follow.	✓	o	o	o	o
5. The quality of instruction was good.	o	✓	o	o	o
6. Class participation and interaction were encouraged.	✓	o	o	o	o
7. Adequate time was provided for questions and discussion.	o	✓	o	o	o

8. How do you rate the course overall?
   - o Excellent
   - ✓ Good
   - o Average
   - o Poor
   - o Very poor

9. The aspects of the course could be improved? practical classes should be improved

10. Other comments? → our staff very good at teaching

Signature of the student: Donald Morris
Date: 15/06/17

Student Feedback Form

Course Name : GENITIC DISORDER

Subject Code: VAC07/AHS/2020-18/05

Name of Student: ASHIK . P Roll No.: UAH1803182

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Feedback Form

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. The course met my expectations.	✓	o	o	o	o
2. I will be able to apply the knowledge learned.	o	✓	o	o	o
3. The course objectives for each topic were identified and followed.	o	✓	o	o	o
4. The content was organised and easy to follow.	o	o	o	o	o
5. The quality of instruction was good.	o	✓	o	o	o
6. Class participation and interaction were encouraged.	o	o	o	o	o
7. Adequate time was provided for questions and discussion.	o	✓	o	o	o

8. How do you rate the course overall?
   - o Excellent
   - ✓ Good
   - o Average
   - o Poor
   - o Very poor

9. The aspects of the course could be improved? Improved practical classes only.

10. Other comments? Very good at teaching.

Signature of the student: Ashik
Date: 15/06/17

Date: 14.06.2020

From

Dr.G.Somasundram
Department of Pharmacology,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To

The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: GENITIC DISORDER for AHS

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: " **GENITIC DISORDER"** May to June 2020 for 25 AHS Students . We solicit your kind action to send certificates for the participants that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards,

Dr.G.Somasundram

Encl: Certificates :

Photographs:


vivo X70 Pro · ZEISS · ClassyTamil

SRI LAKSHMI NARAYANA INSTITUTE OF ALLIED HEALTH SCIENCE

MEDICAL EDUCATIONAL PROJECT

GENITIC DISORDER - VAC07/AHS/2020-18/05

S.No.	Name of the Students	University Register Number	Signature
1	AKSHAY SURESH	UAH1803178	
2	ANAGHA SUKUMARAN	UAH1803179	
3	APARNA REMESHAN	UAH1803180	
4	ASHIK.R	UAH1803182	
5	FEBA SUSAN ABRAHAM	UAH1803183	
6	GOKUL A	UAH1803184	
7	JIJI ELZA JOSE	UAH1803185	
8	MINNU MATHACHAN	UAH1803186	
9	MUHAMMED IRFAN.I	UAH1803187	
10	MURALIKRISHNAN.K	UAH1803188	
11	DONALD MORISON.S	UAH1805199	
12	GADDALA PRAVEEN	UAH1805200	
13	PRAVEEN.G	UAH1805201	
14	RAMANAN.V	UAH1805202	
15	SARATH P S	UAH1805203	
16	S.K.DHARSHINI	UAH1804193	
17	GAYATHRI.V	UAH1804194	
18	JAYABHAVANI.J	UAH1804195	
19	MALATHI.S	UAH1804196	
20	NARAYANADASS.M	UAH1804197	
21	SANDRA.S	UAH1803190	
22	SATHISHKUMAR.R	UAH1803191	
23	SHEHANAYI.M	UAH1803192	
24	VENKATESH.S	UAH1805204	
25	YAZHINI.P	UAH1805205	

SRI LAKSHMI NARAYANA INSTITUTE OF ALLIED HEALTH SCIENCE

MEDICAL EDUCATIONAL PROJECT

GENITIC DISORDER - VAC07/AHS/2020-18/05

S.No.	Name of the Students	University Register Number	Signature
1	AKSHAY SURESH	UAH1803178	
2	ANAGHA SUKUMARAN	UAH1803179	
3	APARNA REMESHAN	UAH1803180	
4	ASHIK.R	UAH1803182	
5	FEBA SUSAN ABRAHAM	UAH1803183	
6	GOKUL A	UAH1803184	
7	JIJI ELZA JOSE	UAH1803185	
8	MINNU MATHACHAN	UAH1803186	
9	MUHAMMED IRFAN.I	UAH1803187	
10	MURALIKRISHNAN.K	UAH1803188	
11	DONALD MORISON.S	UAH1805199	
12	GADDALA PRAVEEN	UAH1805200	
13	PRAVEEN.G	UAH1805201	
14	RAMANAN.V	UAH1805202	
15	SARATH P S	UAH1805203	
16	S.K.DHARSHINI	UAH1804193	
17	GAYATHRI.V	UAH1804194	
18	JAYABHAVANI.J	UAH1804195	
19	MALATHI.S	UAH1804196	
20	NARAYANADASS.M	UAH1804197	
21	SANDRA.S	UAH1803190	
22	SATHISHKUMAR.R	UAH1803191	
23	SHEHANAYI.M	UAH1803192	
24	VENKATESH.S	UAH1805204	
25	YAZHINI.P	UAH1805205	

Sri Lakshmi Narayana Institute of Medical Sciences

Date: 15-05-2020

From

Dr.G.SOMASUNDRAM
Principal of Allied Health Sciences,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

To

The Dean,
Sri Lakshmi Narayana Institute of Medical College
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: Disinfection

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **Disinfection** from June to July 2020 . We solicit your kind permission for the same.

Kind Regards

Dr.G.Somasundram

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: **Dr. Balagurunathan. K**

The HOD: **Dr. Somasundram. G**

The Expert: **Dr.**

The committee has discussed about the course and is approved.

Dean	Subject Expert	HOD
(Sign & Seal)	(Sign & seal)	(Sign & Seal)

Dr. G. JAYALAKSHMI, BSC., MBBS., DTCD., M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Agaram, Kudapakkam Post,
Villianur Commune, Puducherry - 605502.

PRINCIPAL
Allied Health Sciences
Sri Lakshmi Narayana Institute of Allied Health Sciences
Osudu, Agaram Post, Puducherry - 605 502.

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affliated to Bharath University, Chennai - TN]

Circular

31.05.2020

Sub: Organizing Value-added Course: "Disinfection ".reg

With reference to the above-mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research** is organizing **"Disinfection"**. The course content and registration form is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before June to July 2020 . Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

Dr. G. JAYALAKSHMI, BSC., MBBS., DTCD., M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Agaram, Kudapakkam Post,
Villianur Commune, Puducherry - 605502.

Encl: Copy of Course content

VALUE ADDED COURSE

1. Name of the programme & Code

"Disinfection" & VAC08/AHS/2020-15/06

2. Duration & Period

30 hrs. & June to July 2020

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Assessment - *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

1 time June to July 2020

8. Year of discontinuation: 2021

9. Summary report of each program year-wise

Value Added Course- July to August 2017					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	**VAC08/AHS/2020-15/06**	Disinfection	**DR. JAIKUMAR**	AHS	27 students June to July 2020

10. Course Feed Back

Enclosed as Annexure- V

RESOURCE PERSON

COORDINATOR

DR.G.SOMASUNDARAM

PRINCIPAL
Allied Health Sciences
Sri Lakshmi Narayana Institute of Allied Health Sciences
Osudu, Agaram Post, Puducherry - 605 502.

Course Proposal

Course Title: "**Disinfection"**

Course Objective:

1. To enhance the performance in Disinfection.
2. To assess the objectives and protocols in Disinfection.
3. To assess the reaction of target allied Health students towards the Disinfection by getting their feedback.

Course Outcome: Improvement in the "Disinfection"
Course Audience: Students of AHS Batch 2020
Course Coordinator: Dr.G.Somasundram
Course Faculties with Qualification and Designation:
1.Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Time	Hours
1.	15.06.2020	Introduction to disinfectants, Background, Objectives,	4-5p.m	1
2.	17.06.2020	Low level& high-level disinfectant	2-3p.m	1
3.	19.06.2020	Properties of disinfectant	4-6p.m	2
4.	20.06.2020	Types of disinfectant	4-6p.m	2
5.	22.06.2020	Alcohol	4-6p.m	2
6.	24.06.2020	Aldehyde	4-5p.m	2
7.	26.06.2020	conventional didactic lecture and video	4-5P.M	1
8.	29.06.2020	Quaternary amino compounds	4-5p.m	1
9.	30.06.2020	Inorganic compounds	4-6p.m	1
10.	1.07.2020	Non chemical method	4-6p.m	2
11.	3.07.2020	Home disinfectants	4-6p.m	1
12.	6.07.2020	Metals	4-6p.m	2
13.	9.07.2020	Pre course and Post Course evaluation, Feedback analysis from Likert scale	2-5p.m	3
		Practical Class I		
13.	10.07.2020	Steps model explanation and various performance assessment methods		1
14.	13.07.2020	Orientation of the students about the training program and assessment methodology by DOPS		1
15.	15.07.2020	Video demonstration of disinfectants		2

16.	17.07.2020	Disinfectants procedure by STEPS model		2
17.	18.07.2020	Assessment by DOPS procedure and giving feedback in weaker areas	2-6p.m	4
		Total		30 hrs

REFERENCE BOOKS:

1.Shakti Kumar Gupta & Sunil Kant, A Hand Book on Housekeeping and Disinfection Practices for Heal care Facilities

2. Steve E Hrudey & Jeffrey WA Charrols, Disinfection by Products & Human Health

3. Joseph M. Ascenzi , Hand Book of Disinfectants and Antiseptics

DISINFECTANTS

- A **disinfectant** is a chemical substance or compound used to inactivate or destroy microorganisms on inert surfaces.
- Disinfection does not necessarily kill all microorganisms, especially resistant bacterial spores; it is less effective than sterilization, which is an extreme physical or chemical process that kills all types of life.
- Disinfectants are generally distinguished from other antimicrobial agents such as antibiotics, which destroy microorganisms within the body, and antiseptics, which destroy microorganisms on living tissue. Disinfectants are also different from biocides—the latter are intended to destroy all forms of life, not just microorganisms.
- Disinfectants work by destroying the cell wall of microbes or interfering with their metabolism.
- It is also a form of decontamination, and can be defined as the process whereby physical or chemical methods are used to reduce the amount of pathogenic microorganisms on a surface.
- Disinfectants can also be used to destroy microorganisms on the skin and mucous membrane, as in the medical dictionary historically the word simply meant that it destroys microbes.
- Sanitizers are substances that simultaneously clean and disinfect.
- Disinfectants kill more germs than sanitizers. Disinfectants are frequently used in hospitals, dental surgeries, kitchens, and bathrooms to kill infectious organisms.
- Sanitizers are mild compared to disinfectants and are used majorly to clean things that are in human contact whereas disinfectants are concentrated and are used to clean surfaces like floors and building premises
- Bacterial endospores are most resistant to disinfectants, but some fungi, viruses and bacteria also possess some resistance.



Definitions

The Australian Therapeutic Goods Order No. 54 defines several grades of disinfectant as will be used below.

Sterilant

Sterilant means a chemical agent which is used to sterilize critical medical devices or medical instruments. A sterilant kills all micro-organisms with the result that the sterility assurance level of a microbial survivor is less than 10^-6. Sterilant gases are not within this scope.

Low level disinfectant

Low level disinfectant means a disinfectant that rapidly kills most vegetative bacteria as well as medium sized lipid containing viruses, when used according to labelling. It cannot be relied upon to destroy, within a practical period, bacterial endospores, mycobacteria, fungi, or all small nonlipid viruses

.

Intermediate level disinfectant

Intermediate level disinfectant means a disinfectant that kills all microbial pathogens except bacterial endospores, when used as recommended by the manufacturer. It is bactericidal, tuberculocidal, fungicidal (against asexual spores but not necessarily dried chlamydospores or sexual spores), and virucidal.

High level disinfectant

High level disinfectant means a disinfectant that kills all microbial pathogens, except large numbers of bacterial endospores when used as recommended by its manufacturer

.

Instrument grade

Instrument grade disinfectant means:

1. a disinfectant which is used to reprocess reusable therapeutic devices; and
2. when associated with the words “low”, “intermediate” or “high” means “low”, “intermediate” or “high” level disinfectant respectively.

Hospital grade

Hospital grade disinfectant means a disinfectant that is suitable for general purpose disinfection of building and fitting surfaces, and purposes not involving instruments or surfaces likely to come into contact with broken skin:

1. in premises used for:
    -
        - the investigation or treatment of a disease, ailment or injury; or
        - procedures that are carried out involving the penetration of the

human skin; or,

1. in connection with:
    -
        - the business of beauty therapy or hairdressing; or
        - the practice of podiatry;

but does not include :

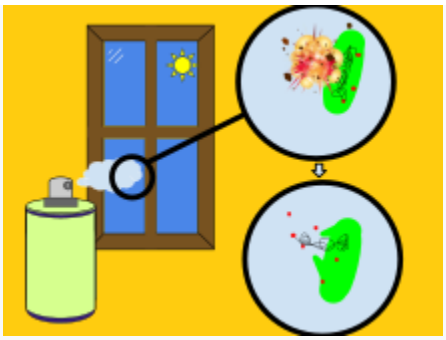
1. **Instrument grade disinfectants**; or
2. **sterilant**; or
3. an antibacterial clothes preparation; or
4. a sanitary fluid; or

5. a sanitary powder; or
6. a sanitizer

Household/commercial grade

Household/commercial grade disinfectant means a disinfectant that is suitable for general purpose disinfection of building or fitting surfaces, and for other purposes, in premises or involving procedures other than those specified for a hospital-grade disinfectant, but is not:

1. an antibacterial clothes preparation; or
2. a sanitary fluid; or
3. a sanitary powder; or
4. a sanitizer



Properties

- A perfect disinfectant would also offer complete and full microbiological sterilization, without harming humans and useful form of life, be inexpensive, and noncorrosive.
- However, most disinfectants are also, by nature, potentially harmful (even toxic) to humans or animals.
- Most modern household disinfectants contain denatonium, an exceptionally bitter substance added to discourage ingestion, as a safety measure.

- Those that are used indoors should never be mixed with other cleaning products as chemical reactions can occur. The choice of disinfectant to be used depends on the particular situation.
- Some disinfectants have a wide spectrum (kill many different types of microorganisms), while others kill a smaller range of disease-causing organisms but are preferred for other properties (they may be non-corrosive, non-toxic, or inexpensive).
- There are arguments for creating or maintaining conditions that are not conducive to bacterial survival and multiplication, rather than attempting to kill them with chemicals.
- Bacteria can increase in number very quickly, which enables them to evolve rapidly.
- Should some bacteria survive a chemical attack, they give rise to new generations composed completely of bacteria that have resistance to the particular chemical used.
- Under a sustained chemical attack, the surviving bacteria in successive generations are increasingly resistant to the chemical used, and ultimately the chemical is rendered ineffective.
- For this reason, some question the wisdom of impregnating cloths, cutting boards and worktops in the home with bactericidal chemicals

Types

Air disinfectants

- Air disinfectants are typically chemical substances capable of disinfecting microorganisms suspended in the air.
- Disinfectants are generally assumed to be limited to use on surfaces, but that is not the case.
- In 1928, a study found that airborne microorganisms could be killed using mists of dilute bleach.
- An air disinfectant must be dispersed either as an aerosol or vapour at a sufficient concentration in the air to cause the number of viable infectious microorganisms to be significantly reduced.

- In the 1940s and early 1950s, further studies showed inactivation of diverse bacteria, influenza virus, and *Penicillium chrysogenum* (previously *P. notatum*) mold fungus using various glycols, principally propylene glycol and triethylene glycol.
- In principle, these chemical substances are ideal air disinfectants because they have both high lethality to microorganisms and low mammalian toxicity.
- Although glycols are effective air disinfectants in controlled laboratory environments, it is more difficult to use them effectively in real-world environments because the disinfection of air is sensitive to continuous action.
- Continuous action in real-world environments with outside air exchanges at door, HVAC, and window interfaces, and in the presence of materials that adsorb and remove glycols from the air, poses engineering challenges that are not critical for surface disinfection.
- The engineering challenge associated with creating a sufficient concentration of the glycol vapours in the air have not to date been sufficiently addressed

Alcohols

- Automatic hand sanitizer in Tomaszów Mazowiecki, Poland
- *: Hand sanitizer*
- Alcohol[and alcohol plus Quaternary ammonium cation based compounds comprise a class of proven surface sanitizers and disinfectants approved by the EPA and the Centers for Disease Control for use as a hospital grade disinfectant.
- Alcohols are most effective when combined with distilled water to facilitate diffusion through the cell membrane; 100% alcohol typically denatures only external membrane proteins.
- A mixture of 70% ethanol or isopropanol diluted in water is effective against a wide spectrum of bacteria, though higher concentrations are often needed to disinfect wet surfaces.
- Additionally, high-concentration mixtures (such as 80% ethanol + 5% isopropanol) are required to effectively inactivate lipid-enveloped viruses (such as HIV, hepatitis B, and hepatitis C).[26][27][28][29]

- The efficacy of alcohol is enhanced when in solution with the wetting agent dodecanoic acid (coconut soap).
- The synergistic effect of 29.4% ethanol with dodecanoic acid is effective against a broad spectrum of bacteria, fungi, and viruses. Further testing is being performed against Clostridium difficile (C.Diff) spores with higher concentrations of ethanol and dodecanoic acid, which proved effective with a contact time of ten minutes.



Aldehydes

- Aldehydes, such as formaldehyde and glutaraldehyde, have a wide microbicidal activity and are sporicidal and fungicidal.
- They are partly inactivated by organic matter and have slight residual activity.
- Some bacteria have developed resistance to glutaraldehyde, and it has been found that glutaraldehyde can cause asthma and other health hazards, hence ortho-phthalaldehyde is replacing glutaraldehyde

Peroxy and peroxo acids

Peroxycarboxylic acids and inorganic peroxo acids are strong oxidants and extremely effective disinfectants.

- Peroxyformic acid
- Peracetic acid
- Peroxypropionic acid
- Monoperoxyglutaric acid
- Monoperoxysuccinic acid

- Peroxybenzoic acid
- Peroxyanisic acid
- Chloroperbenzoic acid
- Monoperoxyphthalic acid

Phenolics

Phenolics are active ingredients in some household disinfectants. They are also found in some mouthwashes and in disinfectant soap and handwashes. Phenols are toxic to cats[1] and newborn humans

- Phenol is probably the oldest known disinfectant as it was first used by Lister, when it was called carbolic acid. It is rather corrosive to the skin and sometimes toxic to sensitive people. Impure preparations of phenol were originally made from coal tar, and these contained low concentrations of other aromatic hydrocarbons including benzene, which is an IARC Group 1 carcinogen.
- *o*-Phenylphenol is often used instead of phenol, since it is somewhat less corrosive.
- Chloroxylenol is the principal ingredient in Dettol, a household disinfectant and antiseptic.
- Hexachlorophene is a phenolic that was once used as a germicidal additive to some household products but was banned due to suspected harmful effects.
- Thymol, derived from the herb thyme, is the active ingredient in some "broad spectrum" disinfectants that often bear ecological claims. It is used as a stabilizer in pharmaceutic preparations. It has been used for its antiseptic, antibacterial, and antifungal actions, and was formerly used as a vermifuge.
- Amylmetacresol is found in Strepsils, a throat disinfectant.
- Although not a phenol, 2,4-dichlorobenzyl alcohol has similar effects as phenols, but it cannot inactivate viruses.

Quaternary ammonium compounds

- Quaternary ammonium compounds ("quats"), such as benzalkonium chloride, are a large group of related compounds.
- Some concentrated formulations have been shown to be effective low-level disinfectants.
- Quaternary ammonia at or above 200ppm plus alcohol solutions exhibit efficacy against difficult to kill non-enveloped viruses such as norovirus, rotavirus, or polio virus.
- Newer synergous, low-alcohol formulations are highly effective broad-spectrum disinfectants with quick contact times (3–5 minutes) against bacteria, enveloped viruses, pathogenic fungi, and mycobacteria.
- Quats are biocides that also kill algae and are used as an additive in large-scale industrial water systems to minimize undesired biological growth.

Inorganic compounds

Chlorine

This group comprises aqueous solution of chlorine, hypochlorite, or hypochlorous acid. Occasionally, chlorine-releasing compounds and their salts are included in this group. Frequently, a concentration of < 1 ppm of available chlorine is sufficient to kill bacteria and viruses, spores and mycobacteria requiring higher concentrations. Chlorine has been used for applications, such as the deactivation of pathogens in drinking water, swimming pool water and wastewater, for the disinfection of household areas and for textile bleaching

- Sodium hypochlorite
- Calcium hypochlorite
- Monochloramine
- Chloramine-T
- Trichloroisocyanuric acid
- Chlorine dioxide
- Hypochlorous acid

Iodine

- Iodine

- Iodophors

Acids and bases

- Sodium hydroxide
- Potassium hydroxide
- Calcium hydroxide
- Magnesium hydroxide
- Sulfurous acid
- Sulfur dioxide
- phosphoric acid
- dodecylbenzenesulfonic acid

Metals

Most metals, especially those with high atomic weights can inhibit the growth of pathogens by disrupting their metabolism.

Terpenes

- Thymol
- Pine oil

Other

- The biguanide polymer polyaminopropyl biguanide is specifically bactericidal at very low concentrations (10 mg/l).
- It has a unique method of action: The polymer strands are incorporated into the bacterial cell wall, which disrupts the membrane and reduces its permeability, which has a lethal effect to bacteria.
- It is also known to bind to bacterial DNA, alter its transcription, and cause lethal DNA damage.
- It has very low toxicity to higher organisms such as human cells, which have more complex and protective membranes.

- Common sodium bicarbonate ($NaHCO_3$) has antifungal properties, and some antiviral and antibacterial properties, though those are too weak to be effective at a home environment.

Non-chemical

- Ultraviolet germicidal irradiation is the use of high-intensity shortwave ultraviolet light for disinfecting smooth surfaces such as dental tools, but not porous materials that are opaque to the light such as wood or foam.
- Ultraviolet light is also used for municipal water treatment. Ultraviolet light fixtures are often present in microbiology labs, and are activated only when there are no occupants in a room (e.g., at night).
- Heat treatment can be used for disinfection and sterilization.

- The phrase "sunlight is the best disinfectant" was popularized in 1913 by United States Supreme Court Justice Louis Brandeis and later advocates of government transparency. While sunlight's ultraviolet rays can act as a disinfectant, the Earth's ozone layer blocks the rays' most effective wavelengths.

- Ultraviolet light-emitting machines, such as those used to disinfect some hospital rooms, make for better disinfectants than sunlight

Home disinfectants

- The most cost-effective home disinfectant is chlorine bleach (typically a >10% solution of sodium hypochlorite), which is effective against most common pathogens, including disinfectant-resistant organisms such as tuberculosis (mycobacterium tuberculosis), hepatitis B and C, fungi, and antibiotic-resistant strains of staphylococcus and enterococcus.
- It has disinfectant action against some parasitic organisms.

- The benefits of chlorine bleach include its inexpensive and fast acting nature. However it is harmful to mucous membranes and skin upon contact, has a strong odour; is not effective against *Giardia lamblia* and *Cryptosporidium*; and combination with other cleaning products such as ammonia and vinegar can generate noxious gases like chlorine.
- The best practice is not to add anything to household bleach except water. As with most disinfectants, the area requiring disinfection should be cleaned before the application of the chlorine bleach, as the presence of organic materials may inactivate chlorine bleach.
- The use of some antimicrobials such as triclosan, is controversial because it may lead to antimicrobial resistance.
- The use of chlorine bleach and alcohol disinfectants does not cause antimicrobial resistance as it denatures the protein of the microbe upon contact



SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure III

Assessment Form

Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry

COURSE CODE:VAC08/AHS/2020-15/06

Multiple choice questions ***20x1=20***

1. …….. Is a chemical substance or compound used to inactivate or destroy microorganisms on inert surfaces**?**
    a) Sterilization
    b) Disinfectant
    c) Sanitizer
    d) None of the above
2. Disinfection does not necessarily kill all microorganisms, especially resistant……
    a) Bacterial spores
    b) Only spores
    c) Viral
    d) None of the above
3. ……are substances that simultaneously clean and disinfect.
    a) Sanitizer
    b) Disinfectant
    c) Sterilization
    d) All of the above
4. ……. means a chemical agent which is used to sterilize critical medical devices or medical instruments
    a) Sterility
    b) Disinfectant
    c) Sterilization
    d) None of the above

5. ……. means a disinfectant that rapidly kills most vegetative bacteria
    a) Low level disinfectant
    b) High level disinfectant
    c) Moderate level disinfectant
    d) Medium level disinfectant
6. High level disinfectant means a disinfectant that kills all……
    a) Bacterial pathogens
    b) Microbial pathogens
    c) Viral pathogens
    d) None of the above
7. ……. Are typically chemical substances capable of disinfecting microorganisms suspended in the air?
    a) Low level disinfectant
    b) Commercial grade
    c) Air disinfectant
    d) High level disinfectant
8. The efficacy of alcohol is enhanced when in solution with the wetting agent……
    a) dodecanoic acid
    b) canonic acid
    c) Canopic acid
    d) decani acid
9. ……. Are strong oxidants and extremely effective disinfectants.
    a) Peroxycarboxylic acids and inorganic proxy acids
    b) Inorganic proxy acids
    c) Aldehydes
    d) None of the above
10. ……. Are active ingredients in some household disinfectants?
    a) Aldehydes
    b) Inorganic peso acids
    c) Phenolic
    d) All of the above
11. Chloroxylenol is the principal ingredient in……
    a) Dettol
    b) Phenyl

c) Lysol
d) Sanitizer

12.…….. derived from the herb thyme
a) Hexachlorophene
b) Thyme
c) Streusels
d) Benzene

13. Chlorine has been used for applications, such as the deactivation of pathogens in ……
a) river water
b) Drinking water
c) Underground water
d) None of the above

14.……. for disinfecting smooth surfaces such as dental tools, but not porous materials that are opaque to the light such as wood or foam
a) Radiations
b) Ultraviolet light
c) X rays
d) None of the above

15. The most cost-effective home disinfectant is…….
a) Dettol
b) Phenyl
c) Chlorine bleach
d) Lysol

16.……is the best disinfectant
a) Sunlight
b) Aldehyde
c) Glutaraldehyde
d) Terpenes

17. Example for inorganic compound disinfectant…….
a) Iodine
b) Chlorine
c) Aldehyde
d) Both a&b

18.……means a disinfectant that kills all microbial pathogens except bacterial endospores, when used as recommended by the manufacturer.

a) Low level disinfectant
b) Intermediate level
c) High level
d) None of the above

19. Alcohols are most effective when combined with…….

a) Normal water
b) Distilled water
c) Drinking water
d) Pool water

20. The use of chlorine bleach and alcohol disinfectants does not cause…….

a) Antimicrobial resistance
b) Antimonial resistance
c) Antimicrobial resistance
d) Antifungal resistance

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

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Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that **MALATHI.S UAH1804196** has actively participated in the Value Added Course on **Disinfection VAC08/AHS/2020-15/06** held June to July 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. G.Somasundram

COORDINATOR

RESOURCE PERSON

5Annexure- V

Student Feedback Form

Course Name: DISINFECTION

Subject Code: VAC08/AHS/2020-15/06

Name of Student: _____Roll No.:

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Feedback Form

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. The course met my expectations.	○	○	○	○	○
2. I will be able to apply the knowledge learned.	○	○	○	○	○
3. The course objectives for each topic were identified and followed.	○	○	○	○	○
4. The content was organised and easy to follow.	○	○	○	○	○
5. The quality of instruction was good.	○	○	○	○	○
6. Class participation and interaction were encouraged.	○	○	○	○	○
7. Adequate time was provided for questions and discussion.	○	○	○	○	○

8. How do you rate the course overall?
   - ○ Excellent
   - ○ Good
   - ○ Average
   - ○ Poor
   - ○ Very poor

9. The aspects of the course could be improved?

10. Other comments?

Signature of the student:
Date:

Student Feedback Form

Course Name: DISINFECTION

Subject Code: VAC08/AHS/2020-15/06

Name of Student: Yazhini . P Roll No.: UAH18052O5

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Feedback Form

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. The course met my expectations.	o	o	✓	o	o
2. I will be able to apply the knowledge learned.	o	✓	o	o	o
3. The course objectives for each topic were identified and followed.	o	✓	o	o	o
4. The content was organised and easy to follow.	o	o	✓	o	o
5. The quality of instruction was good.	o	✓	o	o	o
6. Class participation and interaction were encouraged.	o	o	o	✓	o
7. Adequate time was provided for questions and discussion.	o	o	o	o	✓

8. How do you rate the course overall?
   - o Excellent
   - ✓ Good
   - o Average
   - o Poor
   - o Very poor

9. The aspects of the course could be improved? Practical should be conducte more .,

10. Other comments?

Need to improve extra curricular activities, li sports and cultural events.

Signature of the student:
Date: 18/07/20 Yazhini.P

5Annexure- V

Student Feedback Form

Course Name: DISINFECTION

Subject Code: VAC08/AHS/2020-15/06

Name of Student: GAYATHRI V Roll No.: UAH18041194

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Feedback Form

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. The course met my expectations.	o	o	✓	o	o
2. I will be able to apply the knowledge learned.	o	✓	o	o	o
3. The course objectives for each topic were identified and followed.	✓	o	o	o	o
4. The content was organised and easy to follow.	✓	o	o	o	o
5. The quality of instruction was good.	✓	o	o	o	o
6. Class participation and interaction were encouraged.	o	o	o	✓	o
7. Adequate time was provided for questions and discussion.	o	o	o	o	✓

8. How do you rate the course overall?
   - o Excellent
   - ✓ Good
   - o Average
   - o Poor
   - o Very poor

9. The aspects of the course could be improved? Need more Practical Classes

10. Other comments? Classes are very effective.

Signature of the student: Gayathri
Date: 18/07/20

Date: 18.07.2020

From

Dr.G.Somasundram
Department of Pharmacology,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To

The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: DISINFECTION for AHS

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: "**DISINFECTION "** June to July 2020 for 27 AHS Students . We solicit your kind action to send certificates for the participants that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards,

Dr.G.Somasundram

Encl: Certificates

Photographs



SRI LAKSHMI NARAYANA INSTITUTE OF ALLIED HEALTH SCIENCE
MEDICAL EDUCATIONAL PROJECT

DISINFECTION - VAC08/AHS/2020-15/06

S.No.	Name of the Students	University Register Number	Signature
1	AKSHAY SURESH	UAH1803178	
2	ANAGHA SUKUMARAN	UAH1803179	
3	APARNA REMESHAN	UAH1803180	
4	ASHIK.R	UAH1803182	
5	FEBA SUSAN ABRAHAM	UAH1803183	
6	GOKUL A	UAH1803184	
7	JIJI ELZA JOSE	UAH1803185	
8	MINNU MATHACHAN	UAH1803186	
9	MUHAMMED IRFAN.I	UAH1803187	
10	MURALIKRISHNAN.K	UAH1803188	
11	DONALD MORISON.S	UAH1805199	
12	GADDALA PRAVEEN	UAH1805200	
13	PRAVEEN.G	UAH1805201	
14	RAMANAN.V	UAH1805202	
15	SARATH P S	UAH1805203	
16	S.K.DHARSHINI	UAH1804193	
17	GAYATHRI.V	UAH1804194	
18	JAYABHAVANI.J	UAH1804195	
19	MALATHI.S	UAH1804196	
20	NARAYANADASS.M	UAH1804197	
21	SANDRA.S	UAH1803190	
22	SATHISHKUMAR.R	UAH1803191	
23	SHEHANAYI.M	UAH1803192	
24	VENKATESH.S	UAH1805204	
25	YAZHINI.P	UAH1805205	
26	SHALINI.T	UAH1804198	
27	SHEHANAYI.M	UAH1803192	

SRI LAKSHMI NARAYANA INSTITUTE OF ALLIED HEALTH SCIENCE

MEDICAL EDUCATIONAL PROJECT

DISINFECTION - VAC08/AHS/2020-15/06

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4	ASHIK.R	UAH1803182	
5	FEBA SUSAN ABRAHAM	UAH1803183	
6	GOKUL A	UAH1803184	
7	JIJI ELZA JOSE	UAH1803185	
8	MINNU MATHACHAN	UAH1803186	
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10	MURALIKRISHNAN.K	UAH1803188	
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13	PRAVEEN.G	UAH1805201	
14	RAMANAN.V	UAH1805202	
15	SARATH P S	UAH1805203	
16	S.K.DHARSHINI	UAH1804193	
17	GAYATHRI.V	UAH1804194	
18	JAYABHAVANI.J	UAH1804195	
19	MALATHI.S	UAH1804196	
20	NARAYANADASS.M	UAH1804197	
21	SANDRA.S	UAH1803190	
22	SATHISHKUMAR.R	UAH1803191	
23	SHEHANAYI.M	UAH1803192	
24	VENKATESH.S	UAH1805204	
25	YAZHINI.P	UAH1805205	
26	SHALINI.T	UAH1804198	
27	SHEHANAYI.M	UAH1803192	

Sri Lakshmi Narayana Institute of Medical Sciences

Date: 03.05.2019

From
Dr. M Kalasree
Head Of Department Incharge
Department of Anaesthesia
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research
Puducherry

To
The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Puducherry

Sub: Request for Permission to conduct value-added course: Fluid Therapy

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: Fluid Therapy for undergraduates from July -Dec 2019. We solicit your kind permission for the same.

Kind Regards

Dr. M KALASREE

Head of Dept. Anaesthesiology
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry - 605 502

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: Dr JAYALAKSHMI

The HOD: Dr. M KALASREE

The Expert: Dr CHANDRASEKAR

The committee has discussed about the course and is approved.

Dean

Subject Expert

HOD

Dr. JAYALAKSHMI, BSC.,MBBS.,DTCD.,M.D.
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Ageram Kudapakkam, Post,
Villianur Commune Puducherry-605 502.

DEPARTMENT OF ANAESTHESIOLOGY
SRI LAKSHMI NARAYANA INSTITUTE
OF MEDICAL SCIENCES
OSUDU, KUDAPAKKAM, PUDUCHERRY-605 502.

Head of Dept. Anaesthesiology
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry - 605 502

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affliated to Bharath University, Chennai - TN]

Circular

07.06.2019

Sub: Organising Value-added Courses: Fluid Therapy - reg

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research**, is organizing **"_Fluid Therapy"** course in July- Dec 2019. The course content is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before 15/06/2019. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

Dr. G. JAYALAKSHMI, BSC.,MBBS.,DTCD.,M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Ageram Kudapakkam. Post,
Villanur Commune Puducherry-605 502.

Encl: Copy of Course content

COURSE PROPOSAL

Course Title: Fluid Therapy

Course Objective:

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1. To enable the students to learn about normal fluid and electrolyte balance and to understand the various abnormalities associated with its imbalance and measures to correct it.

2. To know about the newer available fluids and newer regimens of fluid correction

Course Outcome:

On successful completion of the course the students will have a basic understanding of how to calculate fluid deficit in patients and to decide on replacement strategies for the deficit.

Course Audience: IV MBBS

Course Coordinator: Dr. M KALASREE

Course Faculties with Qualification and Designation:

1. Dr Kalasree: Associate Professor.

2. Dr Chandrasekar: Assistant Professor

Course Curriculum/Topics with schedule (Min of 30 hours)

S.No	Date	Topics	Time	Hours	Faculty
1	14.07.2019	Introduction	2-4PM	2	Dr Chandrasekar
2	21.07.2019	Goals of fluid therapy	2-4PM	2	Dr Kalasree
3	28.07.2019	Composition of body fluids	2-4PM	2	Dr Chandrasekar
4	04.08.2019	Fluid requirements	2-4PM	2	Dr Kalasree
5	11.08.2019	Electrolyte requirements	2-4PM	2	Dr Chandrasekar
6	18.08.2019	Renal regulator mechanisms	2-4PM	2	Dr Kalasree
7	25.08.2019	Replacement strategies	2-4PM	2	Dr Chandrasekar
8	01.09.2019	Crystalloids and colloids	2-4PM	2	Dr Chandrasekar
9	08.09.2019	Achievement of successful fluid resuscitation	2-4PM	2	Dr Kalasree
10	15.09.2019	Indicators of successful fluid resuscitation	2-4PM	2	Dr Chandrasekar
11	22.09.2019	Electrolyte imbalance	2-4PM	2	Dr Kalasree
12	29.09.2019	Complications	2-4PM	2	Dr Chandrasekar
13	06.10.2019	Group discussion	2-4PM	2	Dr Kalasree
14	13.10.2019	Management of electrolyte deficiencies	2-4PM	2	Dr Chandrasekar
15	20.10.2019	Assessment	2-4PM	2	Dr Kalasree

REFERENCES

1) Miller’s Anaesthesia- 8th edition.

2) The ICU book – Paul marino - 4th edition.

3) Morgan and Mikhail's Clinical Anaesthesiology - 5th Edition

VALUE ADDED COURSE

1. Name of the program & Code

Fluid Therapy, ANAES 11

2. Duration & Period

30 hrs: July 2019- December 2019

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled:

Enclosed as Annexure- II

5. Assessment procedures:

Multiple choice questions- *Enclosed as Annexure- III*

6. Certificate of Participation:

Enclosed as Annexure- IV

7. No. of times offered during the same year:

1 Time JULY 2019-DEC 2019

8. Year of discontinuation: 2019

9. Summary report of each program year-wise

Value Added Course -JULY 2019-DEC 2019					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	ANAES 11	Fluid Therapy	DR. M KALASREE	IV MBBS	20

10. Course Feed Back

Enclosed as Annexure- V

DEPARTMENT OF ANAESTHESIOLOGY SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES OSUDU, KUDAPAKKAM, PUDUCHERRY-605 502

RESOURCE PERSON **COORDINATOR**

DR. CHANDRASEKAR **DR. M KALASREE**

Head of Dept - Anaesthesiology,
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry - 605 502.

Annexure I

FLUID THERAPY

TOPICS:

Composition of body fluids

Principle of fluid therapy

Crystalloids

Special fluids

Colloids

Guideline of fluid therapy in hypovolemia andmonitoring

Methods to calculate the rate of infusion

Water regulation

Sodium regulation

Potassium regulation

Calcium and magnesium regulation

Fluid therapy in hypovolemic shock

Fluid therapy in DKA

Fluid therapy in children

Composition of body fluids

Total body water:

Total body water content.is about 60°/o of body weight in an young adult male and about 50°/o in an young adult female. Since fat contains less water, an obese person will have proportionately less body water as compared to a lean person. In new born infants the proportion of body water in relation to weight is as high as 80°/o, which declines with age.

Distribution of body fluid :

Out of total body water two third (40o/o of body weight) is intracellular fluid

(ICF) and one third (20% of body weight) is extracellular fluid (ECF)

Oral (or l.V.) fluid intake and urine output are important measurable parameters

of body fluid balance. To determine daily fluid requirement of body we need to

know insensible fluid input and loss as summarized below :

Insensible fluid input= 300 ml water due to oxidation.

Insensible fluid loss= 500 ml through skin

= 400 ml through lung

= 100 ml through stool

Fluid loss - Fluid input - 1000 - 300 ml - 700 ml.

NORMAL DAILY INSENSIBLE FLUID LOSS= 700 ML

Fluid loss

(Abnormal)

= 500 ml. through moderate sweating

= 1.0 - 1.5 liter through severe sweating/high fever

= 0.5 - 3.0 liter through exposed wound surface

(burns) and body cavity (laparotomy)

Units of measurements

It is important to understand basic terminology used to measure concentration and composition of body fluids and their inter relationship.

Ions

· An ion is an atom or group of atoms with an electric charge.

Anion : When ion has a negative electric charge it is called anion (i.e. er HC0 3 -).

Cation : When ion has a positive electric charge it is called cation (i.e. Na+, K+, Mg+2).

Cation- "t"- + positive charge

Different ways by which solute concentrations can be measured are milligram per decilitre (mg/di), milliequivalent per litre (mEq/L) or niilliosmoles per litre or per kg (mOsmol/L or mOsmol/kg).

Equivalent and milliequivalent:

Equivalent is a relative term, it refers to mole of ionic charges.

Equivalent : An equivalent is the atomic weight in grams, multiplied by

the valence.

For ions which carry a single charged mole equals an equivalent (i.e. Na+, K+, c1·, H•). But if the ion carries charge that is greater than one, numbers are no tonger equal. For example a mole of calcium ion (Ca+2) equals two equivalents.

So equivalents = moles x valence

Comparision of normal value of serum electrolytes concentration in mEq/L and mmol/L

Molecules must be quantified in moles (e.g. 'a mole of glucose') because they carry no charge. However in practice they are usually measured in .mg or gram because of simplicity and convenience. To conve~ from mg/di to mmol/L the following formula can be used

mmol/L =

mg/di x ·1 O

Atomic weight

Ions can be quanUfied as either"moles or e·quivalents.

As concentration ·of most *of* the molecules ·and ions are very low in serum, their measurement is convenient in mmol or mEq rather than moles or equivalents. In day to day· work we use millimeter which .is

·. '1/1,000 of meter. :In same. way .mmol·or mEq is 1/1,000 of. mole or

equivalent. If we look at value. of serum potassium. it, is 0.004 mole orequivalent/L. But after conversion it is 4 mmol/L or mEq/L, which is very simple and convenient value to use in practice .

PRINCIPLES OF FLUID THERAPY

Advantage:

.*Y* Accurate, controlled and predictable way of administration.

L

Immediate response due to direct infusion in intravascular

compartment.

/. Prompt correction of serious fluid and electrolyte disturbances.

Indications :

Fluid therapy is widely used for restoration of fluids and electrolytes, as a

drug carrier and for nutrition. Most common and important indications are :

Conditions when oral intake is not possible e.g. coma, anesthesia,

surgery.

. Severe vomiting and diarrhoea.

. Moderate to severe dehydration and shock,

. Hypoglycemia where 25°/o dextrose is life saving.

.Treatment of critical problems : Shock, anaphylaxis, severe asthma

cardiac arrest and forced diuresis in drug overdose, poisoning, urinary

stone

Disadvantages :

Possible only in hospitalized patient under skilled supervision .

.Improper selection of type of fluid used can lead to serious problems .

Improper volume and rate of infusion of fluid can be life threatening.

Improper technique of administration can lead to compfications.

Contraindications :

. l.V. fluid should be avoided if patient is able to take oral fluid.

.

Preferable to avoid l.V. fluid in patient with congestive heart 'failure or volume overload.

Complications :

1.Local:

Haematoma, infiltration and infusion phlebitis.

2. Systemic :

Circulation overload with rapid or large volume infusion espe cially in patients with cardiac problem.

Rigors, air embolism and septicaemia.

3. Others :

~uidC'onta~i~ation, fungus in I. V. fluids, mixing of incompatibl e, drugs.

improper technique of infusion, 1.v. set or l.V. catheter related problems

and human error related problems

CLASSIFICATION OF I. V. FLUIDS

I. V. fluids can be *divided* into three groups.

1. Maintenance fluid 2. Replacement fluid 3. Special fluid

Maintenance Fluids :

Maintenance fluid replaces fluid lost from lungs, *skin, -urine* arid faeces. These losses are poor in salt so this maintenance *fluid* should be hypotonic to plasma sodium. Routinely used maintenance fluid is 5% dextrose, dextrose with 0.45°/o NaCl solution (dextrose with half isotonic saline).

Replacement Fluids

Formulate~ to correct body fluid deficit caused by losses such as gastric drainage, vomiting, diarrhoea, fistula drains, intestinal oedema, oozing from trauma, infection, burns etc. Commonly used replacement fluids are Isotonic saline, DNS, Ringer's lactate, lsolyte-M, P and G.

Special Fluids

.Special fluids_ are . used for the special indications such as

CRYSTALLOIDS

5%DEXTROSE

Composition :

One litre of fluid contains :

Glucose 50 grams'

2. Pharmacological Basis :

5°/o-dextrose (D-5°/o) corrects dehydration and Supplies energy. After consumption of glucose, remaining water is distributed in all compartments of body proportionately. Therefore D-5°/o is the best agent to correct intracellular dehydratign. D-5o/o is selected when there is need of water but not electrolytes.

5°/o-dextrose solution (50 gm dextrose per litre) provides 170 Kcal/L.

1 gm of hydrous dextrose supplies 3.4 Kcal.

Indications :

1. Widely used fluid for prevention and treatment of dehydration due to inadequate water intake or excessive water loss.

2. Cheapest fluid fo provide adequate calories to bodt

3. For pre and post-operative fluid replacement.

. For l.V. administration of various drugs.

5. For treatment or prevention of ketosis in starvation, diar rhoea,

vomiting and high grade fever.

6. Adequate glucose infusion proteets the liver against toxic substances.

correction of hypernatremia due to pure water loss(e.g. diabetes

-insipidus)_. Hypernatremiadue to salt poisoning or excessive use

_of electrolyte solution needs infusion of 5%-dextrose with frusemide.

_!Q. promote Na excretion and correction .of hypernatremia..,

4. contraindications

· Cerebral oedema

Neurosurgical procedures:

3. Acute ischaemic stroke : Glucose containing fluid should not be used after acute ischaemic stroke as hyperglycemia aggravate~ cerebral ischaemic brain damage.

4. Hypovolemic shock : 5°/o-dextrose is not the right fluid to select because it does not substantially increase intravascular volume. Moreover, fast replacement by large volume of D-5o/o can lead to hyperglycemia and osmotic diuresis leading to increased urine .. output. s.o correction of dehydration w·ill be delayed.

5. Hyponatremia and water intoxication : By providing . electrolyte free water 5°/o-dextrose worsens both conditions.

6. Hypernatremia : Fast infusion of 5°/o-dextrose· rapidly corrects severe hypernatremia, but this correction occurs slowly in brain cells, so swelling of hypertonic brain cells occur. This may lead to serious or permanent neurological damage. Moreover, rapid

infusion of dextrose induces osmotic diuresis, which can aggravate hypernatremia. So correction of hypernatremia should be done gradually with D-5°/o or with low sodium containing fluids.

7. Blood transfusion :

Dextrose

solution

and whole blood should not

be administered thr~ug~ the same l.V. line as haemolysis and clumping can occur.

8. Uncontrolled diabetes and severe hyperglycemia.

5. **Precautions** :

Inverted sugar solution

1. Composition :

One litre of fluid supplies :

Inverted sugar 100 gm

2. Pharmacological Basis :

Inverted sugar is a nequimolar mixture, which contains half dextrose and half fructose. Fructose is considered to be metabolized ih the absence of insulin. Therefore, it can be utilized mo,r,e rapidly than dextrose, especia lly in a diabetic patient. However, glucose is a metabolic product of fructose and requires the presence of insulin for its metabolism.

3. Indications :

1. Treatment of nausea, vomiting including vomiting *of* pregnancy.

2. In patient with liver disease it provides glucose, prevents glycogen depletion and exerts protein sparing effects.

4. Adverse effects :

Large dose of fructose can cause lactic acidosis, hyperuricemiaand hypophosphatemia.

Contraindications :

Hereditary fructose intolerance.

Cautious use in patients with impaired kidney function or severe

Less effective in treatment of hypoglycemia.

Generally more than 25 gm of fructose per dayis not

2.. Pharmacological Basis :

Sodiun1 chloride is present chiefly in extracellular fluid maintaining osn1olal-ity of ECF. So isotonic saline is used to provide major extracellular electrolytes.

During von1iting and diarrhoea along with water loss, there is a substantial loss of sodium chloride. 0.9isotonic saline is very useful to correct both fluid and electrolyte deficit.

As isotonic saline is distributed chiefly in extracellular fluid, it will increase the intr~vascularvolume substantially. There.tore, isotonic saline is a very useful l.V. fluid to raise blood pressure in the patient with hypovolemic shock.

3. **Indications** :

1. Water and salt depletion as in diarrhoea, vomiting, excessive diuresis or excessive perspiration.

2. Treatment of hypovolemic shock.

3. Treatment of alkalosis (e.g. vomiting) with dehydration.

In severe salt depletion or hyponatremia when rapid correction of sodium is necessary.

Miscellaneous :

• Initial fluid therapy in diabetic ketoacidosis.

• Treatment of hypercalcen1ia.

• Fluid challenge in prerenal ARF.

• Irrigation for washing of body fluids .

.As a vehicle for certain drugs and can be given safely with blood

Hypertonic saline 3°/o NaCl is used in treatment of hyponatremia due to SIADH or water intoxication (along with frusemide), as it provides greater sodium in lesser fluid volume (Na concentration 513 mEq/L in 3°/o NaCl versus 154 mEq/L in 0.9°/o Na.Cl). 3°/o. NaCl is available as 250 ml bottle commercially.

4. Contraindications :

1. Cautious use or avoid in . hypertensive or preeclamptic patients and in patients with oedema due to congestive heart.failure,. renal

disease and cirrhosis.

2. Careful administration to very young or elderly patients.

Dehydration with severe hypokalemia : With severe hypokalemia there is deficit of even ICF potassium so infusion of isotonic saline, without additional potassium supplementation, will aggravate electrolyte imbalance of ICF.

Dextrose with half strength saline

(5°/o-O,extrose with 0.45 °/o NaCl Solution)

1. Composition :

One litre of fluid contains :

Sodium

77 mEq

Glucose

50 gm

Chloride

77 mEq

Each 100 ml contains : Glucose

5.0 gm and Sodium chlo'ride 0.45 gm

3**. Indications** :

1. Fluid therapy in paediatric patients.

2. Treatment of severe hypernatremia: As it corrects hy~ernatremia

gently, it avoids cerebral oedema, and is therefore sa e .

. 3. As maintenance fluid therapy.

4. Early post operative period.

4**. Contraindications** :

1. Hyponatremia.

2. Severe dehydration due to diarrhoea and vomiting where there is need for larger salt replacement.

Dextrose Saline (DNS)

(5o/o Dextrose with 0.9°/o NaCl Solution)

Composition :

One litre of fluid contains :

Glucose

50 gm

Chloride

154 mEq

. Sodium

154 mEq

Each 100 ml contains : Glucose 5.0 gm and Sodium chloride 0.90 gm

Pharmacological Basis :

This fluid has advantage of both 5°/o-dextrose (to provide energy} and isotonic saline (to provide salt). So DNS is_ useful to supply major extracellular electrolytes. (sodium and chloride) and energy a'iong with fluid to correct dehydration.

Like 0.9% isotonic salin_e it rapidly corrects NaCl deficit of ECF. As DNS is distributed chiefly in ECF compartment, unlike D-5o/o it does not correct intracellular dehydration.

As bNS increases only ECF volume, it can be considered in treatment oLdehydration with hypovolemic shock. But like D-5%, faster infusion of large volume of DNS will lead to large glucose load (> 25 gm/hr)J leading to hyperglycemia induced osmotic diuresis. So in presence of incompletely or partially corrected shock patient will have increased urine output.

Unlike D-5o/o DNS is not hypotonic (due to NaCl) and hence it is compatible with blood transfusion.

3. Indications :

1. Correction of salt depletion and hypovolemia with supply of energy.
2. Correction of vomiting or nasogastric aspiration induced alkalosis and hypochloremia along with supply of calories.
3. Fluid compatible with blood transfusion.

4.. Contraindications :

1. Anasarca : Cautious use in anasarca of cardiac, hepatic and renal disease.
2. Hypovolemic shock: Not preferred in severe hypovolemic shock,

when rapid replacement with larger volume of fluid is required.

Rapid infusion of DNS can cause hyperglycemia and osmotic diuresis even in presence of fluid deficit. So the simple logic tp use DNS for supplying salt solution to correct shock and providing energy simultaneously is not correct.

Ringer's lactate (RL)

Each 100 ml contains :

Calcium

Bicarbonate

3mEq

28 mEq

Sodium lactate 320 mg, Sodium chloride 600 mg, Potassium chloride

2. **Physiological Basis** :

" Because of high sodium concentration p'30 mEq/L), Ringer~ lactate rapidly expands intravascular volume and so it is very effective in treatment of severe hypovolemia. Ringer's lactate is the most physiological fluid as its electrolyte content (i.e. Na, Kand Ca) is nearly similar to the free concentration in plasma. So even larger amount of RL can be infused rapidly without risk of electrolyte im~alance.

Sodium lactate in Ringer's lactate is metabolized in liver to bicarbonate . As RL provides bicarbonate, it is useful in correction of metabolic acidosis. As Ringer's lactate not only supplies all electrolytes but also provides bicarbonate, it is very useful in many surgical conditions .

3. Indications :

Correction of severe hypovolemia rapidly with large fluid volume.

. For replacing fluid in postoperative patients, burns, fractures, peritoneal irrigation etc.

Diarrhoea induced hypovolemia with hypokalemic metabolic acidosis is effectively treated. with RL. RL is the fluid of choice for initial treatment of diarrhoea induced dehydration even in paediatric practice.

4. In diabetic ketoacidosis, RL provides glucose free water, so corrects metabolic acidosis with added advantage of supplying potassium.

5. For maintaining normal ECF fluid and electrolyte balance during and after surgery ..

5. In vomiting or continuous nasogastric aspiration : Her~ hypovolemia is associated with metabolic alkalosis. As AL.provides bicarbonate, it wrn worsen metabolic alkalosis and, therefore, is riot preferred .

Along with blood transfusion : Calcium in HL binds with the citrate anticoagulant in blood transfusion. This can inactivate the anticoagulant and promote the formation of clots in donor blood .

. For this reason simultaneous infusion of RL and blood product in one l.V. line Is contraindicated.

The calcium in RL binds with cert~in drugs (i.e. amphotericin, thiopental, ampicillin., doxycycline etc.), and reduces their

. bioavailability and efficiency.

lsolyte-G

1. Composition : .

One litre of fluid supplies :

Glucose

50 gms

Sodium

65 mEq

Potassium

17 mEq

100 ml of fluid contains :

Chloride

Ammonium

.150 mEq

69 mEq

: NaCl 0.375 gm, KCI 0.130 gm, NH4CI 0;370 gm, Glucose 5.000 gm, Sodium metabisulphite 0.015 gm

2. Physiological Basis :

During vomiting or continuou~» nasog astric aspiration there is loss of gastric juice. Gastric juice contains 60 mEq/L so dium, 1 o mEq/L potassium and 130 mEq/L chloride along with acidic content. So vomiting or continuous nasogastric aspiration will lead to hypochloraemic, hypokalaemic metabolic alkalosis .

2. · Pharmacological Basis :

lsolyte-M is the richest source of potassium (35 mEq/L), so.very useful

to treat hypokalemia. However, always ensure good urine output or normal renal status before its infusion.

Proportion of electrolytes in lsolyte-M is almost similar to the maintenance requirements of the body. Additionally, it corrects acidosis and supplies energy. So this fluid fulfills the needs of body electrolytes, pH maintenance, caloric supply and water replacement and, so it is the ideal fluid for maintenance fluid therapy and, therefore, named

As concentration of sodium is low (40 mEq/L) in lsolyte-M, it should be avoided in hyponatremia. It is not the preferred I. V. fluid in patients with significant salt and water depletion.

3. Indications :

1. For parenteral fluid therapy, it is the ideal maintenance fluid.

2. To correct hypokalemia secondary to diarrhoea, bilious vomiting, prolonged infusion of potassium free l.V. fluids, ulcerative colitis etc.

4. ContraindiC.ations :

1. Renal failure : Cautiously used or totally avoided in presence of significant renal failure (ARF or CRF) due to potential risk of hyperkalemia.

2. Hyporiatreniia and water intoxication : As Na+ concentration of lsolyte-M is much low (40 mEq/L), it should be avoided.

AdrenoC"ortical insufficiency : These patients have abnormally high potassium concentration and, therefore, should not receive fluids with high potassium.

Burns,: In patient~ with severe burns potassium concentration may

. be ~bnormally

high

due to

tissue destruction and acidosis.

Moreover

· such patients require fluid with high sodium concentration such as

lsolyte-P

Acetate ·

HPO .

4

Magnesium

I :

23 mEq

3 mEq

3 mEq

Glucose 5.0 gm, Sodium lactate 0.260 gm, KCI 0.130 gm, MgCI 0.031

gm, Di_basic potassium phosphate 0.026 ~m, Sodium

metabfsulphafe 0.021 gm.

2. Pharmacological Basis : -

lsolyte-P is designed to suit maintenance fluid requiremen_t .of children.

It provides electrolytes, maintains pH, supplies calories and replaces

water deficit. As c'ompared to adults, children need more water and

· s·ame electrolytes. So lsolyte-P provides almost double water but same -electrolytes as lsolyte-M. Roughly lsolyte-P has half concentration of electrolytes compared to lsolyte-M. lsolyte-P can be used in adults when there is chiefly water loss and only small loss· of eiectrolytes (e.g.· hypernatremia)

3. **Indications** :

1. Chiefly used as. maintenance fluid in infants and children to provide daily water and electrolytes.-

4**. Contraindications** :

Hyponatremia: Among all sodium containing l.V. fluids, lsolyte-P has least concentration of sodium (20 mEq· /L)

Renal failure : Cautiously used in renal failure due to high concentration of potassium (20 mEq/L). ' -

Hypovolemic shock : lsolyte-P is not the suitable l.V. fluid to correct hypovolemic shock (as with diarrhoea or vomiting) . due· to following reasons :

(a) Because of low Na concentration, ability of lsolyte-P to correct mtravascular volume and hypotension is poor.

(b) In oliguric child, high K+ conce~tration (20 mEq/L) is not ·safe.

(c) Rapid infusion of large volume of lsolyte-·P can · c·ause hyperglycemia and osmotic ·diuresis even in child with fluid deficit, which is not desirable.

lsolyte-E

(Extracellular replacement solution)

1 ~ · : **Composition** :

One litre of fluid supplies :

Glucose

50 gms

.Sodium

140 mEq.

Potassium

1 O mEq

Chloride

103 mEq

Each 100 ml contains : ·

Acet.ate

Calcium

Magnesium

Citrate

47 mEq

5 mEq

3 mEq

. 8 mEq

Glucose 5.0 gm, NaCl 0.5 gm, Sodium acetate 0.64.0 gm, KCI 0'. 075 gm,

Sodium Citrate 0.075 gm, MgCI 0.031 gm, Sodium metabisulphate

·0.020 gm.

Pharmacological Basis :

lsolyte-E is extracellular replacement solution .. lsolyte-E has electrolytes similar to ECF except that it has double the concentration of potassium and acetate (which will get converted into bicarbonate). Patients on long term fluid therapy may develop magnesium deficiency. lsolyte-E is the only 1.V. fluid available which will correct magnesium deficiency. So lsolyte-E provides all ECF electrolytes, additional potassium and acetate for maximum Capacity to correct metabolic acidosis, supplies energy and replaces water deficit.

contraindicatin

Vomiting or continuous nasogastric aspiration will lead to metabolic alkalosis due to loss of H+ ions in gastric juice. As lsolyte-E provides maximum bicarbonate (acetate 47 mEq/L) among all commercially available l.V. fluids it will significantly aggravate metabolic alkalosis.

Metabolic alkalosis due to diuretics or sodium bicarbonate.

SPECIAL FLUIDS

Sodium Bicarbonate (NaHC03)

. **Composition** :

1. Commonly available and routinely used preparation is Injection sodium bicarbonate 7.5°/o, 25 ml ampoule.

2. Each ampoule contains 22.5 mEq sodium and 22.5 mEq bicarbonate.

2**. Indications** :

1. Treatment of metabolic acidosis.

2. For cardiopulmonary resuscitation and shock.

MiJd to mod~rate metabolic acidosis can be treated with Ringer's lacta1e or lsolyte-E in addition to treatment of underlying disorders. But in severe metabolic acidosis or in critically sick patients, conver$ion of acetate or lactate to bicarbonate may be impaired. So effective way to treat is with sodium bicarbonate.

\

(i) Metabolic acidosis suppresses cardiac contractility. So if it is severe and not treated well, it can lead to hypotension.

(ii) Persistent metabolic acidosis will consume bone buffers and cause osteoporosis and rickets. Release of bone calcium will lead to hypercalciuria and may lead to nephrocalcinosis and nephrolithiasis.

(iii) Acidosis induced reduction in urinary citrate concentration · (which is inhibitor of stone formation) also aggravates the stone formation . .

Amo unt of sodium bicarbonate required depends upon severity *of* acidosis.

Amount'of, · NaHCO~ Required (in mEq/L)

= 0.5 x Weight in Kg x (Desired HC03 - Actual HC03)

Do not correct metabolic acidosis rapidly or completely.

Desired, value of HC03 is usually 10-1'5 mEq/L, and riot normal

· value of 24 mEq/L

(iv) . Never treat acidosis .without treating the .etiology. Common

r etiologies are hypotension, diabetic ketoacidosis, diarrhoea,

.sepsis, hypoxia, postoperative catabolic patients, uraemia etc.

(v) In presence of renal failure, treatment with sodium bicarbonate may cause tetany or pulmonary oedema. So the safer treatment will be dialysis, if acidosis and renal failure are severe.

(vi) Never correct acidosis without correcting associated hypokalemia. By correcting acidosis, NaHC03 will shift ·potassium from . the extracellular compartment into the intracellular compartment. It will aggravate hypokalemia which can be life threatening. This is very important in treatment of diabetic ketoacidosis.

(vii) Do not mix lnj. calcium with lnj. NaHC03 in the same syringe or line: Combination can precipitate calcium carbonate as white crystals.

(viii) Avoid mixing of lnj. NaHC03 with inotropes.

Complications :

Over shoot, post treatment metabolic alkalosis.

Hypokalemia : Due to shift of potassium from ECF to ICF.

Volume overload : 25 ml of 7.5°/o sodium -bicarbonate contains 22.5 mEq sodium. (Normal requirement is 60-100 mEq/day). So aggressive treatment with large volume of sodium bicarbonate will lead to sodium overload. If renal status is normal it will be excreted. But if renal function is poor or if large volume is infus~d rapidly, it can lead to volume overload, pulrnonafY _oedema and hypernatremia. Hypocalcemia - Tetany : Decrease in pH will lead to decreased ionic calcium. I~ patient with chronic renal failure where pre-existing hypocalcaemia is likely, rapid alkalization can lead to tetany. 1.V. calcium gluconate will improve hypocalcemia-induced tetany, with additional advantage of counteracting acidosis induced suppression of cardiac contractilitis

5. Contraindications :

1.' Respiratory alkalosis, metabolic alkalosis and hypokalemia.

2. Correct dehydration, hypokalemia, and hypocalcemia prior to or alorig with sodium bicarbonate treatment.

3. Cautious use in congestive heart failure, chronic renal failure, cirrhosis of liver or hypertension.

Injection Potassium Ghloride

1. Composition :

lnj. Potassium Chloride 15% 10 ml ampoule contains :

1 ml = 150 mg potassium chloride = 2 mEq potassium

·1 Amp. = 1 O ml = 1.5 gm potassium chloride = 20 . mEq potassium

2. Pharmacological Basis :

Potassium is chiefly intracellular cation, but its presence in ECF isvery important . for neuromuscular regulation. .

.Ability of kidney to retain potassium is incomplete (unlike sodium) so

about 20 mEq potassium is lost daily even in presence of hypokalemia .

$0 to avoid hypokalemia, K+ supplementation is required in patient

·on maintenance fluid therapy.

Moreover in many conditions where sodium and potassium both are

lost (Le. diarrhoea, vomiting, diuretic therapy etc.), kidney retains

sodium at the cost of potassium with resultant hypokalemia: Potassium

chloride is added .to various potassium free 1.V. fluids ~s potassium .

·supplement.

indications

potassium in an adult is .about 60 mEq/day. Improper use of injection

potassium chloride can cause hyperkalemia, which can be

dangerous and can cause sudden death due to cardiac arrest.

2. Added to potassium free peritoneal dialysis fluid to maintain proper

potassium level.

3. During cardiac bypass surgery for achieving cardiac stand-still after preparation of heart-lung bypass.

Basic Rules in Use of Injection Potassium Chloride

Never give d~rectl.V. potassium chloride injection.

Always use injection potassium chloride diluted in infusion.

Never add more than 40 mEq potassium/litre

Never infuse more than 1 O mEq potassium/hour. .

Never add potassium chloride in lsolyte-M.

Monitor serum K+ level closely and, if possible, also by ECG monitor during infusion of high dose potassium.

4. Contraindications : .

1. Cautious use in renal failure as hyperkalemia is a potential risk.

2. · Never use injection potassium chloride without kndwing potassium status.

Injection 25o/o-dextrose

Composition :

Available as 25 ml ampoule and 100 ml infusion ·bottle.: . .

100 ml· of 25°/o.;.dextrose contains 25 gm glucose. :.

2. Pharmacological Basis :

Dextrose supplies energy and prevents catabolism. 25°/o-dextrose is a concentrated form, so it is useful when faster replacement of glucose is needed (like in hypoglycemic coma).

When patient is on fluid restriction (i.e. CHF, volume overload, cirrhosis, oliguric renal failure) 25°/o-dextrose provides larger glucose in smaller volume to provide nutrition.

3. Indications :

1. Rapid correction of hypoglycemia or hypoglycemic coma.
2. To provide nutrition to patient on maintanence fluid therapy.
3. For the treatment of hyperkalemia, with 1 O units of regular insulin, 25°/o-dextrose 100 ml is infused to prevent hypoglycemia.

4. Contraindications :

1. 25°/o-dextrose is contraindicated in dehydrated patient with anuria, intracranial or intraspinal haemorrhage and in delerium tremens.
2. To be avoided in diabetic patient unless there is severe hypoglycemia.

5. Caution :

Rapid infusion of 25°/o-dextrose can cause glycosuria secondary to hyperglycemia. So in absence of hypoglycemia, 100 ml of 25°/o-dextrose ~ho.uld be infused slowly over a period of 45-60 minutes.

colloids

·Colloids are large molecules so when infused into the vascular space · they are retain-ed within the vascular system unlike crystalloids. So colloids _: are more effective than crystalloids as plasma volume expander. Colloids are about three times more potent than crystalloid fluids for increasing :·· Vascular volume and supporting the cardiac output. So in patient with ·- <h'aemorrhagic shock, when plasma or blood is not available immediately, _ infusion of ·colloids to correct circulatory fluid volume is vital and often life ~vih,g. However, to maintain adequate capacity to carry oxygen, blood transfusion is ·required subsequently. The potency of colloid fluids as Albumin is a physiological plasma protein. Chief function of albumin is to maintain plasma oncotic pressure (responsible for 75°/o of the oncotic pressure of plasma). Other function of albumin is binding and transport of low molecular substances like bilirubin, hormones, certain drugs etc. Heat-treated preparation of human serum albumin is commercially available in a 5°/o solution (50 gm/L) and a 25°/o solution (250 gm/L). As sodium load is small, 25°/o albumin is also called salt poor albumin.

1. Pharmacological basis :

A 5°/o albumin solution (50 gm/Lor 5 gm/di) has a colloid osmotic

pressure of 20 mm of Hg (which is similar to that of plasma), and expands the plasma volume to roughly the same as volume infused. Approximately half of the infused volume of 5°/o albumin stays in the vascular space. The oncotic effects of albumin last 12 to 18 hrs. The 25°/o albumin solution has a colloid osmotic pressure of 70 mm of Hg and expands the plasma volume by 4 to 5 times the volume infused. Thus infusion of 100 ml of 25°/o albumin can increase the plasma volume 400-500 ml.

2. Indications :

Plasma volume expansion : When rapid volume expansion is required, as in acute hypovof emic shock, burns and severe acute albumin loss, albumin is an *ideal* solution for replacement.

b. Correction of hypoproteinemia : Jn liver disease, diuretic resistant nephrotic syndrome or malnutrition, infusion of 25% albumin is *very* effective for short term management.

c. As an exchange *fluid* : In therapeutic pfasmapheresis, albumin is used as an exchange fluid to replace *removed* plasma .

Adverse effects :

Adverse effects are rare and include nausea, vomiting, febrile reaction and allergic *reaction* including anaphylactic shock.

Precautions and contraindications :

Fast infusion wiff rapidly increase circulatory *volume* with resultant

vascular *overload* and pufmo nary oedema

Infusion of albumin solution is contraindicated in patient with

severe anaemia or cardiac failure. It should be *given* with caution to patients with low cardiac reserve

or cardiac insufficiency.

Dehydrated patients may require additional fluids along with

albumin infusion.

Albumin *solution* should not be used for parenteral nutrition.

The amount of albumin solution administered will depend upon the

clinical condition of the patient and his response to treatment.

For adults an initial infusion of 25 gm of albumin is suggested. (e.g. 5~0

ml of a 5% solution or 100 ml of a 25% solution). A suggested rate. IS

1 to 2 m'- *per* minute {5% albumin) or 1 ml per minute *(25%* afbumrn)

a~though high rates may be needed in the treatment of shock.

Dextran

polymers produced by bacteria (Leucohostoc)

1, Pharmacological basis :

1. Plasma volume expansion :

Both forms effectively expand intravascular volume but dextran is not a substitute for whole blood because it has no oxygen carrying property. It is not a substitute for plasma proteins because it has many limitations including lack of clotting factors. Dextran-40 as 10°/o solution produces greater expansion of plasma volume than dextran 70 as 6°/o solution. But comparative duration of expansion with dextran 40 is shorter due to its rapid renal excretion.

2. Improvement of microcirculation &prevention of thromboembolism : Low molecular dextran improves microcirculation independently of simple volume expansion. It minimizes the sludging of blood that may accompany shock and prevents intravascular aggregation of RBC and improves microcirculation in conditions or procedures associated with impaired circulation.

Indications :

1. Correction of hypovolemia : For short term rapid expansion of plasma volume in conditions such as shock or impending shock from burns, surgery, haemorrhage or trauma.

2. Prophylaxis of deep vein thrombosis and postoperative and post traumatic thromboembolism.

3. To improve blood flow and microcirculation in threatened vascular gangrene.

Side effects:

1. Acute

renal failure : Rapid renal excretion of dextran 40 · t

2· Hypersensitivity reaction : As dextran is a potent antigen,

sensi.tivity . reactions are known to occur, but with better

manufacturing techniques incidences have decreased (

3Dextran may interfere with blood grouping and cross matching

4. Contraindications :

1. Severe oligo-anuria and renal failure.

2. Known hypersensitivity to dextran.

3. Sever~ CHF or circulatory overload.

4. Bleeding disorders such as thrombocytopenia, hypofibrinogenemia

etc.

5. ·. Severe dehydration.

5. Precautions :

1. Dextran should be administered with caution in patient with

a.

lmpair~d renal function or oliguria

b.

Active haemorrhage.

c. Chronic liver disease

d. Patient at risk of developing pulmonary oedema or CHF .

2. The haematocrit should not be allowed to fall below 30.

3. Correct dehydration before or at least during dextran infusion to maintain adequate urine flow arid prevent ARF.

4The anticoagulant effect of heparin is enhanced by dextran.

5. As d~xtran m~y interfere with blood grouping and cross matching,

6 .Along with de>e~raninfusion, patient may requirf3 blood, coagulation

Basic Principles of Fluid Therapy and Pharmacology of I. V · Fluids Administration :

Dextran-40

It is given by l.V. infusion as 10°/o solution in 0.9o/o NaCl or so;

0

glucose. The dosage depends on the pa~ient's ~eed: Adult person with shock usually requires 500 ml of rapid I. V. infusion. In the first 24 hours total dose should not exceed 20 ml/kg. Dextran-40 can be given subsequently in dose of 10 ml/kg/day upto 5 days.

Regimen for thromboembolism

Day-1 : 500-1,000 ml over 4 to 6 hours.

Day-2 : 500 ml over 4 to 6 hours.

Up to 1 o days : 500 ml over 4 to 6 hours on alternate day.

Regimen for surgical prophylaxis :

500 ml of dextran given preoperatively and daily postoperatively

for 3 days.

. Dextran-70

Dextan-70 is *given* l.V. as 6°/o solution. The total dose should not exceed 20 ml/kg *in* the first 24 hrs and 1 O ml/kg on subsequent days.

Gelatin Polymers (Haemaccel}

Haemaccel (500 ml plastic bottle pack 3.5o/o solution).

It *is* a sterile, . pyrogen free, colloidal plasma volume substitute, which contains a polymer of the degraded gelatin with electrolytes.

1. Composition :

Each litre contains : Polymer from degraded gelatin 35 gm

(Molecular weight 30,000-35,000Sodium

145 mEq

·Chloride . 145 mEq

Calcium

Potassium

12.5 mEq

5.1 mEq , .

2.Indications :

· ·· i. · ·For · rapid expansion of intravascuar volume and hypote~sionin shock, burns, trauma and intra or postoperative blood loss.

ii. Prophylactic use in major surgery to reduce total volume of fluid replacement.

iii. For priming of the heart lung machine.

3. Advantage :

It doesnot interfere with coagulation, blood grouping and cross matching.

It remains in blood for 4-5 hours and expands plasma volume by about 50°/o of infused volume.

4. Precautions :

L It contains no preservative, so ensure clear solution before infusion.

ii. Gelatin is plasma expander like dextran so needs almost similar precaution.

iii. It contains calcium, so it should not be mixed with citrated blood as calcium may cause clotting.

5. Side effects :

Hypersensitivity reaction (flushing, urticaria, rigor etc.)

ii. Bronchospasm and fall in blood pressure.

Hetastarch (Hydroxyethyl Starch)

Hetastarch is a synthetic colloid available as 6°/o solution in isotonic saline.

Hetastarch is a: starch that is composed of more than 90% esterified amylopectine. Esterification retards degradation, which leads to longer plasma expansion. 6°/o hetastarch, which is normally used, has molecular

Pharmacological basis :

After LV. hetastarch infusion, molecules with lower molecular weight , (about40°/o . of dose) are readily excreted in urine in 24 hours. Larger ·. Hetastarch does not interfere with blood grouping or crossmatching.

Indications

Hetastarch is less expensive than albumin .

. Plasma volume expansion greater than 5°/o albumin.

Expands plasma volume for a longer period, effect lasts for about 24 hours.

Disadvantage :

.

Increase in serum amylase concentration during and 3-5 days after discontinuation of hetastarch. So serum amylase concentration can not be used to diagnose acute pancreatiti1s during this period.

. Like other colloids, it has no oxygen carrying capacity, so *one* should not allow haemotocrit to fall below 30°/o after an infusion. .

Adverse effects :

Hetastarch is not antigenic. However allergic or sensitive reactions . can occur i.e. vomiting, feverishness, urticaria wheezing etc

Anaphylactic reactions are extremely rare . '

6. Contraindications :

Contraindications are similar to dextran, chiefly bleeding disorders, congestive heart failure or impaired renal function.

7. Administration :

The dose of hetastarch depends on the patient's needs. The usual adult dose of hetastarch 6% solution is 500 ml to 1 litre. The total daily dose should not exceed 20 ml/kg

Pentastarch

Pentastarch is a low molecular weight derivative of hetastarch that is available as 3°/~, 6°/o and 10°/o solution in isotonic saline. Pentastarch differs from hetastarch in having a lower degree of e sterification. As pentastarch contains smaller but more numerous starch molecules, it has a higher colloidal osmotic pressure. So it is more effective as a volume expander than hetastarch. 10°/o pentastarch can increase plasma volume 1.5 times of the infused volume.

Indications, contraindications and side effects are similar to hetastarch.

GUIDELINE FOR FLUID THERAPY IN HYPOVOLEMIA

Clinical evaluation of volume depletion :

Mild (<2 litres in adult)

Thirst

Concentrated urine

Moderate (2-3 litres in adult)

As above, plus :

Dizziness, weakness.

Oliguria (<400 ml/day)

Postural hypotension >20 mni Hg systolic.

Low JVP

Severe (>3 l_itresin adult).

Systolic BP 100mm Hg

Tachycardia (not in elderly), low pulse volume

Cold extremities, poor capillary return.

Reduced skin turgor (doughy feel)

It is usually difficult to estimate volume deficit in a hypovolemic patient. If patient's normal weight prior to fluid deficit is exactly known, loss

of weight will reflect the extent of fluid deficit. Above mentioned clinical criteria can provide only rough idea about severity of fluid deficit.

If the haematocrit (Hct) value prior to fluid deficit is known and there is no blood loss or haemolysis, following formula can be used to calculate extracellular fluid deficit.

ECF deficit (L) = 0.2 x lean body weight x (Current Hct - 1)

Normal Hct

As extent of fluid deficit in a hypovolemic patient cannot be calculated precisely, patient should be closely monitored clinically and by

laboratory data to assess adequacy of fluid repletion.

. Fluid selected for initial volume replacement in patient with hypotension due to hypovolemia is isotonic saline. Saline corrects hypovolemia effectively by replacing lost sodium and water. As simple water or 5%-dextrose infusions are salt free, they are less effective in correction of hypovolemia and can lead to hyponatremia, and are therefore avoided in initial therapy (also see Chapter No. 4). Colloids are preferred when. hypovolemia coexists with hypoalbuminemia (burns, nephrotic ., syndrome, cirrhosis of liver, etc.)

For subsequent fluid therapy, selection of fluid for replac-ement-varies from patient to patient. The type of fluid lost, serum electrolyte status, '.: acid base balance and renal status or coexisting disorders~ all.mustbe". ·,,: taken into account for appropriate selection.

CH. 2 :· Bas.ic ,Principles of Fluid Therapy and Pharmacology of l.V. Fluids

. Immediate aim of fluid therapy in hypovolemia is to get the patient out of danger and to induce positive fluid balance.

Hypovolemic ·patient with hypotension or shock requires . rapid fluid replacement. In patient with shock approximately 1 to 2 litre of fluid should b_e given in first hour to restore adequate tissue perfusion as _quickly as possible, under close medical supervision.

In hypovolemic patient who is haemodynamically stable, gradual repletion is_ preferrable, since it will restore normovolemia while minimizing the risk of volume overload and pulmonary oedema.

The aim of fluid therapy is not just to administer fluids but to induce positive fluid balance. If a patient with diarrhoea losses average 300 ml/hour fluid and I. V. fluid is infused at the same rate, there will not be correction of fluid deficit. On the contrary, as urine output and insensible losses are not considered, inspite of infusion of fluid, fluid deficit will worsen. So fluid therapy can successfully correct hypovolemia only if it provides 50 to 100 ml extra fluid in addition to losses, as summarized below.

Effective rate of fluid replacement per hour

= 50 to 100 ml

+ Urine output per hour

+ Ongoing loss (such as diarrhoea or tube drain) per hour.

Monitoring fluid therapy

flu'id therapy needs careful monitoring with frequent

Patient receiving

Suggest correction of hypovolem1a and adequate

Parameters

fluid replacement are :

.

.

1 Weight

2. -: Skin and tongue

.

3Sensorium : Improvement of anxiety and restlessness_.

4. · Urine output : Urine output >30-50 ml/hour in adu!ts or >0.5 ~o 1.0 ml/kg/hour in · children in absence of glyc~suna o~. osmo~1c diuresis. Increased urine output with decreasing unne spec1f1c gravity and osmolality are other dependable parameters.

5. Pulse rate : ·Correction of tachycardia to pulse rate less than 11 O/min in young adults as well as change from low volume collapsing pulse to bounding pulse.

6. Blood pressure : Patient with shock, hypotension or orthostatic hypoten.sion becomes normotensive.

7. . Haematocrit : Decreasing haematocrit in absence of blood loss or ha~molysis.

8. Blood urea an.d Serum creatinine : Both will become normal. High ratio (>20: 1) of blood urea:serum creatinine will become normal (10:1).

9. Urinary Na : Increase in urinary Na excretion (> 25 mEq/L). If the urinary Na remains under 25 mEq/L the kidney is sensing persistent volume depletion and patient requires additional fluid replacement.

10. Metabolic acidosis : Improvement of acidosis with improved peripheral perfusion.

11. CVP or PAWP: Low central venous pressure (CVP) or pulmonary arterial wedge pressure (PAWP) will become normal with adequate fluid replacement.

METHODS TO CALCULATE RATE OF INFUSION

Methods to calculate rate of fluid infusion

Calculation of the rate of fluid infusion for conventional (routine) l.V. sets, is not mentioned in most of the medical text books. Due to lack of such guidelines, we often feel that the calculation of fluid volume to be infused is a tedious and a complicated exercise. The methods that we are using and have found to be simple, practical and user friendly are mentioned below.

1 Calculation for routine l.V. set

When fluid is infused with routine 1.V. set these methods calculate rate of infusion quickly with reasonable accuracy.

The methods consist of :

1. RULE OF TEN

2. RULE OF FOUR

For routine I. V. set 15 drops = 1 ml. ',.

. Simplest and best method is to follow _' _LJLE OF TEN". -. --- -

RULE OF TEN", by multiplying fluid volume in litres to be infused i~ 24 hours with ten, it will give us drop rate per minute.

I. V. fluid in litre/ 24 hrs. x 1 O = Drop rate/minute

2.0 litre in 24 hours = 2.0 x 10 = 20 drops/minute

3.5 litre in 24 hours = 3.5 x .10 = 35 drops/minute

Q. From drop. rate of infusion, how tq calculate fluid volume in 24 hrs.?

A. As per "RULE OF TEN", roughly the is drop rate divided by 10 will give us volume in ·litre in 24 hrs .

Drop rate per minute ·+ 10 -

15 drops/min = 15/1 O =

.·. 20 drops/min = 20/1 O -

I. V. fluid in litre/ 24 hrs.

1 .5 litre *I* 24 hrs

2 ·litre *I* 24 hrs

As this rough calculation is 96 °/o perfect, at end of 24 hrs. 4% less fluid will be infused.

: Simplest and best method is to follow "RULE OF FOUR"

. As per "RULE OF FOUR"; by dividing ·fluid volume (in ml) to be infused in one hour by four will give us drop ·rate per minute.

Volume in ml *I* hour + 4 -

. Drop rate *I* minute

60 ml *I* hour = 60 + 4

=

15 drops *I* minute

· 200 ml *I* hour = 200 + 4 -

50 drops *I* minute

As per "RULE OF FOUR", drop rate per minute multiplied by four will give fluid volume in one hour.

Drop rate *I* min x 4 -

1 o drops *I* min = 1 o x 4 _

80 drops *I* r:nin = 80 x 4 -

Volume in ml *I* hour

40 ml *I* hr

320 *ml I* hr -

Perfect method to calculate fluid volume from drop rate in 24 hrs.

Drop rate x 96 =volume in ml per 24 hour.

10 drops *I* min = 10 x 96 =

960 ml *I* 24 hrs

20 drops *I* min = 20 x 96 = 1,920 ml *I* 24 hrs

Drop rate calculation for any parameters

Volume to be infused {in ml} = Drop rate *I* minute

Duration of infusion in hours x 4

Example : If 660 ml. fluid is to be infused in 3 hours.

660 = 660 = 55 drops *I* minute

3x4

12

53

Caution : If due to manufacturing defect, routine I. V. set fails to provide 15 -drops per each ml of fluid, these methods (rule of ten and four) will not be accurate in fluid delivery. So always counter check calculated rate of fluid admininstration with actual fluid delivery.

2

Calculation for micro drip l.V. set

For micro drip set 1 ml = 60 drops.

. Number of micro drops per minute = volume in ml/ hour

Micro drop rate *I* minute = Volume in ml *I* hour

35 micro drops *I* minute = 35 ml *I* one hour

50 micro drops *I* minute -

50 ml *I* one hour

Similarly :

Volume in ml *I* hour . -

Drop rate per minute

30 ml *I* one hour . = 30 - micro drops *I* minute ·

45 ml *I* one hour.'-.:'= .. ·45 micro dropsiininute

WATER REGULATION

Water Regulation

In a normal person water in the body is balanced by adjustment in input and urine output.

Response to water deficit

Water intake is regulated by thirst, stimuli for which are :

i)

Dehydration

ii) Fall in BP and

iii) Increased solute concentration (osmolality).

Water excretion is tightly regulated chiefly by antidiuretic

hormone (ADH).

Regulation

Fluid deficit increases osmolality (due to increased serum sodium

or decrease circulating blood volume~ which stimulates thehypothalamusfor ADH release. ADH acts on the kidney at distal tubules and collecting

duct and increases water permeability. The result will be that as much as 18 litres of water is reabsorbed under the influence of ADH. ADH mediates increased water reabsorption and decreases urine output, which preserves body water.

Response to water excess

i. Decrease ADH

.When amount of water in the body increases secretion of ADH

will decrease, so water reabsorption by collecting duct will

decrease and there will be increase in urine volume.

ii. Increase ANP

Volume expansion will also lead to increased secretion of atrio

natriuretic peptide-ANP (due to atrial stretching) which promotesdiuresis and natriuresis. So decreased ADH and increased ANP will decrease water reabsorption and increase urine output and thereby maintain required water status in the body.

SODIUM REGULATION

Sodium Regulation

1 Physiological basis

Sodium is the major ECF cation (sodium value 140 mEq/L ECF vs 25 mEq/L intracellular).

Total body sodium is about 5,000 mEq in a normal adult person.

85-90°/o sodium is extracellular.

Major function of sodium is to mJintain ECF volume and therefore maintain blood pressure.

ECF volume is reflectio~ of total body sodiu m content (amount).

Daily requirement of s odium is about 100 mEq or 6 gm of sodium chloride.

2.*Fluid and Electrolyte Disorders*

·Excess salt is excreted chiefly by kidney. Loss .of ·sodiufl1 · sweat is poor (30-65 m Eq/L).

Response to sodium deficit ·

Deficiency of sodium in bo9y will lead to hypovolemi~ and ~ activates Angiotensin-11 and Aldosterone. .

By acting on the kidney, angiotensin-11 helps to increa '. sodium absorption at the proximal tubules and aldosterone:~ l the collecting duct.

In a state of so di Lim deficit, abso.rption ·ot Na under : aldosterone control is so perfect that almost no urinary Na '. loss occurs. So by almost complete absorption of Na kidney : helps to prevent sodium loss.

Renal priority :

To reclaim sodium under aldosterone influ.ence, initially l potassium and if needed later on H+ is lost in the urine.

. D·ue to body's priority to reclaim Na > H >· K, during abnormal ; loss of all electrolytes (like in diarrhoea) hypokalemia is the I commonest abnormality.

1. When there is excess amount (content) of sodium it will lead ~ . to increased ECF volume, which will lead .to decreased : Angiotensin-11, Aldosterone and increase in ANP.

ii. Decreased angiotensin-11 and aldosterone level will lead to :

. decreased renal reabsorption of sodium.

iii. lnc~eased ANP will lead to natriuresis and diu.resis.

.

Hence net result is increased urinary excretion of sodium. ThU5 \

extra sodium will be lost.

HYPONATREMIA

Hypon.atremia i~ defined as plasma sodium. less than, 135 . mEq/L.

Hyponatremia is not uncommon in ahospitalized patient (incidence 1.5 to 2.5°/o), but is rarely s.een in. an ambL1.lato.ry .patient (if present, r~flects a chronic disease status). :)

Hyponatremia is clinically an important entity because :

Acute, severe hyponatremia has substantially high morb'd.

and mortality.

2. Rapid correction of chronic hyponatremia can lead to neurologi

even death.

3. Etiology and treatment is not as simple as that of other elec1rolYte deficit.

A common understanding is that,

the deficit should be treated with supplementation

e.g. potassium deficit is corrected with K+ supplementation.

But in case of hyponatremia the treatment may be contrary to this common

understanding, thus

Hyponatremia = Sodium deficit

So salt replacement is required in all

is a wrong concept.

Serum sodium reflects the relative proportion of sodium and water.

Hyponatremia usually means water overload and not sodium deficit.

Hyponatremia can occur with normal, low or even high total body sodium.

So basically hyponatremia can be dilutional (water excretion lesser than water intake and so needs fluid restriction as the most important treatment) or due to sodium loss (needs sodium and fluid supplementation)

Pseudo hyponatremia,

A. Normal osmolality

B. High osmolality

Hypoosmolar hyponatremia (true hyponatremia)

A. Hyponatremia with ECF volume depletion

(Patient dehydrated, reduction in total body sodium exceeds reduction in total body water)

1. Extrarenal loss (Urinary sodium < 15 mEq/L)

Vomiting, diarrhoea, peritonitis.

2. Renal loss (Urinary sodium > 20 mEq/L)

Excessive diuretics, S?tlt losing nephropathy, diabetic

ketoacidosis, cerebral salt wasting syndrome.

B. Hyponatremia with hypervolemia, increased ECF volume

(Patient oedematous - Increase in total body water exceeds increase in total body sodium)

Urinary sodium< 20 mEq/L: CHF, cirrhosis and nephrotic syndrome.

Urinary sodium > 20 mEq/L : Renal failure

C **Hyponatremia with normal ECF volume**

(Patient normovolemic, increased total body water)

SIADH, post operative pain, hypothyroidism, glucocorticoid deficiency, psychogenic polydypsia, drug induced.

Clinical Features :

The severity of symptoms depends upon the severity of hyponatremia and the rate at which the plasma sodium concentration is lowered. So acute and severe hyponatremia is symptomatic but chronic and mild hyponatremia is well tolerated. The very young and elderly patients are more symptomatic.

Headache

Muscle cramps

Muscular weakness

Convulsions

Nausea

Vomiting

Confusion

Coma

Death '

Lethargy

Ataxia

. It is not the reduction of ECF Na. that .glves rise to symptoms and signs in hyponatremia. ·1ristea·d, it is the · increa_se in volun:ie. of ICF and particularly increase in the volume of the brain cells which leads to signs and symptoms. · ·

Hyponatrernia Jead_s to hypoosmolality of ECF, so. water moves into .. c~lls (ICF) and the cell swells. ln -.tissue such as skel~tal muscle this is of little consequence. When the cells of the brain swell, .this produces an in,creas~ in intracranial pressure because the brain is an enclosed space Witti ·a fixed volume. Increase in intracranial pressure causes decrease in cerebral blood flow leading to hypoxic brain damage. In severe cerebral oedema, swelling_ of brain exceeds about 5-8°/o o.f. brain volume. As th ~ skull is ·a· fixed closed space, s'uch increa~ed brain cell volume and ·resui'tant significant *r(se* in the intracranial pressure can · ·1ead to"· herniation. Herniation is characterized by unequal or fixed dilated pupils, hypo\ientilation, cardiovascular instability, ·urinary .or faecal incontinence or respiratory arrest.

.

HYPONATREMIA

Oedema

Normovolemia .

No salt

Water restriction

Water restriction

Loop diuretics

Removal of the drugs responsible for hyponatremia :

Diuretics, Chlorpropamide or l.V. Cyclophosphamide.

Management of physical stress, postoperative pain.

Specific treatment for adrenal insufficiency, hypothyro_idis~,
nephrotic syndrome, CHF, uncontrolled diabetes or ketoacrdosrs,
salt losing nephropathy etc.

Thes;e patients require fluid and salt supplementation which can be done with l.V. isotonic (0.9°/o) NaCl (or even oral salt .containing water) at rate appropriate for the ~stimated volume depletion. Intake of simple 'water or I. V. fluid with 1ow, Na (0.45°/o NaCl, lsolyte-M :

5<%'-dextrose, 'etc.·) should be· restricted until the plasma sodium i~ within the normal range, because it will aggravate hyponatr~r:nia , Diuretics induced hyponatremia is treated with saline with potassium supplementation (30 to 40 mEq/L)

. .

2. Hypona'tremia with hypervolemia (O.edematous state)

Therapy is difficult in oedematous state since . sodium· supplementation will worsen fluid overload. Such patients are · treated with diuretics·, salt restriction, fluid restriction (intake< urine output) and correction of potassium· deficit in addition · to ,the etiological treatment.

3. Hyponatremia with euvolemia

Hyponatremia with, nprmal or ti_igt:i ECF volume has impaired water excretion with nornia·I or high tbt~I body sodium. In such patients fluid restri.ction is the 'rl1osf Important .. freatment. Adequate restriction of fluid intake will gradually: increase serum sodium concentration.

c. Basic ·Princip t·es of Correction of Hyponatretnia

Treatment of hyponatremia should balance.· ttl'e. ·risk· of hypotonicity due to hyponatremia and.the'·risk of. therapy.

How rapiolY. hyponatrert:lia should be . corrected is a . dilemma. Patier)t~ with severe hyponat:erni_a (110-115 m,Eq/L) ~re at risk

developing severe and potent1ally_ 1rreversible neurological da~~g and sortietimes even death.

So it is important to balance the risk of hyponatremia against the ·risk of correction. To avoid these problems controlled and limited cofrection is advised after proper selection of patients who need treatment for hyponatremia .

This severe ne~rologicaldisorder is characterized by dysarthria, dysphasia,- flaccid paresis or coma. Diagn"osls is confirmed by C.T. scanning or more acc"urately by MRI.

. Pati.ent with seizures or other severe n.eurological .symptoms due to .hyponatremia needs prompt treatment. , In thi~ etting, risk of untreated hyponatremia and cerebral ed~ma is greater than the potential harm of rapid correction. So rapid correction is ipdicated in acute (<48 hours) symptomatic or severe (serum:· Na <120 mEq/L) hyponatremia

·on the other hand, chronic·(> 48 hrs) and mild hyponatremia,

with minimal neurological sympto:ms are at iittle risk due to hyponatremia. However, these patients can develop demyelination

foll.owing rapid correction. So t~ere is no necessity to correct these patients rapidly and they should be treated using slower acting therapy such as fluid restriction .. Pay particular attention to premenopausal women, elderly and YOl:Jng _chiidren" as they ·are more symptomatic and need early treatme~ · · ·

General guidelines for treatment are :

Chronic asymptomatic hyponatremia :

· The targeted rate of plf!sma sodium .should *not* be greater than '.0.5 to 1 _.*9* mEq/L/hour. ..

the plasma.sodium by es~ tha.n .1 O _to .12 m~q/ L on th.e first day and less than 18 mEq/L over the first two days. As per recent recommendations a 'targeted rate of correction should not exceed 8 mEq/L on any day of treatment. !' '

iiLIf the rate of correction . is faster or rise in serum sodium is > 25 mEq/48 hours or correction is made until normonatremia (serum sodium 140 mEq/L) is achieved there is high risk of central pontine myelinosis.

Acute hyponatremia with severe neurological symptoms :

These patients require · rapid correction of plasma Na with

hypertonic saline. Initial rate of rise of Na concentration should be 1.5-2 mEq/L/hr for the first 3 to 4 hours or until the severe neurological symptoms improve. Besides this initial rapid correction rise in the plasma sodium concentration should not exceed 10-12 mEq in first 24 hours. Patient with seizures also require immediate anticonvulsant drug therapy and adequate ventilation .

A. Regardless of the initial rate of correction, chosen acute treatment should be interrupted once any of the three end points is reached.

1. Patient's symptoms are abolished.

2. A safe plasma sodium (generally 120-125 mEq/L) is achieved

or

3. A total magnitude of correction of 20 mEq/L is achieved. It is necessary to correct hyponatremia accurately to a safer range, rather than correcting completely to normonatremia.

. Conventional method :

Conventional method of correction of hyponatremia is as follows

Na requirement = (Desired Na - Actual Na) x Total body water

This conventional method is complicated because :

It only calculates the amount of Na required to raise Na.

After calculating the requirement of Na, it is confusing to

select Na containing fluid and determine its infusion rate.

Newer method :

This method directly calculates

Change in serum sodium concentration for

given infusate

(select type and volume of Na containing fluid and calculate

expected change in Na).

2. For given target *bf* ch~ng e in Na concentration, this formula can

directly calculate the volume o'f selected Na containing fluid.

Change in serum sodium concentration:=

I nfusate Na/L - Serum Na

Total body water (L) + 1

.or

1nfusate (Na.+ K)/L - Serum Na

Total. body water (L) + t

Total body water

= 0.60 x body weight (kg) in children and non elderly man

= 0~50 x body weight (kg) in non elderly woman and elderly man

= 0.45 x body weight (kg) in elderly woman

For correction of hyponatremia, we need to determine

1. Goal of' correction

: Determine how much Na is to

be

raised and in how much time.

2. select _the ~ppn)priatetype_ of _Na c~ntaining 1.V. fluid for

correction of hyponatremia considering the clinical condition.

Example· mentioned below will provide simple guideline for

calculation.

Example for .correction of hyponatremia :

45 year male (with 60 ~g weight), after appendicectomy received

3 litres of

/o dex~rose/day along with liberal oral intake.

On the third day patient became confused and developed

convulsions

TREATMENT PLAN: Infusion of 3°(o NaCl, l.V. fruse.mide 20 mg and

:water . rete.ntion. For convulsions ph.enytoin ~nd: ,diazepam *may* be

given as per requirement

Calculation of expected change of ~a with pne litre of 3°/o Na91

Change in Na = lnfusate Nall - Serum Na./Total body water (L) + 1

= 513-11 O *I* 0. 6 x 60 + 1

= 403 *I* 36 . + 1 = 403 . *I* 37

= 10.9 mEq/L

INITIAL GOAL: To raise Na .by 4 mEq/L in the initial 4 hours .

To raise 10.9 mEq/L of Na, 1,000 ml of 3°/o NaCl is required. So to raise 4 mEq/L of Na, amount of 3°/o NaCl required is 366 ml (4/ 10.9 x 1,000 = 366 ml)

So total 366 ml of 3°/o hypertonic saline is required to raise serum Na concentration by 4 mEq/L in the initial 4 hours.

Therefore, the required rate of infusion of 3% NaCl is 366/4 = 92 ml/hr

AFTER 4 HOURS : Serum Na was 115 mEq/L with no convulsion f. and mild improvement in sensorium.

Subsequent plan : Determine new goal _to ra!s~ serum Na and i calculate volume and rate of infusion of 3% NaCl for given period as mentioned above (if goal is to raise 4 mEq Na in next 8 hours: rate of infusion of 3% NaCl will be about 47 ml/hour).

POTASSIUM REGULATION

Potassium Regulation

1. Physiological basis

Potassium is a major intracellular catio·n. Total body potassium is about 3,500 mEq. Out of this 98°/o is intracellula~ and just 2o/o is extracellular. The normal serum · potassium concentration is· *3:5* to 5.0 mEq/L vs intracellular concentration of 150 mEq/L. Normal requirement of K+ is 50-80 mEq/day. Potassium plays an important role in cell functions and neuromuscular transmission so it is required for normal function of cells and all muscles.

2. Regulation .

Chief regulation of potassium is through renal excretion:.

Almost all filtered potassium is reabs~rbed. K+ i9n _excreted is the . one secreted at distal tubules . and .collecting duct. . . . . ,

K+ secretion (and therefore excretion) is controlled by aldost · > distal fluid · and sodium ·delivery, serum **H+** ion and ser~rone, rn K' '.·- :·

concentration.

iii. K+ secretion (and therefore excretion) is increased due to h' aldosterone level, incre~sed distal fluid and sodium deliv~~h alkalosis and hyperkalem1a.

iv. Effect of acid base balance : Metabolic acidosis increases seru potassium level while metabolic alkalosis reduces serum K+ leve~

v.

Glucose insulin infusion pushes potassium inside the cell leadin to lowering of serum potassium level.

9

3. How renal regu_lation of potassium and sodium differs ?

Unlike sodium, absorption of K+ is not complete. About 20 mEq K+ is lost everyday even in absence of potassium intake. So hypokalemia frequently occurs in the patient who is on potassium free maintenance fluid therapy.

4. Correlation of serum and body potassium :

It is important to remember that whenever body potassium increases serum potassium rises proportionately and may reach to a dangerous level rapidly. But when there is deficit in total body potassium, reduction in serum potassium is not proportionate because it is partly compensated by shift from intracellular compartment. So hyperkalemia suggests increased total body potassium but level of hypokalemia may under estimate total body potassium deficit.

DISORDERS OF POTASSIUM CONCENTRATION

Disorders of potassium are hypokalemia and hyperkalemia.

HVPOKALEMIA

Hypokalemia is defined as persistent reduction of serum potassium (K+)

below 3.5 mEq/L.

Etiology

Common causes of hypokalemia are summarized in Tab.le No. 3.10 · CH, 3 : Fluid and Electrolyte Disorders

!_able No. 3.1 O : Causes of hypokalemia

1. Poor Intake

Low dietary intake or potassium free l.V. fluids

2. Non Renal Loss

(Urinary

potassium

excretion

< 20 mEq/d

3. Renalloss

Magnesium deficiency, Amphotericin B, Bartter's syndrome

4. **Redistribution** (shift of K+ into cell)

Metabolic alkalosis

Insulin, 82 adrenergic agonist (i.e. salbutamol)

Hypokalemic periodic paralysis

II. **Clinical Features**

.

Clinical picture varies greatly and seldom occurs unless serum

potassium is less than 3 mEq/L. The manifestations of hypokalemia

are mainly neuromus~ular and cardiac.

Fatigue, myalgia and muscular weakness of the lower extremity are common complaints.

Smooth muscle involvement may result in constipation, ileus or urinary retention.

More severe hypokalemia leads to progressive weakness. hyporef.lexia,hypoventilation (due to respiratory muscle involvement) and virtually complete paralysis.

Hypokalemia leads to increased risk of arrhythmia especially in patients on digitalis treatment.

Hypokalemia can lead to polyuria due to nephrog~nic di~betes insipidus. Hypokalemia can cause increased am~ornag~nes1s a~d can precipitate hepatic encephalopathy in patients with hepatic failure.

ECG changes

Do not correlate well with the serum potassium

Early changes :

Flattening or inversi~n. of T waves

Prominent U waves

ST segment depression

Prolonged QT interval

Severe potassium depletion :

Prolonged PR interval

Decreased voltage

Widening of QRS complex

Ventricular arrhythmia

Ill. oragnosis of etiology of hypokalemia

A. History : History of poor K+ intake, abnormal losses due to diarrhoea, vomiting, diuretiG therapy, or transcellular shift of K+ due to insulin, NaHC03 or salbutamol can identify cause

of hypokalem

8. Urinary K+ excretion: In patients with K+ deficit appropriate response is to excrete K+ less than 25 mEq/day. Measurement of urinary K+ excretion is very useful to establish etiological diagnosis ol hypokalemia.

1. Hypokalem1a with low renal K+ excretion (< 25 mEq/day)

It suggests poor intake of K+, diarrhoea, excessive sweat or previous K+ loss due to vomiting or diuretics.

2 High urinary K+. excretion besides K+ deficit.

'd

The ECF volume status, blQod pressljre and associated.aci.

base disorders are useful for arrivi.ng at of etiological diagnosis

.hypokalemia

A. **Therapeutic goals**

1. Prevention of hypokalemia ·

2. To p·revent life threatening complicatfons.

(arrhythmia and respiratory failure)

3. To correctthe potassiumdeficit

4. To minimize on-going losses ·

5. To treat underlying etiology

B. ·Prevention of potassium depletion ·

Normal potassium intake of about 60 mEq/day ·is. sufficient to prevent hypOkalemia. But patients receiving digit81is, !Ong term · diuretics or la'rge doses of steroids should · receive potassium Supplement. Conditions where prevention of hypokalemia is of . special importance are digitalis therapy, hepatic failure, previous myocardial infarction or IHD and diabetes mellitus.

Postoperative patients on parenteral fluid 'therapy shouid receive 40-50 mEq/day of potassium to preverit hypokaleri1ia.

The degree of total body potassium depletion does not correlate with serum potassium. No potassium supplement

Increased oral intake of potassium rich food

Add potassium sparing diuretiqs or decrease dose of diuretics

3 to 3.5 mEq/L :

Treatment in selected high risk patients

(Risk of arrhythmia e.g. CHF, digitalis therapy, history

of acute myocradial infarction or IHD.) ..

< 3 mEq/L :

Needs definitive treatment

E. Precautions before initiating potassium supplements

1. In oliguria-anuria, avoid or supplement K+ caut_iously.

2.Patient's receiving potassium sparing diuretics, ACE

inhibitors and patients with renal failure are at high risk of

developing hyperkalemia, so potassiu m supplementation should

b~ done cautiously.-

3.Digitalis therapy.: In patients on digitalis, potassium enters the

cell at a slower rate so there is a risk of transient hyperkalemia with

faster I. v·. infus.ion. So rate of infusion should be <20 mEq/

4.hour.

Continuous ECG monitoring and frequent ·serum potassium

level estimation is advisab.le. if the rate of infusion is > 20

mEq/hour in any patient

The amount of potassium required to correct potassium deficit cannot

be determined by any fixed formula.

When the average deficit of potassium is about 200-400 mEq,
50-
100 mEq/day of potassium slowly, but adequately corrects deficit.
With severe hypokalemia· or with high rate of ongoing loss, larger ·
dose may be required.
The deficit should be corrected ·slowly over a period of days. It may take weeks to correct severe potassium loss. Failure to increase serum potassium after sufficient dose and duration of potassium supplement raises the possibility of associated magnesium deficiency.

Potassium chloride (KCI) is usually the preparation of choice and will promote correction of hypokalemia as well as of metabolic alkalosis (vomiting and diuretics lead to both hypokalemia and alkalosis).
Potassium bicarbonate and citrate tend to alkalinize the patient and would be more appropriate for hypokalemia associated with chronic diarrhoea or distal RT A.
Oral potassium administration is safer than 1.V. route because
I. V. route carries high risk of hyperkalemia.
H. Oral potassium supplementation

Oral potassium is a safer mode of corr~ction of hypokalemia as there is minimal risk of h~perkalem1a. .

In mild to moderate hypokaler:nia (serum potassium 3 to 3.5 mEq/L) average dose of potassium chloride is 60 to 80 mEq/~ay (20 mEq, 3_ 4 times) along wi.th treatment of underlying disorder (such as vomiting or diarrhoea).

Potassium chloride solution, available in the market contains 20 mEq potassium per 15 ml solution (~gm KCl=13 .. 4 mEq of potassium).

KCI tablets available contain 8 mEq potassium per. tablet.

•

Oral potassium preparation may frequently cause G.I. irritation and therefore the patient is advised to take potassium chloride solution with proper dilution in a glass of water, after food.

•

Oesophageal or small bowel erosion and stricture are uncommon side effects.

l.V. Potassium Therapy

l.V. potassium supplementation carries higher risk of hyperkalemia. So l.V. potassium supplementation should be reserved for severe symptomatic hypokalemia (K+ <3 mEq/L) or for patients who cannot ingest oral potassium.

·No rule is absolute, but common guidelines for l.V. potassium

therapy are as follows :

Always monitor l.V. potassium therapy closely with continuous ECG monitoring and frequent serum potassium estimation.

Avoid l.V. potassium, till urine output is established .

Don't give> 10-20 mEq/hour .

Don't give> 40 mEq/Litre .

Don't give> 240 mEq/day .

Never give inj. KCI directly intravenously, it can cause sudden hyperkalemia and instant death from cardiac arrest.

Never add KCI to lsolyte-M .

Remember that hypokalemia is safer than hyperkalemia, so avoid over enthusiastic treatment.

Rapid I. V. correction can cause dangerous hyperkalemia even in potassium depleted patients.

Tre~t~ent of acidosi.s with l.V. NaHC0

may aggravate or

prec1p1tate hypokalem1a (due to intracellular shift of potassium).

In severe hypokalemia, KCI should be mixed with isotonic .

saline. Don•t use D-5°/o as diluent because dextrose stimulated insulin release will shift pota~sium intracellularly and hence initially aggravates hypoka~emia. Here transient reduction of serum potassium can be 0.2 to 1.4 mEq/L if 20 mEq K+/L of D-5o/o is infused.

•

Diabetic ketoacidosis and nonketOtic hyperosmolar hyperglycemia are amongst the commonest indications .of l.V . . potassium therapy.

Depending upon etiology readymade available l.V. fluid_s can be used to provide potassium supplement e.g. lsolyte-G in vomiting or continuous nasogastric _aspiration, lsolyte-M for parenteral fluid therapy etc.

To make tailor made potassium chloride infusion, 1 oo mEq of potassium. (5 ampoules of 1 O ml, 15°/o KCI ampoules) is mixed in 1 litre of isotonic saline. Infusion of this saline at rate of 100 ml/hour (25 macrodrops or 100 microdrops) will deliver 1 o. mEq KCI per hour.

•

Potassium concentration> 40 mEq/L can cause phlebitis and should be infused only into large (femoral or subclavian) veins.

•

Average rise in potassium level is 0.25 mEq/L, when 20 mEq is given during one hour. Usually 80°/o of the administered dose enters cells.

As soon as cardiac rhythm retu rns to normal or the respiratory muscle strength is restored to normal, l.V. potassium drip is gradually tapered and discontinued and oral KCI is initiated.

.Potassium rich food : Fruit .juices, coconut water, ba~ana, juicy fruits, dry fruits, chocolate, coffee, soup, salt substitutes

e.g. Lona salt.

lnj. Potassium chloride : Most widely available and used is inj. KCI 15°/o, 10 ml ampoule.

10 ml of 15°/o KCI = 1.5 gm KCI = 20 mEq of potassium

1 ml of 15°/o KCI = 2 mEq of potassium

Potassium concentration of commonly used l.V. fluids is summarized in Table No. 3.12.

Table No. 3.12 : Potassium concentration of l.V. fluids

1.V. Fluid
lsolyte-M
lsolyte-P
lsolyte-G

lsolyte-E

Ringer's

Lactate

-

Potassium

35.0

20.0

17.0

10.0

4.0

(mEq/Litre)

HYPERKALEMIA

Introduction

Serum potassium level greater than 5.5 mEq/L is considered hyperkalemia. Hyperkalemia is not as common as hypokalemia and it's clinical manifestations are fewer but more severe than hypokalemia. Mild hyperkalemia (serum potassium 5.5 to 6.5 mEq/L) is of slight concern, but moderate to severe hyperkalemia can be life threatening.

Etiology

Common causes of hyperkalemia are summarized

Clinical Features

Hyperkalemia is often asymptomatic until plasma potassium

concentration is *above* 6.5 to 7.0 mEq/L and may lead to fatal cardiac arrhythmia hence it is called a silent killer.

Vague muscular weakness is usually the first symptom of hyperkalemia. Severe hyperkalemia can lead to hyporeflexia, gradual paralysis affecting initially legs, then trunk and arms, and at last f~ce and respiratory muscles. Paralysis usually spares the muscles supph_ed by cranial nerves and patient remains alert and apprehensive until cardiac arrest and death occurs.

Electrolyte Disorders

1. Increased intake
2. . V. fluid containing potassium

Potassium containing drugs .

Tissue Breakdown

Bleeding into soft issue, G.I. tract or body cavities .

Haemolysis, Rhabdomyolysis

Catabolic state

Shift of potassium out of cell

Tissue damage (ischemia or shock), severe exercise

Metabolic Acidosis

Uncontrolled diabetes due to insulin deficiency

Aldosterone deficiency

Hyperkalemic periodic paralysis, succinyl choline

Impaired Excretion

Acute renal failure or chronic renal failure

Potassium sparing diuretics, ACE inhibitors, NSAID,

heparin, cyclosporine

Reduced tubular excretion : Addison's disease

hyporeninemichypoaldosteronism and amyloidosis

iv.

Effective circulatory volume depletion

Pseudo hyperkalemia

Traumatic haemolysis during blood drawing

Thrombocytosis, marked leucocytosis

105 .

The patient may complain of tingling around lips or in fingers but is more likely to present with slow or irregular pulse rate or collapse due to dangerous bradyarrhythmia.

Diagnosis

Diagn·osis of hyperkalemia depends on clinical susp1c1on, serum potassium measurement and characteristic ECG changes.

Serum potassium greater than 5.5 mEq/L is diagnostic. If all patients with ARF and CRF are excluded the incidence of hyperkalemia will be rather insignificant. If the etiolog~ is not readily apparent and patient is asymptomatic, pseudohyperkalemia should be excluded.

Diagnosis of etiology of hyperkalemia

Clue to other etiological . factors should be sought in the history and . la.boratory analysis. So -to establish etiological diagnosis of hyperkalemia, ex'clude moderate to severe renal failure, c;trugs causing hyperkalemia, pseudohyperkalemia, ECF volume depletion and severe metabolic acidosis as underlying causes . .

The urinary potas_sium excretion rate or transtubular potassium gradient' (TTKG) . are most widely used ·to differentiate renal (hyp~aldosteroni sm) from extra re.nal causes of hyperkalemia.

.

. Renal causes can be further differentiated by administration of mineralocorticoid (0.005 mg fludrocorUsone) :

(a) Increased K+ excretion (urinary K+. excretion > 40 mEq/day _and TTKG > 7) favours diagnosis of aldosterone deficiency (Addison's diseases)..

(b) No increase in K+ excretion is suggestive of aldosterone resistance (pseudo hyperaldosteronism, cyclosporine, K+ sparing diuretics).

. Transtubular potas~ium gradient (TTKG) is a rapid and simple test designed to evaluate the driving force for net K+ secretion. TTKG is useful to establish etiological diagnosis of K+ disorders, as it differentiates renal (abnormal K+ secretion) from non renal causes

of hypo or hyperkalemia.

EMERGENCY TREATMENT

Potentially fatal hyperkalemia (serum potassium> 7.5 mEq/L, profound weakness, absence of P wave, QRS widening or ventricular arrhythmia on ECG) needs urgent treatment. It is based on the following principle :

Cation exchange resin (Keyxalate)

Peritoneal dialysis or haemodialysis

Calcium Gluconate

Calcium gluconate injection is available as 10°/o solution in 1 O ml ampoules.

The usual dose is 10-20 ml infused over 5 to 10 minutes .

It is the most rapid treatment available and the effect begins within minutes but is short lived (30-60 minutes). The dose can be repeated if no change in the ECG is seen after 5-10 minutes.

Calcium administration decreases membrane excitability, and protects the myocardium from toxicity due to potassium.

It should be remembered that calcium does not lower serum potassium level, so definitive treatment should be planned.

Calcium can exacerbate or precipitate digitalis induced arrhythmia .

As a result calcium should be avoided if patient is on digitalis therapy or, if necessary, should be used with great care.

Insulin and Glucose

with insulin to prevent hypoglycemia.

Caution : Hyperglycemic patients should not be given glucose along with insulin.

Administer 25 to 50 grams of glucose together with 10-20 units of regular insulin. Dose of insulin is reduced to 50°/o in patients with severe renal impairment.

Initial bolus of glucose insulin should be followed by continuous infusion of 5°/o-dextrose at 100 ml/hour to prevent late hypoglycemia.

If effective, the plasma potassium concentration will fall by 0.5 to 1.5 mEq/L. This effect begins in 15 minutes, peaks at 60 minutes, and may last for approximately 4 to 6 hours.

Sodium Bicarbonate infusion

Alkali therapy with l.V. NaHC03 will shift potassium into the cei'ls .

Sodium bicarbonate 7.5o/o, 50-100 ml (45-90 mEq) is given as bolus l.V. slowly over 10-20 minutes followed by l.V. NaHC03 drip. Onset of its effect is within 5-1 O minutes and effect lasts for 1-2 hours.

The injudicious use of large amount of alkali can cause excessive calcium binding to albumin and provokes tetany.

Care should be taken to avoid contact between calcium gluconate and sodium bicarbonate in the needle, syringe or infusion set, as

it will precipitate into chalky deposits.

l.V. sodium bicarbonate is most likely to be useful in severe hyperkalemia with metabolic acidosis.

Patients with CRF-ESRD seldom respond to this therapy and may not tolerate the sodium load and the resultant volume expansion.

Beta adrenergic agonists

B agonists such as salbutamol promote cellular uptake of p~tassium and effecitvely lower serum potassium level.

Salbutamol is given in a nebulized form or parenterally. Dose recommended is 20 mg in 4 ml of saline by nasal inhalation over 1 O minutes, or 0.5 mg by 1.V. infusion.

• · Insulin and B agonists exert additive effect. 1.V. salbutamol is preferred in E§Ro requiring a rapid lowering of serum potassium. However nebulization is preferred in ESHD patients associated with CAD, because heart rate is less elevated with nebulization than with l.V. therapy.

Calcium, . glucose-insulin, sodium bicarbonate and 82 .. agonists are temporary measures. It does not remove excess potassium from the body. Measures to remove potassium are diuretics, c~tion exchange resins and dialysis .

. 5 . . Loop and thiazides diuretics often in combination may. enhance

potassium excretion, if renal function is adequate.

6. Cation exchange r~sins

Cation exchange resins such as sodium polystyrene sulphonate (Keyxalate) promote the exchange of sodiuni for potassium in G.I. tract. Each gram binds 1 hlEq of potassium and releases 2-3 mEq of sodium.

• When given orally the usual dose is 25-30 grams mixed with 100 ml *20°10* sorbitol 3-4 times daily (sorbitol prevents constipation). It can also be given as retention enema consisting of 50 grams Of resins and 50 ml of *70°10* sorbitol mixed in 150 ml of water every 4-6 hrly. It is retained for about 60 minutes after which rectum is washed with clear water. The rectal route is faster and more reliable.

Each enema can generally lower the plasma potassium concentration by 0.5 to 1 mEq/L within 1-2 hours and effect will last for 4-6 hours.

Adve~se ~ffects of resins include anorexia, nausea, vofniting and const1pat1on. As sodium is released in exchange of potassium an~ absor?ed by G.I. tract, resins should be used cautiously in patients with CHF or volume overload.

7. **Dialysis**

The most rapid and effective way of lowering the plasma potassium concentration is haemodialysis (removal rate 35 mEq/hour). Dialysis should be reserved for patients with renal failure and those

with severe life threatening hyperkalemia unresponsive to more conservative measures.

Peritoneal dialysis also removes potassium but is only · 15 to 20°/o as effective as haemodialysis. . . · ·

Monitoring

Repeated ECG or serum potass.ium determination shoufd be ~sed to check the effectiveness of therapy.

NON EMERGENCY TREATMENT

In mild to moderate hyperkalemia. and for prevention of recurrence of severe hyperkalemia following measures are useful : ·

. .

Dietary potassium restriction : Avoid fruitjuice, coconut water and food rich in potassium.

. Avoid medications like :

Potassium sparing diuretics, NSAID and ACE inhibitors (_all reduce ·renal potassium excretion).

B-blockers (decrease ECF to ICF shift of potassium) ..

Loop or thiazides diuretics to increase renal excretion of potassium.

Cation exchange resins : Dose required is 15-20 gram Keyxa~ate, 2-4 times/day. .

Glucocorticoid (hydrocortisone)

therapy.

Treatment of diabetic ketoacidosis.

Correct metabolic acidosis : Metabolic acidosis is generally associated with hyperkalemia. So treat with sodium bicarbonate (600 mg tablets, 2-3 times/day) or sodium citrate (Shohl's solution, 10-15 ml three times daily).

CALCIUM AND MAGNESIUM REGULATION

CALCIUM

Calcium is essential for bone formation and neuromuscular function. If calcium intake is truly inadequate, bone mineralization may be impaired in children and bone loss will be accelerated in adults.

Distribution : The body of a normal adult contains 1 .2 to 1 .4 kg of calcium, so it is the most abundant cation in the body. Out of this about 99% is present in the bone, 1°/o in the cells of soft tissue and 0.15% in ECF.
Serum Calcium : Normal value is 10 ± 0.5 mg/di. About 40o/o of this calcium is bound to albumin (protein) and 50-55% is in ionized form. The remaining calcium is complexed with the anions of organic acids such as phosphate, bicarbonate, citrate, lactate or sulphate.
• Ionized calcium : The ionized-free form is the physiologically active form of calcium and measures 4.8 mg/di. The total serum calcium does

not always reflect the level of ionized calcium. Hypoproteinemia leads to reduction in protein bound and total serum calcium but the ionized calcium remains unchanged. In such cases hypocalcemia may be wrongly diagnosed.

Correction of total serum calcium in hypoalbuminemia : For corrections add 1 mg/di to serum calcium for each 1 gm/di reduction in serum albumin below 4 gm/di.

Regulation : Parathyroid hormone (PTH) and vitamin D (1,25(0H)2D3) are the main factors that maintain normal serum ionized calcium.

Fine control of serum calcium is achieved by their action on bone, intestine and kidney.

Role of PTH : PTH increases serum calcium by stimulating bone reabsorption, increasing renal calcium reabsorption and promoting conversion of vitamin D to its active form (1,25(0H)20 3). Serum calcium CH. 3 : Fluid and Electrolyte Disorders

regulates PTH secretion by a negative feedback mechanism. _ Hypocalcemia stimulates and hypercalcemia suppresses PTH release.

Role of vitamin D : Active form of vitamin D - Calcitriol (1,25(0H) 2 D) increases serum calcium by promoting intestinal calcium absorption and plays a major role in bone marrow formation and reabsorption. Calcitriol is a potent suppressor of PTH. Synthesis of calcitriol is stimulated by both PTH and hypophosphatemia, and is inhibited by increased serum phosphate.

Hypercalcemia

Hypercalcemia can have variable presentation. It can present with serious illness such as malignancy or may be diagnosed accidentally by laboratory testing in asymptomatic patient in primary hyperparathyroidism.

Etiology

Primary hyperparathyroidism and malignancy are the two most common causes responsible for hypercalcemia in more than 90°/o of the patients. Common causes of hypercalcemia as per their basic pathophysiologi~al mechanism are summarized in Table No. 3.16.

Clinical Features

Variable clinical features can be

1. Secondary to underlying disorders.

Secondary to hypercalcemia.

Clinical features of hypercalcemia are related to severity and rapidity of onset. Mild hypercalcemia is generally asymptomatic. Features of severe hypercalcemia are :

CNS Symptoms : Weakness, fati_gue, depression, confusion, stupor or coma.

. GI Symptoms : Constipation, anorexia, n~u.sea and vo~iting. Abdominal pain may result from hypercalcem1a induced peptic ulcer disease or pancreatitis.

Renal Symptoms : Polyuria, nocturia and stone formation. 114

Cardiac abnormalities ·: .Patients with· hypercalcemia a.re more prone· to digoxin _ toxicity. ECG shows shortened QT interval.

Increased. bone turnover

(1) Primary hyperparathyroidism

(2) Sec~ndary hyperparathyroidism

(3) Malignancy (lung, breast, ·kidney,. multiple myeloma)

(4) Thyrotoxicosis

(5) Lithium therapy

II

Increased intestinal absorption

(1) Vitamin D intoxication

(2) Milk Alkali. syndrome .

(3) Granulomatous disease (i.e. sarcoidosis)

Ill Decreased renal excretion

(1) Familial hypocalciuric hypercalcemia

(2) · Thiazide diuretics

(3) Acute adrenal insufficiency

Diagnosis

It is important to diagnose the two most common disorders, primary hyperparathyroidism and malignancy (which accounts for more than 90°/o of total hypercalcemia), from other less common causes of hypercalce~i a.

I

History and physical examination .

(a) Patient with primary hyperparathyroidism is usually a~ymptomatic. Hypertension is common in primary hyperparathyroidism .

.

(b) . If hYpercalcem.ia is present fcir more than 6 months without obvious cause, primary hyperparathyroidism is most certain.

(c)

(e)

In . m~lignancy,. symptoms of mal.ignancy bring the patient to the physician and hypercalcemia is diagnosed by laboratory investigations.

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Hypercalcemia With renal stone favours long duration, so malignancy is unlikely. ·

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Use of vitamin. D, calcium, antacid and lithium therapy may be underlying cause of hypercalcemia. CH. 3 : Fluid and Electrolyte Disorders

1.1 s

(f) A chest X-ray should be obtained to rule out pulmonary malignancies and granulomatous disorders.

11

Investigation

Useful laboratory tests are electrolytes, BUN, serum creatinine, phosphate, serum protein electrophoresis, intact PTH level etc.

(a) The presence of high serum chloride and low serum HCO in a ratio >33 to 1 is suggestive of primary hyperparathyroidis~.

(b) A low serum chloride, high serum HCO and elevated BUN and creatinine are characteristic of milk alkaIT syndrome.

(c) In patients with high total protein with reversed AG ratio, suspect multiple myeloma. Serum protein electrophoresis showing a monoclonal spike is suggestive of multiple myeloma.

(d) If increased intact PTH, most common cause is primary hyperparathyroidism. A low plasma phosphate is found in primary hyperparathyroidism.

As a general rule, primary hyperparathyroidism is the etiology in outpatients who are asymptomatic with a serum calcium concentration lower than or at 11 .0 mg/di. On the other hand, malignancy is often the cause in symptomatic patients with an abrupt onset of diseases and serum calcium concentration higher than or at 14 mg/di.

Treatment

Volume restoration, expansion and saline diuresis are the most useful and effective measures to correct hypercalcemia.

o.9°/

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NaCl is infused to correct dehydration, for volum~ expansion and natriuresis, which leads to. urinary excretion of calcium. patient may need 4-6 litre of saline to achieve this goal. So use cautiously in elderly and heart failure patients to avoid pulmonary oedema.

Frusemide : After volume expansion forced diuresis can increase urinary calCium excretion. Avoid de.hydration, hypokalemia and hypomagnesemia during treatment with frusemide. Avoid thiazide diuretics because it impairs urinary calcium excretion.

Haemodialysis : Reserved for treatment of patients with severe hypercalcemia and little or no renal function. ·· ~

B Measures to inhibit bone resorption

(1) Bisphosphonates : Pamidronate is the potent and most widely used bisphophonate in treatment of hypercalcemia due to bone reabsorption. For severe hypercalcemia pamidronate 90 mg 1.V. over 4 hours causes a fall in calcium, which is maximal at 2-3 days, and the effect lasts for a few weeks

(2) Plicamycin (mithramycin) : It acts by inhibiting bone resorption. Currently it is used sparingly due to its high toxicity and because of better effectiveness of bisphosphonates. Mithramycin should be avoided in patients with severe hepatic, renal and marrow disorders. Its effect begins in 12 hours and peaks at 48 hours. The dose can be repeated at 3 to 7 days intervals.

(3) Calcitonin : It inhibits bone resorption and increases urinary calcium excretion. Because of its rapid action it is useful for urgent therapy of life threatening hypercalcemia along with rehydration

and saline diuresis, but it is not useful for long term therapy.

(4) Gallium Nitrate : It inhibits bone resorption and corrects hypercalcemia. It is not often used due to 5 days duration of infusion, potential for nephrotoxicity and availability of safer and effective agents.

C Measures to decrease intestinal absorption

(1) Glucocorticoids : It decreases intestinal absorption and increases urinary excretion of calcium in pharmacological doses.

Alternatively ketoconazole and hydroxyl chloroquine can be used.
Glucocorticoids are effective in hypercalcemia due to vitamin D intoxication, sarcoidosis and malignancies (multiple myeloma, leukaemia, Hodgkin's disease etc.), but do not alter calcium level in primary hyperparathyroidism or in a normal person.
(2) Oral phosphate : It inhibits calcium absorption and promotes calcium deposition in bone and soft tissue. It should be used only if the serum phosphorus level is less than 3 mg/di and renal function is normal. Summary of treatment options tor hypercalcemia is shown in Table No. 3.17 CH. 3 :fluid and Electrolyte Disorders

D Specific treatment

(1) Discontinue drugs responsible.
(2) Surgical treatment of primary hyperparathyroidism.
(3) Specific treatment for malignancy, thyrotoxicosis etc.

Hypocalcemia

1: Etiology

Hypoalbuminemia is the common cause of hypocalcemia with normal ionized calcium. True hypocalcemia is the result of decreased calcium absorption from the gastrointestinal tract or decreased calcium reabsorption from bone, due to abnormalities of either PTH or vitamin D (calcitriol). The most common causes of hypocalcemia are shown

in Table No. 3.18.

2. Clinical Features

Symptoms of hypocalcemia vary with degree and rate of onset and are due to increased neuromuscular excitability. The patient may complain of weakness, circumoral and distal extremity parasthesia, muscle spasm, carpopedal spasm, tetany and mental changes such as irritability, depression and psychosis. On physical examination patient may have increased deep tendon reflexes or signs of latent tetany (Chvostek

sign, Trousseau•s sign).

Chvosteksign is a facial twitch $1icited by tapping on the facial nerve just anterior to earlobe, just below the zygomatic arch with the mouth slightly open.

Trousseau's sign is the development of wrist flexion metacarpophalangeal joint flexion, and hyper extended fingers' and thumb flexion when a BP cuff is inflated above systolic pressure for 3 minutes.

The ECG may show prolonged QT interval. Digitalis effect may be reduced.

Severe hypocalcemia may cause lethargy, confusion, laryngeal spasm, seizures or reversible heart failure.

Chronic hypocalcemia due to hypoparathyroidism may cause

cataracts and calcification of basal ganglia.

Hypoalbuminemia

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Hypoparathyrodisim

(a) Post surgical - Hungry bone syndrome

(b) Hypomagnesemia

(c) Idiopathic

Defect in vitamin D metabolism

(a) Nutritional, lack of exposure to sunlight

(b) Malabsorption and drugs (e.g. anticonvulsants)

(c) Liver disease, renal failure

(d) Vitamin D dependent rickets

Miscellaneous

(a) Metabolic or respiratory alkalosis

(b) Sepsis, toxic shock syndrome

(c) Acute pancreatitis, burns

(d) Massive transfusion of citrated blood

Severe acute hyperphosphatemia

Tumorlysis syndrome, ARF, rhabdomyolysis

Diagnosis

Detailed history and physical examination may give clue for underlying etiology of hypocalcemia. Hypoalbuminemia is a common cause of decreased total serum calcium. However the common causes of true hypocalcemia are magnesium deficiency, re.nal failure, metabolic alkalosis and complications of parathyroid surgery. Important investigations required for etiological diagnosis of hypocalcemia are serum albumin, serum HC03 , serum CH.

Acute Management

Symptomatic hypocalcemia should be treated as emergency with 10°/o calcium gluconate (90 mg elemental calcium/1 O ml) 10-20 ml l.V. slowly over 1 O minutes. Severe symptomatic hypocalcemia may require infusion of 60 ml of calcium gluconate in 500 ml of 5°/o dextrose. Calcium concentration of the drip is 1 mg/ml and its requirement is 0.5 mg to 2 mg/kg/hour.

If 1.V. calcium does not relieve tetany, rule out (and correct) hypomagnesemia. In treatment of metabolic acidosis with hypocalcemia (e.g. CRF), correct hypocalcemia before correction of acidosis.

When citrated blood is transfused rapidly, hypocalcemia can occur. So for every 4 units of blood, give 10 ml of 10°/o calcium gluconate.

Long term management

1. Treatment of underlying etiology.
2. Calcium supplementation : An asymptomatic hypocalcemic patient

needs oral elemental calcium 1 to 3 gram per day. Calcium is best absorbed when taken between the meals.

3 Vitamin D supplementation

Calcitriol (1,25 (OH) D) is the most potent of the vitamin D preparations and has the fastest ~n~et and the shortest duration of action. So there is no risk of vitamin D intoxication but disadvantage is the higher cost. 120 · CH .. 3 . . Fluid and Electrolyte Disorders

Vitamin D (ergocalciferol) requires several weeks to achieve full effect. Although cost is low, because of long half-life and storage in fat, it carries higher risk of vitamin D intoxication.

PHOSPHORUS

Ph6s.phorus is critical for bone formation and cellular energy metabolism. Phosphorus is chiefly intracellular and only 1°/o is in the ECF. The normal serum phosphate level is 3.0-4.5 mg/di. It is best measured in the fasting state, since there is diurnal variation (lower value in the morning and higher at night and post meals). Major regulatory factors includes PTH, 1,25(0H)2D3 and insulin. PTH lowers serum phosphorus by increasing renal excretion. 1,25(0H)2D3 increases serum phosphorus by enhancing intestinal phosphate absorption. Insulin lowers serum levels by shifting phosphate into cells.

Hypophosphatemia

Etiology ·

Important causes of hypOphosphatemia are summarized in Table No. 3.20

Clinical Features

Acute Hypophosphatemia can cause :

(a) Muscular abnormalities : Proximal muscle weakness,

rhabdomyolysis, impaired diaphragmatic function, respiratory

failure and congestive heart failure.

(b) Neurological abnormalities : Parasthesia, dysarthria, confusion,

seizures or coma.

(c) Haematological abnormalities :

i. Enhanced oxygen dissociation causes tissue hypoxia, and

haemolysis.

ii.

Impaired phagocytosis and opsonization leading to increased

susceptibility to bacterial and fungal infections.

Chronic hypophosphatemia causes mineralization defect leading

to rickets in children ahd osteomalacia in adults. CH. 3 : Fluid and Electrolyte Disorders 121

Table No. 3.20 : Causes of hypophosphatemia

A Decre~se~ intestinal phosphate absorption

(1) V1tamm D deficiency

(2) Vitamin D dependant rickets type I and II

(3) Malabsorption, Phosphate binding antacids

B

Increased renal phosphate excretion.

(1) Hyperparathyroidism

(2) Vitamin D - deficiency

(3) X linked hypophosphatemic rickets

C

Shift of phosphate into intracellular fluid .

(1) Respiratory alkalosis

(2) Dextrose infusion

(3) Diabetic ketoacidosis

(4) Sepsis

(5) Hungry bone syndrome

Treatment

(1) Mild hypophosphatemia needs only treatment of underlying etiology.

(2) If serum phosphate level is > 1 .0 mg/di and patient is asymptomatic, oral phosphorus replacement is sufficient. Milk and milk product is an excellent source of phosphorus. Milk contains 1 gram of inorganic phosphorus per litre.

To correct hypophosphatemia, solutions containing sodium phosphate, potassium phosphate and neutral sodium phosphate are used.

Depending upon severity, upto 3 grams can be given in four to six divided doses in 24 hours.

(3) Severe (<0.5 to 1.0 mg/di) symptomatic hypophosphatemia may require

f.V. phosphate therapy. 1.V. infusion should be stopped when serum phosphorus level is greater than 1.5 mg/di or when oral therapy is possible. Extreme care must taken to avoid hyperphosphatemia, which may cause hypocalcemia, ectopic soft tissue calcification, hypotension and death. Hypophosphatemic patients . are frequently hypokalemic and hypomagnesemic and need correction.

MAGNESIUM

Magnesium is the fourth most common cation of the body (after Na, K and Ca), second most common intracellular cation (after K) and is the commonest intracellular divalent cation. About 60°/o of body magnesium is in bones, only 1°/o in ECF and rest is within the cells. Since clinical effects of magnesium disorders are determined primarily by tissue magnesium content, serum magnesium levels have limited diagnostic value. The normal serum magnesium level is 1.4 to 2.2 mEq/L (1.8 to 3.0 mg/di)

Magnesium plays an important role in neuromuscular function and maintenance of cardiovascular tone.

Hypermagnesemia

Hypermagnesemia is defined as serum magnesium concentration above 2.5 mEq/L (3.0 mg/di). As a normal kidney c~n.effectivel~ e~crete magn~siu~

load, hypermagnesemia is rarely seen in clinical practice 1f renal function normal.

Etiology

Renal failure patients, receiving magnesium containing antacids,

laxative or 1.V. ·fluids is the most common cause. · 124

CH.' 3

Fluid and Electrolyte Disorders

· Treatment of pre-eclampsia with 1.V. magnesium sulphate.

ARF with acute rhabdomyolysis.

· Diabetic ketoacidosis without treatment.

Clinical features

Neuromuscular manifestations: It includes muscular weakness; lethargy,

loss of deep tendon jerks, muscular paresis leading to respiratory

depression and respiratory failure.

Cardiac manifestations : It includes hypotension due to peripheral

vasodilatation, bradyarrhythmia and, in severe cases, cardiac asystole.

ECG changes : Due to generalized depression of cardiac conduction.

ECG changes are prolonged PR intervals, increased QRS ·duration

and QT interval and lastly complete heart block.

Hypocalcemia may occur due to hypermagnesemia induced decreased

secretion of PTH and end organ resistance of PTH.

Treatment

1. Eliminate source : Stop magnesium containing antacids, laxative and discontinue magnesium containing l.V. fluids.

2. 10°/o calcium gluconate, 10-20 ml l.V. slowly over 10 minutes will effectively correct hypotension by lowering magnesium levels.

3. If renal function is normal I nj. Frusemide after rehydration with isotonic saline will enhance renal excretion.

4.

Haemodialysis can effectively correct hypermagnesemia and is the treatment of choice in patients with renal failure.

5. Supportive treatment : Artificial respiration may be necessary if respiratory failure occurs

Hypomagnesemia

Hypomagnesemia is defined as serum magnesium concentration less t~~n 1.5 mEq/L (1.8 mg/di). However in symptomatic hypomagnesemia: 1 .t 15 usually less than 1 mEq/L. Magnesium deficiency is a common clinical problem, seen in about 10°/o of patients admitted in city hospitals and up to 65% patients in ICU.

Etiology:

Common causes of hypomagnesemia are alcoholism loop diuretics diarrhoea and poor nutrition. Causes of hypomagnesemia are ~ummarized in' Table No.

1 · Loop diuretics, osmotic diuretics

2. Hypercalcemia

3.Acute Pancreatitis

Increased gastro-intestinal losses .

Chronic diarrhoea due to malabsorption .

Vomiting or nasogastric aspiration

Poor intake

Prolonged malnutrition or magnesium free l.V. fluids

Chronic alcoholism and alcohol withdrawal

Others

1. Primary aldosteronism

2. Hypoparathyroidism

3. Drugs : Aminoglycosides, Cisplatin, Amphotericin B,

Cyclosporine A etc.

Clinical features

Hypomagnesemia rarely occurs as a single deficiency. It often causes hypocalcemia and hypokalemia, which contributes to the clinical picture.

Neuromuscular manifestations

They are similar to hypocalcemia and include lethargy, confusion, tremor, fasciculations, ataxia, tetany and seizures.

Cardiovascular manifestations

ECG abnormalities include prolonged PR and QT intervals. Atrial and ventricular arrhythmia may occur, especially in patients treated with

digoxin. Digitalis toxicity may be precipitated or aggravated by hypomagnesemia. 126

Metabolic abnormalities

Hypocalcemia : Mg deficiency results in decrease in PTH secretion and end organ resistance to PTH leading to hypocalcemia. If patient With hypocalcemia does not respond to calcium or vitamin-D replacement, think of hypomagnesemia and correct it.

Hypokalemia : Mg deficiency enhances renal excretion of potassium. Hypomagnesemia and hypokalemia often coexist. So when hypokalemia does not respond to K+ replacement, rule out associated Mg deficiency and correct it.

Treatment

Correct underlying etiology and-coexisting hypocalcemia and hypokalemia.

(2) Magnesium sulphate ($MgSO_4$)

$MgSO_4$ is available as powder as well as 10% or 50% solution. 5 ml of 10°/o or 1 ml of 50o/o $MgSO_4$ contains 4 mEq magnesium. The 50% solution must be diluted before use.

Conversion equations for Mg therapy are

1 gram $MgSO_4$ = 8.1 mEq of magnesium

1 mEq of Mg is provided by 123 mg of $MgSO_4$

1 mmol = 2 mEq = 24 mg elemental magnesium

Onset of action : l.V. immediate, l.M.<1 hour

Peak effect: l.V. few minutes, l.M. 1-3 hours

Duration of action: l.V. 30 min, l.M. 3-4 hours

Treatment of mild hypomagnesemia

Mild deficiency (serum Mg concentration 1.5 mEq/L or 1.8 mg/di) needs oral supplementation of 2 gram three times a day without producing diarrhoea. For dietary supplementation, Mg rich diet includes green vegetables, nuts and legumes, chocolate and fruits such as bananas, grapes and oranges.

(4) Treatment of severe Mg deficiency

Patients with severe hypomagnesemia (serum Mg concentration less than 1.0 mEq/L or 1.2 mg/di) need parenteral Mg supplementation.

FLUID THERAPY IN HYPOVOLEMIC SHOCK . ....

Fluid loss leading to hypovolemia, hypotension and shock are common clinical problems. Amount of fluid to be given is decided by clinical and other guidelines

1.

Poor expansion of intravascular volume : 1,000 ml of D-5°/o will

increase 330 ml of ECF volume and only 83 ml (1 /4 of ECF) stays in the intravascular space. As 1 litre of D-So/o will increase intravascular volume only by 83 ml, rise in blood pressure would not occur satisfactorily in the patient with shock.

2.

Increased urine output due to osmotic diuresis: Larger and faster infusion of D-5°/o will cause glucose load(> 25 gm/hour) and osmotic diuresis will occur. So even in presence of hypovolemia, there will be increased urine output, which delays correction of dehydration. Increased urine output will also create false impression that now there is no fluid deficit. In such a setting rate of fluid replacement may be slowed down despite hypovolemia, therefore hypotension may not improve. So 5°/o-dextrose should be avoided in the treatment of shock.

Fluid Therapy in Medical Disorders

The other reason to prefer isotonic saline as initial therapy is its safety in unknown glycemic status. Moreover isotonic saline is least expensive, readily available, and reaction free (as compared to colloids), so preferred for the initial treatment of shock.

Rate of infusion is decided on the clinical status and vital data. Depending upon the nature of loss, NaHC03 and KCI is added to the infusion.

1. Ringer's lactate is the most physiological fluid. Its composition is

almost identical to ECF, so large volume can be infused without fear of electrolyte imbalance.

2.

It corrects acidosis (lactate is converted into HC03) produced by lactic acid due to anaerobic metabolism during hypotension.

Q. Why Ringer's lactate is avoided in initial treatment of shock ?

A. Ringer's .lactate is not an ideal fluid for initial fluid therapy because.

1. Potassium in Ringer's lactate is unsafe till renal status is uncertain.

2.

In. shock state hepatic conversion of lactate to bicarbonate is unpredictable.

So use of RL for initial .treatment of shock may cause hyperkalemia or lactic acidosis and hence avoided. NaHC03 is preferred agent for initial treatment of acidosis with shock.

.1. More effective plasma volume expansion, since it remains in the vascular space (in contrast to saline, where 2/3 of it enters the interstitium).

2. Lesser risk of pulmonary oedema, since the increase in plasma oncotic pressure favours fluid movements out of the interstitium into the vascular space.

The primary indication of the use of albumin or other colloids is in hypovolemia with hypotension in protein losing states such as burns.

Although these solutions are also used in treatment of shock or severe hypovolemia, they appear to offer little or no advantage over the pure electrolyte solutions. Isotonic saline is equally effective in producing volume repletion, although volume required is 2.5 to 3 times greater than that of- colloids, because of its extravascular. distribution. Replacement of such large volume by colloids is not harmful. On the contrary it replaces the interstitial fluid deficit that is induced both by fluid loss and by fluid movement into the cells.

FLUID THERAPY IN GASTROINTESTINAL DISORDERS .

Pathophysiology of fluid, electrolytes and acid base disturbances and fluid therapy of the following important G.I. disorders are included here~

1. Enteric disorders :

Vomiting or nasogastric aspiration, diarrhoea and haemetemesis

2. Hepatic disorders :

Ascites in cirrhosis of liver and hepatic encephalopathy

3. Pancreatic disorders :

Acute pancreatitis CH : 4 : -Fluid Therapy in Medical Disorders . 135

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Fluid Therapy in Vomiting

Upper gastrointestinal losses (vomiting o'r nasogastric aspiration) is a commonly encountered. problem. For proper. selection of fluid, i,t is necessary to understand the basic physiology.

1. Hypovolemia : Due to loss of fluid there is dehydration-:

decreased ECF volume.

2.

tlypokalemia : Decreased ECF volume and loss of sodium in gastric juice will lead to increased secretion of aldosterone. Under aldosterone influence, there will be increase in reabsorption of sodium and increase in secretion of potassium leading to greater loss of potassium in urine (Table No. 4.3). So hypokalemia occurs partly due to loss of potassium in vomiting but chiefly due to its loss in urine (renal loss).

3.

Corrects Hypochloremia, Alkalosis and Dehydration

A. Besides the clinical criteria and urine output monitoring, urinary pH i~ very important to assess efficacy of fluid therapy. Acidic urine suggests need for more vigorous treatment and alkaline urine suggests response to therapy.

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.A. Isotonic normal saline is ideal for gastric irrigation . (especially in electrolyte disturbances, hypovolemia and haemodynamically unstable patients). Remember never to use plain water for irrigation. Plain water draws more gastric secretions iri to the stoma.ch in attempt to make the fluid isotonic for absorption. Removal of this electrolytes containing fluid can deplete fluid and electrolytes. ·

For the same reason, in patients with contiriious hasogastric

aspiration, it is important to restrict the amount of ice chips given by mouth. Nasogastric suctioning of ice chips : can cause fluid and electrolytes loss from the stomach. CH. 4

Fluid and electrolyte abnormality in diarrhoea is summarized below :

1. Hypovolemia : Loss of fluid in diarrhoea occurs due to

a. Abnorma.lly increased secretion of fluid into the small bowel (secretory diarrhoea due to G. I. infections e.g. E. coli, Vibrio cholerae or rota virus).

b.

Decreased absorption of fluid by intestine (osmotic diarrhoea due to purgatives like magnesium sulphate or malabsorption of glucose or lactate in children).

c. Additional loss of water can also occur due to associated vomiting or fever.

2. Sodium deficit : Diarrhoea causes loss of Na, resulting in Na deficit in all patients, but proportion of Na loss as compared to water loss will decide serum Na concentration and type of dehydration.

a.

b.

c.

In most frequent cases of diarrhoea loss of water and sodium are in the same proportion leading to isotonic dehydration hypovolemia.

In some infants with diarrl1oea net loss of water is in excess of Na (deficit of water is greater than deficit of Na), which ·1eads to hypertonic (hypernatremic) det1ydration.

If net loss of Na is greater than loss of water (deficit of Na is ' v 140 · usually adult patients with diarrhoea· who drink large amount of , water, hypotonic fluids or receive 1.V. infusion of 5°/0-dextrose may develop hyponatremia.

Hypokalemia : Hypokalemia occurs because. fluid. lost in diarrhoea *!s* rich in potassium. (Normally 8-15 mEq potassium ions are excre~ed rn faeces daily. Much greater loss occurs with diarrhoea). Moreover in the process to retain sodium under the influence of aldosterone, potassium is lost in urine and secretion of potassium *in* intestine also increases, which aggravates hypokalemia.

In patiehts with hypokalemia due to diarrhoea, the actual serum potassium concentration may be misleading due to acidosis, water and sodium loss. Therefore, serum potassium concentration may be normal (or high) inspite of loss of total exchangeable body potassium and a low potassium concentration in the cell.

Hyperchloremia : The ileal and colonic mucosa possesses a luminal ci-/HC03 - exchanger that is capable of reabsorbing chloride in exchange of bicarbonate. secreted, more chloride is absorbed from intestine causing hyperchloremia. In attempt to increase sodium absorption (to maintain ECF volume) from intestine and kidney, simultaneous chloride absorption by NaCl

transporter will also aggravate hyperchloremia. So during diarrhoeahyperchloremia occurs.

Metabolic acidosis : Fluid secreted distal to pylorus is rich in bicarbonate. Diarrhoea leads to large amount of HCo3 - secretion (30-45 mEq/L) in the gut which is excreted, and leads to metabolic acidosis. If diarrhoea causes severe hypovolemia or renal failure, renal compensation to loss of bicarbonate is lost and severe metabolic acidosis may develop rapidly. Acidosis may also result from excessive production of lactic acid when patient has hypovolemic shock.

So hyperc~loremic, **hypokalemi.c, metabolic acidosis** occurs in patients **with diar'rhoea.**

1. Oral rehydration therapy (ORT) : As oral rehydration therapy is easily available, simple to use and safe, it is a preferred method of fluid replacement. Losses due to diarrhoea can be effectively corrected by oral rehydration solutions (ORS). Readily available ORS provides Na+, K+, Cl- and bicarbonate along with glucose, which effectively corrects fluid and electrolyte abnormalities, and also provide calories.

Oral rehydration therapy is based on the principle that the intestine actively absorbs glucose and Na is carried with it. Glucose enhances Na and secondary water transport across the mucosa of the upper intestine, even in presence of infective d,iarrhoea.

Avoid correction of losses due to diarrhoea, totally with electrolyte

free solutions (i.e. water, glucose water, tea, soft drinks or commercially available fruit drinks). As it provides only fluid, but lacks electrolytes, it can cause hyponatremia and is not effective in correction of hypovolemia. For detailed discussion on ORT, please refer to Chapter No. 8 ("Fluid therapy in children").

2. Intravenous fluid therapy : I.V. fluid therapy is indicated when rapid correction of blood volume is required for severe dehydration and shock,. inability. of patient to take ORS due to pe,rsistent vomiting or ORT fails to correct volume depletion due to greater losses.

The preferred LV. fluids to correct losses due to diarrhoea are Ringer's lactate and isotonic saline~ But no l.V. fluid is ideal, because they all are deficient in atleast some of the electrolytes required to correct the deficiency found in patients dehydrated :by acute diarrhoea.

To ensure adequate electrolyte replacement, patient needs supplementation of potassium and *I* or .. bicarbonate to l.V .. fluiqs, or ORS should be given as soon as the patient on I. V. fluid is able to drink.

a. Ringer's lactate solution : It is the best commercially available solution. It is the preferred solution because it not only provides an adequate concentration of sodium but also provides bicarbonate (by hepatic conversion of lactate) for the correction of metabolic acidosis. How~ver its potassium

concentration is low (4 mEq/L) and solution provides no glucose to prevent hypoglycemia. So the patient with diarrhoea may require additional potassium, glucose and at times bicarbonate supplementation (1.V. or oral).

b. Isotonic saline : It effectively corrects hypovolemia and provides Na along with water. Isotonic saline does not contain potassium to replace potassium deficit or base to correct metabolic acidosis. So patient may require additio~C:ll supplementation of potassium (10-20 mEq/L) and NaHC03 (20-30 mEq/L) to correct existing hypokalemia and metabolic c. acidosis.

Although isotonic saline lacks K+, adequate supply of sodium and water will prevent urinary loss of K+ by suppressing aldosterone.

Similarly isotonic saline does not correct metabolic acidosis directly, but adequate correction of hypovolemia will improve renal perfusion, which will permit renal correction of f!letabolic acidosis.

5o/o dextrose : It is not an acceptable I. V. fluid because it does not correct acidosis, hypokalemia; and sodium 9eficit.

50;0 de.xtrose :is not effective in correction of hyopovolemia. Rapid infusion of large volume of 5°/o dextrose also carries the risk of hyponatremia and hyperglycemia leading to osmotic diuresis. However D-5°/o with 45 mEq NaHC03 (2 ·amp - :50 ml of 7.5°/o NaHC03) and 20-30 mEq of potassium ·chloride · ·is effective.

FLUID THERAPY IN DIABETIC KETOACIDOSIS

Diabetic ketoacidosis (OKA) is a medical emergency condition that can be life threatening if not treated promptly. OKA is one of the common

complications of type-I diabetes mellitus (IDDM) associated with significant fluid and electrolyte imbalance.

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Definition

Diabetic ketoacidosis is characterized by the triad of hyperglycemia (blood glucose> 250 mg/di), acidosis (HC03 < 15 mEq/L, pH< 7.3) and ketonemia.

Pathophysiology

A. OKA o_ccurs due to reduction in effective concentration of the circulating insulin (decreased insulin secretion or utilization) and concomitant effect of counter-regulatory hormones (catecholamines, glucagon, growth hormone and cortisol).

This hormonal alteration brings about three major metabolic events :

1. Hyperglycemia resulting from accelerated gluconeogenesis (increased hepatic glucose production) and decreased peripheral glucose utilization.

2. Increased proteolysis and decreased protein synthesis.

3. Increased lipolysis and ketone production. Insulin deficiency leads to increased lipolysis, leading to increased plasma and subsequently hepatic free fatty acids (FFA), which leads to increased production of ketone bodies. Glucagon is the primary hormone responsible for inducing hepatic ketogenesis. Common precipitating factors for OKA are inadequate or discontinuation of insulin, irregular diet, infectio n, trauma, surgery, emotional stress, myocardial ischemia etc.

1. Fluid and Electrolyte loss

The renal threshold for glucose is approximately 170 mg/di. Hyperglycemia in OKA leads to glycosuria. This glycosuria leads to osmotic diuresis. So large amount of water and electrolytes are lost. Hyperglycemia indu.ced hyperosmolality causes the movement of water out of the cell with subsequent intracellular dehydration, extracellular fluid expansion and diuresis. Urinary loss then leads to progressive dehydration and volume depletion which causes diminished urine flow and greater retention of glucose in plasma. Vomiting due to OKA also leads to loss of water and electrolytes aggravating hypovolemia.

2. Metabolic Acidosis

In OKA fat is mobilized at an excessive rate to supply energy. As a result, large amount of ketone bodies (B- hydroxy butyric -acid and acetoacetic acid) are formed. These ketoacids are neutralized by bicarbonate buffer, thus serum bicarbonate level decreases leading to metabolic acidosis. Due to large amount of ketones, the anion gap is high.

Severe dehydration induced hypoperfusion leads to impaired renal function, which also contributes to the metabolic acidosis.

3. Potassium Imbalance

Hyperkalemia may occur because of metabolic acidosis and lack of insulin (so potassium will shift from intracellular to extracellular

compartment leading to hyperkalemia).

continuous loss of K• in urine. Potassium is also lost due to vomiting. This Ki- loss leads to deficit of total body potassium. So in OKA, serum K+ may be high, normal or even low but there will be deficit of total body potassium.

~ Other losses

In addition to loss of water, sodium and potassium there is loss of magnesium and phosphorous.

So in OKA, the patient has salt and water loss, hyperkalemia (besides deficit of total body potassium) and metabolic acidosis (with high anion gap). Pathophysiology of loss of fluid and electrolytes is summarized in Fig. No. 5.1.

Q. Roughly how much loss of fluid and electrolytes is expected in OKA ?

A. In diabetic ketoacidosis, usual loss is :

5-8 litre or

100 ml/kg body weight

Water

Sodium

400-700 mEq or 7-10 mEq/kg body weight

Potassium 250-700 mEq or

3-5 mEq/kg body weight

This loss represents loss of water in excess of loss of sodium and therefore, fluid lost in OKA more closely resembles hypotonic saline

solution rather than isotonic solution.

TREATMENT

A. Treatment of OKA can be discussed as follows :

1. Insulin therapy

2. Replacement of fluid and electrolytes

3. Treatment of precipitating factors

4. Avoidance of complications of therapy

5. To monitor treatment

1. Insulin therapy

Selection of insulin : Insulin preferred in treatment of OKA is purified, regular or short acting insulin. As hal~-life of l.V. insulin is not more than 5 minutes, insulin therapy with large loading dose followed by bolus at large intervals is discarded.

Insulin therapy preferred is loading dose followed by frequent small bolus or preferably insulin infusion drip . . With continuous low dose . infusion method lowering of blood sugar is smoother, hypokalemia is less severe and th.ere ar~ lesser chances of hypoglycemia and cerebral oedema.

Loading dose: 0.4 unit/kg body weight (half l.V. and half l.M.)

Subsequent therapy : Loading dose is followed by 5-10 units (or 0~1 unit/kg) of insulin hourly. Insulin infusion is preferred if patient is in ICCU, otherwise insulin is given IM. This bolus is continued till blood glucose reaches 250 mg/di.

. Q. How to prepare and infuse the insulin drip ?

A. In one litre fluid 100 units of insulin is added. After connecting l.V. set, initial 50 .ml fluid is rapidly run through and discarded as insulin particle.s stick to the wall of the tubings. If 1 ml/min (15 macrodrops or 60 microdrops/min) is the rate of this infusion, it will deliver 6 units insulin/hour.

Q. When to increase dose of insulin bolus ?

A. If blood glucose level does not decrease by at least 10% or 50-70 mg/di from the initial value, loading dose is repeated, or the drip rate doubled until blood glucose starts declining satisfactorily. Conversely, if the blood glucose has fallen by greater than 150 mg/di per- hour, the infusion rate should be halved. With insulin therapy control of hyperglycemia is faster than that of ketoacidosis. So once blood glucose falls below 250 mg/di, D-5°/o infusion is started. *D-5oi*

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infusion prevents

hypoglycemia and helps in early · resolution of ketoacidosis. CH. 5 : Fluid Therapy .in Diabetes Mellitus

2. Replacement of fluid and electrolytes . . ..

A. Fluld therapy

As large amount of fluid is lost in OKA, initial treatment priority is

restoration of fluid deficit with proper fluid.

Q. Which fluid to be infused ?

A. Isotonic sali'ne, Ringer's lactate and 5°/o-dextrose are the available and commonly used fluids. For initial treatment, only glucose free fluids (isotonic saline and Ringer's lactate) are given. In shock or hypotensive patient isotonic saline is preferred. Ringer's lactate is given in absence of shock, hypotension and in patient with good urine output. After initial fluid replacement, depending upon the serum sodium, the fluid should be changed to 0.45°/o saline. This allows more free water to be delivered. In OKA there is a greater deficit of free water in comparision to sodium. Ata later stage (once blood glucose falls below 250 mg/di), D-5°/o is i~fused.

. Most of the patients require about 5-8 litres of fluid to correct volume depletion. Fluid resuscitation should be started early and continued until the resolution of the ketoacidosis.

The optimum rate of infusion of isotonic saline. depends on the clinical status of the patient.

Severe hypovolemia and shock: In such patients fluid should be infused as quick as possible. Patients with normal cardiac function should receive the first litre of fluid within the first hour. Fluid replacement should be conti~ued at the rate of one litre per hour (or more) till the correction of intravascular

deficit and haemodynamic stability. Such rapid fluid infusion needs proper, close monitoring.

Maintanence requirement : After rapid fluid replac~ment ~~d in those patients who do not have significant fluid def1c1t,

Fluid Therapy in Diabetes Mellitus

l.V. fluid should be administered slowly. Initially fluid is infused at the rate of 500 ml for the first 4 hours followed by 250 ml/h~ur.

Q. When and why dextrose solution is given ?

A. In OKA D-5o/o is started once blood glucose falls below 250 m.g/dl. N.eed of 5°/o-dextrose at .this stage is :.

1. For b.etter intracellular distribution of free water . (corrects intracellular dehydration).

2. To p revent hypoglycemia and to help in resolution of the ketone bodies.

3. As a prophylactic measureto prevent the late cerebral oedema syndrome.

Q. How to asses s fluid status during therapy ?

A. Norm.ally good urine output reflects proper fluid therapy and reasonable hydration. But in DKA, only urine output will not be a dependable criterion for it. In DKA due to hyperglycemia induced osmoti~ diuresis, urine output will be high even in presence of yolu_me deficit. ,So other parameters need to be

. . considered to assess hydration.

8. Potassium supplementation

Marked urinary and G.I. loss of potassium (about 250-700 ·

mEq or 3 to 10 m'Eq/kg) occurs in OKA. However, initially serum

potassium is usually normal or high due to insulin deficiency

and metabolic acidosis. Regardless of the serum potassium

leveL, total body .reserves are depleted. which can cause life threatening hypokalemia.

Potassium replacement is always necessary but the time of administration varies .. It is dangerous to give potassium in shock

or oliguric patient. After initiation of therapy when blood

pressure becomes normal, urine output is established, blood

sugar starts declining, level of serum potassium is < 4 mEq/L

and when.there is no clue of hyper~alemia on EQG, than only

potassium supplementation is started. Usually ·potassium is

replaced after few hours of treatment with insulin and reversal

of acidosis. However in patients with low or normal initial level

of potassium, replacement may be done earlier.

A. An initial rate of potassium supplementation is 1 O mEq/hour,

when there is no hyperkalemia in · ECG ,and urine output is

adequate.

Once the potassium concentration falls below 4.5 mEq/L

20-40 mEq of potassium is added to one litre of infusion.

If hypokalemia is severe and causes serious cardiac arrhythmias, potassium should be supplemented in doses upto 20-40 mEq/hour under close ECG monitoring. Many patients require oral potassium supplementation for several days after treatmenrof OKA to correct potassium deficit.'

C. Treatment of metabolic acidosis

· A.~ , Proper . fluid ; and . insulin therapy ccin e~fectively correct metabolic acidosis in most of the patients with DKA. Only few patients with metabolic ac::idosis are tree:tted with . bicarbonate therapy because : .

1. Bicarbonate therapy can paradoxically increas·e ketone · p·roductio.n. The basic cause ·of ·the acidosis· is the lack of insulin and the accumulation ·ofketoacids. Therefore insulin 180 · CH. 5 · Fluid Therapy in Diabetes Mellitus . ' therapy · and metabolism of ketone bodies will correct acidosis .

. 2. NaHC03 may.paradoxically increase spinal fluid acidosis and may precipitate coma due to cerebral oedema.

3. Bicarbonate therapy may worsen tissue oxygen delivery by depleting RBC phosphate (2-3 OPG) .

Indications of bicarbonate .therapy in OKA are :

1. Severe metabolic acidosis (HC03 < 9 mEq/L, pH<7.0-7.1) . .

2.

OKA associated with shock.

3. Severe hyperkalemia.

Provide NaHC03 supplementation cautiously. Bicarbonate therapy is stopped when pH reaches 7 .2 to minimize possible detrimental side effects and to prevent metabolic alkalosis as circulating ketones are metabolized to bicarbonate with reversal of ketoacidosis.

A. Bolus infusion of bicarbonate should be avoided except as an emergency resuscitation measure. A solution of NaHC03 44-88 mEq (2-4 Amp of 25 ml 7.5°/o NaHC03) per litre of 0.45°/o saline can be infused as a substitute for isotonic saline, as per the requirement.

D. Correction **of hypophosphatemia**

Decreased oral intake and increased urinary loss of phosphate is known to cause phosphate depletion. Hypophosphatemia frequently occurs during treatment of OKA (in similar way as hypokalemiashown improvement in morbidity. In addition to lack of efficiency, phosphate. Administration . is not without ·risk, since _hyperphosphatemia and hypocalcemia may occur. So reserve , phos.phate administration for the occasional patient who develops .... a severe, symptom aticreduction In the plasma phosphate concentration. Early Initiation of oral intake containing milk can effectively and rapidly correct hypophosphatemfa in most *o1* the

patients .

3. Treatment of precipitating factors

80°/o of OKA occurs due to lack of insulin or due to presence *of* infection. By careful history and evaluation, precipitating factor for OKA is diagnosed and treated meticulously.

4. Avoidance of therapy related complications

Care should be taken to avoid treatment-related complications.

Hyperchloremic acidosis

Possibility of cerebral oedema during treatment of OKA is due 'to too rapid administration of fluid and correction of hyperglycemia leading to imbalance between the brain and ECF. Cerebral oedema can also occur due to excess use of bicarbonate, development of hyponatremia or allowing blood glucose to fall rapidly below 200 mg/di.

For proper monitoring, in all patients with OKA a therapeutic fl v sheet should be maintained, where time and amount of in ufin .. fluid and electrolytes administered, vital data. urin ut .. ut. laboratory parameters are recorded. Chief par m t r · u · d f r monitoring of treatment are :

a.. Blood glucose level

b. Plasma ketone *I* keton urla

c. pH - anion gap 182

CH .-s-

Fluid Therapy in Diabetes Mellitus

a Blood Glucose

· · · · · Effective therapy reduces the blood glucose level. But as hyperglycemia responds faster than ketoacidosis, once blood glucose falls below 250 mg/di, insulin is continued along with glucose infusion till ketosis disappears.

b. , Plasma ketone *I* ketonuria

c. Presence of ketosis is important .tor diagnosis and to decide how long to · treat s·uch patients aggressively. But in DKA, therapeutic . response and extent .of recovery in ketosis is not parallel, so this test is not very useful in monitoring the treatment. Nitroprusside reacts chiefly with acetoacetate, to a lesser extent with acetone and not at all with B-hydroxybutyrate. Usually ratio of B-hydroxybutyrate to acetoacetate is 3: 1 and may reach up to 7: 1 in severe hypoxia or shock.

With proper treatment in OKA patients with shock-hypoxia, . circulation is reestablished and tissue oxygenation is restarted. This leads to conversion of large amount of the accumulated B-hydroxybutyrate to acetoacetate with clinical recovery of the patient. But as the test picks up only acetoacetate and not at all with B-hydroxybutyrate, although total ketone concentration is . falling, paradoxicall"y ketosis may seem to WOr?en.

pH and anion gap

Therapeutic progress can be more accurately. monitored with se~um pH and a~ion gap measurement Rise in the pH and normalization · of increased anion gap suggests response to . therapy. If the anion remains elevated ahd pH is persistently low, this indicates insulin resistance and requires an aggressive increase in the amount of insulin needed. ·

6. Supportive treatment

Supportive treatment is discussed later, along with treatment of hyperglycemic, hyperosmolar nonketotic coma. CH. 5

Fluid Therapy in Diabetes Mellitus

183

Hyperosmolar Nonketotic Coma (HO~K) ; .. .

Hyperglycemic, hyperosmolar rionketotic coma (nonketotic hyperdsmolar syndrome) is usually a complication of NIDDM· in the elderly, in whom severe dehydration and severe hyperglycemia occurs without the development of ketoaCidosis.

This syndrome occurs over a longer interval than. OKA, usually in the patient unable to .drink sufficient amount of water to keep up with the t.frinary fluid loss. A full blown picture does not occur until volume depletion has b~c ome

severe en9ugh to decrease urine output. The severe . glycemia is p·artly caused by decreased renal glucose excretion due to either intri'nsic

underlying renal disease or due to decreased glomerular filtration. and prerenal azotemia secondary to marked dehydration.

When ketoacidosis occurs nausea, vomiting and air hunger brings the patient to the physician before extreme dehydration occurs. As ketoacidosis is absent, clinical symptoms are mild at the early stage and so dicl'griosis is delayed. Usual precipitating factors are drugs (steroids, mannitol, diuretics, and phenytoin) infections or cerebrovascular accident.

..

.-**Diagnosis**

1. Variable CNS symptoms (disorientation to coma).
2. Severe dehydration - hypovolemia.
3. Hyperglycemia, blood sugar > 600 mg/di
4. Absence of ketonemia and acidosis.
5. Plasma osmolality > 320 mOsm/kg
6. Severe azotemia.

Treatment

Therapy of hyperosmolar nonketotic coma should include correction of fluid and . electrolyte deficit, correction of hyperglycemia and hyperosmolarity. Even with the best possible treatment mortality is very high (75°/

0). 184

CH. 5

Fluid Therapy in Diabetes Mellitus

a Fluid therapy

. The most important measure is rapid administrati~n of large amount of intravenous fluid to reestablish the circulation and unne flow. The.aver.age fluid deficit is 10-11 litres. Initially 0.9°/o isotonic salin.e without additive ' is pr.eferred to correct fluid deficit and 2-3 litres is given in the first ? hours. Subsequently, half strength (0.45°/o) saline can be used to correct relative free water deficit. As hyperglycemia i.s controlled and blood glucose reaches to 300 mg/di, 5°/o-dextrose is s~arted, especially to ·correct intracellular dehydration (to supply tree water). Dehydration in hyperosmolar nonketotic coma is usually more severe than in OKA and 'approximately 12°/o of total body weight fluid ' replacement is required in first 12-24 hours.

b. Insulin treatment

To control severe hyperglycemia, insulin therapy preferably by infusion is given in similar way to OKA. Larger dose of insulin may be necessary . especially in obese patient.

c. Electrolyte management

Potassium salts are usually required earlier in the treatment . of hyperosmolar nonketotic coma than in OKA because the intracellular shift of plasma potassium during therapy is accelerated in the absence of acidosis. If lactic acidosis is present, sodium bicarbonate should be given until tissue perfusion is reestablished. Method and need of administering electrolytes and bicarbonates is similar to OKA.

d. Monitoring of therapy

Blood sugar sh~uld be monitored half or one hourly and electrolytes frequently. Detarls of therapy, vital data, urine output and laboratory parameters are recorded in continuous flow sheet.

e. Supportive treatment

Oth~r additional supportive measur~s to be kept in mind are :

1. Nasogastric tube in unconscious patient.

2. CVP line in patient with cardiovascular disease.

3. Plasma or plasma expander in persistent hypotension.

4. Low dose heparin in comatose obese patient to prevent deep vein thrombosis.

5. Recognition and treatment of precipitating factors i.e. drugs (steroids, mannitol, diuretics'. and phenytoin), infections or cerebrovascular accident.

6. Antibiotics, if infection i~ detected or suspected~

7. ECG : Cardiac monito"ring as a guide to potassium therapy.

a. Bladder catheterization if sensorium is altered.

9. Frequent monitoring of pulse, BP, respiralion and level of consciousness.

FLUID THERAPY IN CHILDREN

Fluid therapy ln children needs better understanding and more careful planning as compared to dults because in children fluid requirement is higher and they are more prone to dehydration.

When to *give I.* V. fluid ?

A. *Oral fluid* replacement is *always* a safe and preferred mode. The indications of I. V. *fluid* therapy are shock, severe dehydration, *uncontrolled* vomiting or diarrhoea, inability to drink, paralytic ileus abdominal distension, impaired sensorium and serious complications.

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Factor	**Mild Dehydration**	**Moderate Dehydration**	**Severe Dehydration**
*Consciousness level	Fully Conscious	Restless, irritable	Lethargic, unconscious
*Ability to drink	Drinks normally	Eager to drink	Unable to drink
*Skin turgor	Instant recoil	Delayed 2-4 sec	Markedly delayed > 4 sec
Capillary refill	Normal < 2 sec	Delayed 2-4 sec	Markedly delayed > 4 sec
Note: Blood pressure mostly remains to be normal even in severe dehydration unless patient develops shock when it drops or may be undetected.			
* Indicates major criteria, there are also minor criteria: depressed fontanel if still open, sunken eyes, absent tears, dry tongue and mucus membrane, tachycardia, decreased or absent urine output.			

SIGNS	CLASSIFY AS	IDENTIFY TREATMENT (Urgent pre-referral treatments are in bold print.)
Two of the following signs: • Lethargic or unconscious • Sunken eyes • Not able to drink or drinking poorly • Skin pinch goes back very slowly	**SEVERE DEHYDRATION**	➤ If child has no other severe classification: — Give fluid for severe dehydration (Plan C). OR **If child also has another severe classification:** **— Refer URGENTLY to hospital with mother giving frequent sips of ORS on the way.** **Advise the mother to continue breastfeeding** ➤ **If child is 2 years or older and there is cholera in your area, give antibiotic for cholera.**
Two of the following signs: • Restless, irritable • Sunken eyes • Drinks eagerly, thirsty • Skin pinch goes back slowly	**SOME DEHYDRATION**	➤ Give fluid and food for some dehydration (Plan B). ➤ **If child also has a severe classification:** **— Refer URGENTLY to hospital with mother giving frequent sips of ORS on the way.** **Advise the mother to continue breastfeeding** ➤ Advise mother when to return immediately. ➤ Follow-up in 5 days if not improving.
Not enough signs to classify as some or severe dehydration.	**NO DEHYDRATION**	➤ Give fluid and food to treat diarrhoea at home (Plan A). ➤ Advise mother when to return immediately. ➤ Follow-up in 5 days if not improving.

A. *Aims* of parenteral fluid therapy are :

1. To correct *fluid* and *electrolyte* deficit

2. To provide maintenance requirements

3. To *replace* ongoing losses

Maintenance fluid and electrolyte requirements

b.

From body weight:

Maintenance requirements calculated as per the body weight is easy to remember and convenient to calculate.

1. Water requirement :

For 1st 1 O kg body weight = 100 ml/kg/day

For 11-20 kg body weight = 1000 ml + 50 ml/kg/day

Above 20 kg body weight = 1.500 ml + 20 ml/kg/day

Example : A 25-kg child will require

2.

Sodium:

10 kg. x 100 + next 10 kg x 50 + rest 5 kg x20

= 1 ,000 + 500 + 100

= 1,600 ml of total fluid

3 mEq/kg or 2-4 m'Eq/100 nil of fluid (as 0.45°/o, 0.33% or 0.2°/o NaCl, which contains 7.5 mEq, 5 mEq and or 2.5 mEq sodium/100 ml of fluid respectively) .

. 3. .Potassium :

2 mEq/kg or 2-4 mEq/100 ml of fluid.

4. Calorie requirement :

100 Kcal for first 1 O kg.

50 Kcal for next 1 O kg.

20 Kcal for remaining weight (above 20 kg.)

A. Modification in normal requirements are :

Decreased requirement : With oligo-anuria, meningitis due to

excessive ADH release and high humidity atmosphere. CH. 8 : Fluid Therapy in Children

3. It contains 28 mEq/L of acetate which will get converted into

bicarbonate by liver and will co'rrect' associated metabolic

acidosis.

4. It will also supply magnesium and phosphate.

5. It contains ·so g/L of glucose which provides caloric requirement

of the child . .

Conclusions :

1. For a child upto 12-13 kg. weight lsolyte-P is ideal.

2. ~or a child with 15-20 kg. or more weight needs lsolyte-P +

additional Na supplementation or I. V. fluid with higher Na

concentration.

A. a. 5°/o-dextrose : As it provides only water and glucose but no

electrolytes, child is at risk of developing hyponatremia and hypokalemia.

b. Isotonic saline or DNS : Normal requirement of sodium in children is roughly 30 to 50 mEq/L (30 mEq/L in young children with lesser weight i.e. 1 O kg, while 45 mEq/L in older children with greater weight i.e. 30 kg), sodium concentration of isotonic saline or DNS is 154 mEq/L (which is 3 to 5 times greater than normal requirement). So maintenance fluid therapy exclusively with it will lead to hypernatremia. Moreover it does not contain any potassium, therefore hypokalemia can occur. So it is not a preferred fluid for maintenance fluid therapy in children.

c.- Ringer's lactate : Ringer's lactate contains 130 mEq/L of sodium, 4 mEq of potassium and does not contain any glucose. As sodiU concentration of RL is 3-4 times greater than the requirement children, ·so RL as maintenance fluid will lead to hypernatre Moreover potassium concentration is very Jess (4 mEq/L Vs t required concentration of 20 mEq/L), so the child will be prone to develop hypokalemia. As RL is free of dextrose chi)d is prone to develop hypoglycemia and starvation ketosis. So RL is not a

suitable agent for maintenance fluid therapy in children.

10°/o dextrose with calcium gluconate (1-2 ml/kg/dose 6 houriy or 100-200 mg for every 100 ml) is the fluid of choice. (10°/o calcium gluconate, 10 ml ampoule contain 4 mEq = 224 mg calcium) The amount of 10°/o dextrose administered is 60-80 ml/kg on the first day with 10°/o increment everyday till it reaches to 160-180 m\/kg/day. Infant receiving phototherapy requires 25°/o increment in daily fluid requirement. No electrolytes are required for the first two days. Later on Na 3 mEq/kg/day and potassium 2 mEq/kg/day are added. So at this stage 1 /5 (0.2°/o) isotonic saline with added potassium chloride or lsolyte-P are suitable 1.V. fluids.

Initial Treatment

A. Aims of initial fluid therapy are :

1. To treat shock

2. To achieve haemodynamic stability

3. To improve tissue perfusion

A. Guidelines for initial fluid therapy are :

1. In shock stage, initial treatment remains the same in iso/ hypo/hypernatremic dehydration. Subsequent treatment differs as per the clinical and biochemic~I status.

2. If shock is present du(ing first hour 20-30 ml/kg isotonic saline or Ringer's lactate is infused. Same dose is repeated if

nec~ssary till pulse is well palpated.

3. After one hour if shock does not improve 1 O ml/kg, 5°/

4. If patient is asymptomatic and/or dehydration is isotonic or hyponatremic, one half of the calculated fluid for 24 hours should be administered in the first 8 hours. The remaining half should be administered in the remaining 16 hours.

Total fluid required= fluid deficfr +maintenance fluid.

5.

Ongoing losses should be assessed frequently and should be added to replacement of deficit and maintenance fluid and electrolytes. In febrile child there is additional 12°/o need of maintenance fluid which should also be calculated and added.

6.

Establishment of normal urine output (2 ml/kg/hour or 50 ml/kg/24 hours) suggests adequate tissue perfusion and reflects adequate fluid replacement. An urine output less than 0.5 ml/kg/hour suggest pathological oliguria and requires assessment to rule out inadequate hydration, development of renal failure or other causes.

7. Along with fluid therapy, specific treatment for the underlying etiology should also be started as early as possible.

Selection of fluid

To correct shock and to increase tissue perfusion the fluid which

rapidly expands volume of extracellular fluid, especially plasma, will be most preferred (see Chapter No. 4). Till urine output is established isotonic saline is the fluid of choice. On failure, 5°/o albumin may be required to treat shock.

In patient with shock, once urine output is established Ringer's lactate is the preferred I. V. fluid because :

1. It's composition is most physiological so avoids fluid electrolyte distur~ances even with rapid infusion.

2. Lactate in RL gets converted into bicarbonate so corrects associated metabolic acidosis, especially in cases of diar~hoea.

However, AL is av~ided in ~evere shock because impaired hepatic conversion of lactate can lead to lactic acidosis, rather than correction of acidosis. RL is also avoided in vomiting 242 induced dehydration where associated metabolic alkalosis gets aggravated by conversion of lactate to bicarbonate.

A. No. Though lsolyte-P is freely available and the most widely used fluid in pediatric practice, lsolyte-P should never be used in the initial treatment of shock, as it has definitive disadvantages.

1. Sodium content of lsolyte-P is just 1 /6 of Isotonic saline (25 mEq/L Vs 154 mEq/L of Na in isotonic saline) hence it's ability to expand the compromised intravascular

~olume and shock will be very poor.

2. Due to low sodium concentration, lsolyte-P can lead to hyponatremia and may worsen the general condition.

3.

lsolyte-P being rich in potassium (20 mEq/L) increases risk of hyperkalemia specially when renal functions are compromised. So use of lsolyte-P can be dangerous with unknown renal status or till the urine output is established.

A. No. 5%-dextrose should not be used to treat the initial phase of shock because

1. 1 litre of D-5o/o increases just 83 ml of intravascular volume (which decides blood pressure), so it is useless to select 'this fluid in the initial treatment.

2. It does not contain any electrolytes, especially sodium, so it will lead to gross electrolyte disturbances. If *?-5°!* is selected as a sole agent for fluid replacement, it can be life threatening.

3. Rapid infusion of So/a-dextrose (> 0.5 gms/kg/hr) w!ll cause osmotic diuresis, which is undesirable and 15 detrimental. n severe dehydration large volume of fluid at rapid rate is required. Rapid infusion of dextrose con•aining fluids i.e. lsolyte P, 5o/o-dextrose etc.) can cause hyperglycemia and subsequent

osmotic diuresis vhich leads to fluid loss and impairs correction of dehydra ·ion. Ho vever dextrose In water can be given I. V. at the rate of 0.5 gm/Kg body\ eigh r without causing glycosuria. Exceptions o this rul e are infants and sic, and malnourished children .1ith less glucose storage. As they are more prone to de 1elop h . poglycemia even the iinit.ial fluid should contain glucose.

A. _ The *fluid* deficit in severe dehydration is about 1 Oo/o of body weight *i.e.* 100 ml/kg, which should be infused as follows :

Infants

rnfant should be given I. V. fl _uid at the rate of 30 ml/kg in first hour, followed by 70 ml/kg in the next 5 hours, thus providing a total of 100 ml/kg in 6 hours.

Older children

Older children should be given l.V. fluid at the rate of 30 ml/ kg within first 30 minutes, followed by 70 ml/kg in the next 2.5 hours, thus providing a total of 100 ml/kg in 3 hours.

After the first 30 ml/kg l.V. infusion, a strong radial pulse should be easily felt. If it is still very weak and rapid, a second infusion of 30 ml/kg should be given at the same rate.

~· After initial stabilisation with AL, most of the children with good oral acceptance are treated with oral rehydration solution (ORS). l.V. fluids are continued in

exceptional cases of nonacceptance of ORS. Type of I. V. fluid selected subsequently depends on the type of dehydration and it's magnitude. In absence of deficit lsolyte-P is preferred.

A. Fluid and . sodium defici_t is corrected slowly in the first 24 to 48 hours, while ~ota~sium deficit in 3 to 4 days. ~sually potassium sup pl e~entat1on ts started after first 24 hours. However, early potassium replacement is necessary with proven hypokalerriia o~ when severe hypokalemia is expected as in severe vomiting with hypochloremic alkalosis, prolonged diarrhoea or diabetic ketoacidosis.

Sodium bicarbonate should be given if serum bicarbonate is below 15 mEq/L. Amount of sodabicarb req~ired (in mEq/L) == 0.4 x body weight (kg) x (desired HCO - measured HCO). The fluid selected is on the basis of underlying etiology and the sodium status of the child. Ringer's lactate is preferred in patient with diarrhoea induced dehydration while isotonic saline is the suitable initial fluid to treat vomiting induced dehydration.

On the basis of sodium status of a child fluid deficit is classified as lsonatremic, Hyponatremic or Hypernatremic dehydration. Table No. 8.4 provides guidelines about amount of fluid and N~ deficit, which enables us to select the right fluid for replacement. Clinically, patients with hyponatremic dehydration are haen:'odynamically

most unstable, while those with hypernatremic dehydration are least unstable.

After proper calculation, sodium concentration in th e fluid to be infused is determined and accordingly fluid is selected. lmpro~er selection of fluid may cause either hypernatremia or hypona~remia. If NaHCO .. is given to treat acidosis, sodium replaced with _the same sho~ld be considered in the calculation. 100 ml of. ~ NaHCO contains 90 mEq of sodium.

VALUE ADDED COURSE

FLUID THERAPY

Annexure II

STUDENT ENROLLMENT LIST (JULY-DECEMBER 2019)

S.No.	University no	Name of the student	Year / CRRI	Signature
1.	U15MB330	NAVEEN ANUSH .R	IVth	Naveen Anush
2.	U15MB331	NAYANA.G.CHANDRAN	IVth	Nayana Chandran
3.	U15MB332	NIVEDHITHA .A.N	IVth	Nivedhitha
4.	U15MB333	NIVETHA. S	IVth	Nivetha
5.	U15MB334	NIVETHITHA. R.N.	IVth	Nivethitha
6.	U15MB335	PADMA SUNDARI.P	IVth	Padma Nila
7.	U15MB336	PIRAI NILA. M	IVth	Pirai Nila
8.	U15MB337	PRAJEETH BALAGE. B	IVth	Prajeeth Balage
9.	U15MB338	PRAKASH .M	IVth	Prakash
10.	U15MB339	PRATIBA SHRUTHY. M	IVth	Pratiba Shruthy
11.	U15MB340	PRAVEEN. R	IVth	Praveen
12.	U15MB341	PREETHIKA. R	IVth	Preethika
13.	U15MB342	PRIYADHARSHINI .R	IVth	Priyadharshini
14.	U15MB343	RAGHAVI .B.R	IVth	Raghavi
15.	U15MB344	RAJESH .K	IVth	Rajesh
16.	U15MB345	RAKESH.R	IVth	Rakesh
17.	U15MB346	RAM KUMAR. S	IVth	Ram Kumar
18.	U15MB347	RAMRAJ. D	IVth	Ramraj
19.	U15MB348	RATCHAKESH. R	IVth	Ratchakesh
20.	U15MB349	REVANTH. C	IVth	Revanth

DEPARTMENT OF ANAESTHESIOLOGY
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
OSUDU, KUDAPAKKAM, PUDUCHERRY-605 502

RESOURCE PERSON

DR. CHANDRASEKAR

COORDINATOR

Dr M KALASREE

Head of Dept. Anaesthesiology
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry -605 502.

Annexure III

MCQS FLUID THERAPY

1. The quantity of glucose in 5% dextrose

a. 32g

b. 50g

c. 41g

d. 5g

2. Correction of hypoglycemia is done by

a.50% dextrose

b.75% dextrose

c.25% dextrose

d 100%dextrose

3. Which of the following is colloid

a. RL

b. DNS

c. Hetastarch

d. Platelet

4. ECG changes in hyperkalemia

a. Wide QRS complex

b. T wave inversion

c. Flattened T wave

d. Tall T wave

5. Features of modearte hypovolemia

a. Dizziness

b. Weaknesss

c. Oliguria < 400ml/day

d. All of the above

6. Assessment of dehydration

a. Dry tongue

b. Loss of skin turgor

c. Sunken eyes

d. All the above

7. Normal serum potassium level

a.1-2 meq/l

b.8-10 meq/l

c.3.5-5.5meq/l

d.None of the above

8. Total body sodium for normal adults

a. 6500 mg

b. 5000mg

c. 4000mg

d. 3000mg

9. Fluid therapy is measured using

a. SpO_2

b. $EtCO_2$

c. CVP

d. None

10. RL is unsafe in following disorder

a. Liver disorder

b. Respiratory disorder

c. Renal disorder

d. Gynaecological disorder

PADMA Sundari. P

Annexure III

MCQS FLUID THERAPY

8/10

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d. None

10. RL is unsafe in following disorder

a. Liver disorder

b. Respiratory disorder

c. Renal disorder

d. Gynaecological disorder

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Annexure III

MCQS FLUID THERAPY

7/10

1. The quantity of glucose in 5% dextrose

a. 32g

b. 50g

c. 41g

d. 5g

2. Correction of hypoglycemia is done by

a.50% dextrose

b.75% dextrose

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d. None

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c. Renal disorder

d. Gynaecological disorder

Annexure V

Student Feedback Form

Course Name: **FLUID THERAPY**
Subject Code: **ANAES 11**

Name of Student: _____ Roll No.: _____

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear					
2	Course contents met with your expectations					
3	Lecturer sequence was well planned					
4	Lectures were clear and easy to understand					
5	Teaching aids were effective					
6	Instructors encourage interaction and were helpful					
7	The level of the course					
8	Overall rating of the course	1	2	3	4	5

*** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory**

Suggestions if any:

Annexure V

Student Feedback Form

Course Name: **FLUID THERAPY**
Subject Code: **ANAES 11**

Name of Student: Praveen. R Roll No.: U15MB340

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear				✓	
2	Course contents met with your expectations				✓	
3	Lecturer sequence was well planned					✓
4	Lectures were clear and easy to understand			✓		
5	Teaching aids were effective					✓
6	Instructors encourage interaction and were helpful				✓	
7	The level of the course			✓		
8	Overall rating of the course	1	2	3	4	5

*** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory**

Suggestions if any:

Good.

Annexure V

Student Feedback Form

Course Name: **FLUID THERAPY**
Subject Code: **ANAES 11**

Name of Student: Nivedhitha · A · N Roll No.: U1SMB332

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear			✓		
2	Course contents met with your expectations				✓	
3	Lecturer sequence was well planned					✓
4	Lectures were clear and easy to understand				✓	
5	Teaching aids were effective					✓
6	Instructors encourage interaction and were helpful				✓	
7	The level of the course					✓
8	Overall rating of the course	1	2	3	4	5

*** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory**

Suggestions if any:

Excellent.

Date:02.12.2019

From
Dr. M Kalasree
Head Of Department Incharge
Department of Anaesthesia
Sri Lakshmi Narayana Institute of Medical Sciences
Puducherry

To
The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Puducherry

Sub: Completion of value-added course: Fluid Therapy

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: Fluid Therapy in July- Dec 2019 for 20 students. We solicit your kind action to send certificates for all the participants, whose name list is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards,

Dr. M Kalasree

Encl: Certificates

Photographs

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that ___NIVETHA S_____ has actively participated in the Value Added Course on Fluid Therapy held during July - December 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr.CHANDRASEKAR
RESOURCE PERSON

Dr. M KALASREE
COORDINATOR

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that ____RAJESH K_____ has actively participated in the Value Added Course on Fluid Therapy held during July - December 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. CHANDRASEKAR
RESOURCE PERSON

DEPARTMENT OF ANAESTHESIOLOGY
SRI LAKSHMI NARAYANA INSTITUTE
OF MEDICAL SCIENCES
OSUDU, KUDAPAKKAM, PUDUCHERRY-605 502

Dr. KALASREE M
COORDINATOR

Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry - 605 502.


FLUID THERAPY
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VALUE ADDED COURSE

1. Name of the programme & (Code)

Doping (**FMT- VAC 09**)

2. Duration & Period

30 hrs & July 2019 to December 19 and Jan 2020 to June 2020

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Multiple choice questions- *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

2

8. Year of discontinuation: 2020

9. Summary report of each program year-wise

Value Added Course- July 2019 - June 2020					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	FMT-09	**Doping**	Dr. S.N.Rathod	2nd MBBS	20 (July 2019 – Dec2019)
2	FMT-09	**Doping**	Dr. S.N.Rathod	2nd MBBS	20 (Jan 2020- June2020)

10. Course Feed Back

Enclosed as Annexure- V

RESOURCE PERSON **COORDINATOR**

DOPING

PARTICIPANT HAND BOOK

COURSE DETAILS

Particulars	Description
Course Title	Doping
Course Code	FMT VAC 09
Objective	1. Introduction to Doping 2. Most common doping substances and techniques 3. Other at risk populations for doping 4. Overview and different trends of doping 5. Anabolic steroids 6. Human Growth Hormone
Further learning opportunities	Forensic aspects of doping and Pharmacology
Key Competencies	On successful completion of the course the students should be able to diagnose and investigate doping related issues
Target Student	2nd yr MBBS Students
Duration	30hrs Every July 2019– Dec 2019 & Jan 2020 – June 2020
Theory Session	22hrs
Practical Session	8 hrs
Assessment Procedure	Multiple choice questions

1.Introduction to doping:

Doping is now a global problem that follows international sporting events worldwide. International sports federations, led by the International Olympic Committee, have for the past half century attempted to stop the spread of this problem, with little effect. It was expected that, with educational programs, testing, and supportive medical treatment, this substance-abusing behavior would decrease. Unfortunately, this has not been the case. In fact, new, more powerful and undetectable doping techniques and substances are now abused by professional athletes, while sophisticated networks of distribution have developed. Professional athletes are often the role models of adolescent and young adult populations, who often mimic their behaviors, including the abuse of drugs. This review of doping within international sports is to inform the international psychiatric community and addiction treatment professionals of the historical basis of doping in sport and its spread to vulnerable athletic and non-athletic populations.

The creed of the Olympics states: "The important thing in the games is not winning but taking part. The essential thing is not conquering, but fighting well". As noble a goal as this is, it has little to do with the reality of the modern sports world. Athletes are rewarded for winning at virtually every level of competition. Second place is viewed as the "first loser". A coach's job security is directly related to his team's success, not that they are simply "fighting well". Given this reality, it is not surprising that athletes and coaches will sacrifice and risk a great deal in order to obtain a competitive edge and enhance performance at all costs. Performance enhancement in olympic and professional sport has now become a medical, ethical, and legal problem for modern athletes and athletic organizations. This is primarily due to the amount of money associated with winning in today's sports industry. Multimillion dollar contracts, appearance fees, international endorsement and sports merchandising represent a billion dollar industry that offers today's athletes, their sponsors and entourage previously unheard of financial gains. When Sports Illustrated interviewed a cohort of elite olympic athletes, one of the questions was: "If you were given a performance enhancing substance and you would not be caught and win, would you take it?". 98% of the athletes responded "Yes". The more chilling question was: "If you were given a performance enhancing substance and you would not be caught, win all competitions for 5 years, then die, would you take it?". More than 50% said "Yes" .

Athletic performance enhancement can be gained using various diets, training routines and hard work. However, it can and has been achieved since ancient competitions by using a wide variety of physiological, mechanical and pharmacological doping techniques. As prize money and endorsement rewards increased, so did the science and abuse of performance-enhancing techniques. Today no sport is spared the cloud of cheating using illegal performance enhancement. Driven by the millions of dollars now routinely available for winning a sporting event, unethical pharmacists, medical professionals, trainers and sports organizations have worked secretly, and at times without their athletes' consent, to develop sophisticated doping programs where performance is optimized, often at the risk of the athletes' health. Now, these same doping programs are moving out of the professional sports market to our youth and other at-risk populations at alarming rates.

There are several hundred forms of known and potentially more unknown doping substances and techniques abused by professional athletes worldwide. This review will provide a summary of the history of doping in sport, and focus on the most commonly abused substances: anabolic androgenic steroids, human growth hormone (hGH) and erythropoietin (EPO).

2.Most common doping substances and techniques:

There are literally hundreds of known doping substances and an equal number of designer, veterinary, and yet to be identified drugs and techniques abused in sports today. The 2006 WADA list of prohibited substances includes the following major categories: anabolic agents (i.e., exogenous anabolic androgenic steroids such as androstendiol, boldenose, closterbol and danazol; endogenous anabolic androgenic steroids such as dihydroxytestosterone and testosterone, and other anabolic agents such as clenbuterol and tibolone); hormones and related substances (i.e., EPO*, hGH*, insulin-like growth factors, mechno growth factors, gonadotropins, insulin and corticotrophins); beta-2 agonists (i.e., terbutaline, salbutamol, etc.); agents with anti-estrogenic activity (i.e., anastrozole, letrozole, clomiphene, etc.); diuretics (furosemide, hydrochlorothiazide, etc.) and other masking agents (such as epitestosterone, probenecid, plasma expanders, etc.); stimulants (amphetamines, ephedrine, cocaine, etc.); narcotics (morphine, oxycodone, etc.); cannabinoids (marijuana, hashish), and glucocorticosteroids (allowed externally but not internally). WADA also lists prohibited methods, including enhancement of oxygen transfer (blood doping, efaproxial, etc.), chemical and physical manipulation (tampering or substitution of sample) and gene doping. In addition, WADA prohibits alcohol and beta- blockers (in specific sports: archery, billiard, etc.) .

Testing for the above list of compounds is technically challenging, expensive and only performed by about 35 WADA-accredited laboratories worldwide. Steroids are still the most detected performance-enhancing drugs by WADA laboratories. However, because of the limitations of laboratory technology and sophistication of doping athletes to avoid detection, they may not be the most abused.

Anabolic androgenic steroids:

Anabolic androgenic steroids are naturally occurring male hormones involved in a wide range of physiological functions. Simply referred to as "steroids", they fall into two categories: endogenous or naturally occurring, like testosterone, and exogenous or synthetic, like danazol.

In 1923 Bob Hoffman formed the famous York Barbell Company in the United States. A dominant figure in US weightlifting, he published the *Strength and Health magazine* and sold health and food supplements in his gym. As a weightlifting coach, his success led to him being named the head coach of the US Olympic weightlifting team. At the 1954 World Championships in Vienna, he met with a Soviet colleague who told him of a synthetic form of testosterone developed by the Nazis which produced dramatic improvements in strength and power. He and his colleagues contacted Ciba Pharmaceuticals in pursuit of synthetic testosterone. Ciba had conducted a number of studies on the use of synthetic testosterone in pain patients and the physically disabled. This resulted in the development of danazol, which rapidly became a doping substance abused by weightlifters .

Although steroids were first reported to be abused in Olympic sports in the 1950s, the abuse of steroids in young male non-Olympic athletes was not reported until the 1980s. As demand increased, trafficking steroids at schools and gyms became common and the use of steroids was seen in younger and younger populations . Steroid sources included doctors, trainers, friends, the black market and foreign suppliers. In the United States, the Anabolic Steroid Enforcement Act of 1990 brought anabolic steroids under the record-keeping, reporting, security, prescribing, import and controls of the Controlled Substances Act. All manufacturers and distributors of steroids were required to register with the Drug Enforcement Agency. Other countries have similar laws on the manufacture and dispensing of steroids. However, the amount of illegal steroids entering the United States and distributed to athletic and at-risk populations has increased dramatically. It is now estimated to be an over 100 million US dollar black market for steroids in the US alone, with more than 80% manufactured in Mexico. Projecting these figures internationally suggests that the illegal steroid market alone approaches a billion US dollars annually, clearly making it a public health concern, especially for at-risk groups.

The serious side effects of steroids described in the medical literature include liver function abnormalities, liver and kidney tumors, endocrine and reproductive dysfunctions, testicular atrophy, lipid and cardiac effects and psychiatric symptoms . These consequences are exaggerated with the common doping practices using ten times or more the recommended medical dose, and multiple drugs or "stacking", e.g., steroids and EPO or hGH. Added to this, a new problem has emerged with the manufacture of "counterfeit" drugs by unregulated pharmacies, which are tainted with impurities, contain no medication, or are potentially harmful. Now, more so than in the past, when an athlete buys performance-enhancing drugs from a friend or at the gym, he will never know exactly what is being bought or taken. Steroids are sold on the internet ranging in price from $50 to $200 per regime, depending upon the type of steroid and doping program selected. These black market steroids may or may not contain any medication at all or may contain harmful material. Testing for steroids in urine is available at a few commercial clinical laboratories in the United States and can be obtained in the price range of $100-$200/test, depending upon the number of steroids screened.

Human growth hormone (hGH and rhGH)

hGH is a naturally occurring hormone produced by the anterior pituitary gland and is one of the major hormones influencing growth and development. Harvey Cushing discovered the hormone in 1912 and isolated it from human and monkey cadaver brains in 1956. Two years later it was used to treat dwarfism in children by injection. The unfortunate development of Creutzfeldt-Jakob disease, a degenerative brain disorder, in boys who were treated with cadaver growth hormone led to the discontinuation of all products derived from the human pituitary gland. Because of this ban, the abuse of hGH was rare in sport until the middle to the end of the 1980s. In 1985 Genentech received approval from the US Food and Drug Administration (FDA) to market Protropin for children with growth hormone deficiency. This was the first recombinant DNA form of growth hormone (rhGH) that was safer than cadaver extracts used in the past. Recombinant DNA technology made the production of pharmaceutical grade growth hormone easier and cheaper. Genetically engineered rhGH is now marketed as Nutropin, Humatrope, Genotropin, Norditropin, Saizen, and Tev-Tropoin. Most human growth hormone used in medicine and diverted to sports doping is now obtained by recombinant technology, and is simply referred to as hGH (but it may also appear as rhGH or HGH).

Unfortunately, cadaver extracts of pituitary hGH may still be in circulation. It has been reported that a Russian coach was arrested and, upon searching his apartment in Moscow, over 1000 cadaver pituitary glands were found preserved in a large container . Moreover, the problem of counterfeit drugs also exists with hGH: illegal pharmaceutical manufacturers are now flooding the black market with hGH vials of unknown quality and safety. It is estimated that an eight week performance enhancement regime of pharmaceutical grade rhGH will cost about $2000, well out of the range of an adolescent and the majority of weekend athletes. However, the increased trafficking of low cost counterfeit rhGH will create interest and experimentation in these at-risk populations. hGH is marketed on the internet in many forms: pills, drops and aerosol formulations; most are ineffective and shams. The normal route of administration of hGH is injection, posing an additional health risk of infection from non-sterile counterfeit drugs and the risk of HIV and hepatitis transmission caused by shared needles.

Olympic, professional and weekend athletes abuse hGH because of unsubstantiated reports that it is as effective as anabolic steroids with fewer side effects. They often abuse hGH as a steroid substitute to prevent loss of muscle after discontinuing the use of steroids. Ben Johnson admitted to using hGH along with steroids during investigations after his disqualification in Seoul. According to some controlled scientific studies, hGH does not increase muscle strength. Nevertheless, the abuse of hGH in sports is escalating, with large caches of needles and vials of hGH being confiscated at sporting events worldwide. Six months prior to the 2000 Olympic Games, a pharmacy in Sydney was broken into and 1,575 multiple dose vials of hGH were taken while nothing else was touched. Also, on their way to Australia, the Chinese swimming team were detained, as needles, syringes, and vials of hGH were found by customs officials in their baggage.

Using hGH may lead to life-threatening health conditions, especially since some estimates report that athletes who use hGH to enhance performance are taking 10 times the therapeutic dosage. Some reported side effects of hGH are abnormal bone growth, hypertension, cardiovascular disease, cardiomyopathy, glucose intolerance, colonic polyps, decreased life span, and cancer .

Since hGH is a naturally-produced hormone and rhGH is similar in structure, testing for doping with rhGH has been a technical challenge only recently solved by WADAcertified laboratories. Routine blood tests for hGH available at clinical laboratories will not differentiate hGH from rhGH and are of no value in determining if an adolescent or weekend athlete is doping.

Erythropoietin (EPO):

EPO is a naturally occurring hormone produced by the kidney that stimulates red blood cell production in the bone marrow in response to low circulating oxygen levels. It was not until 1977 that it was identified and extracted from human urine. This was concurrent with the development of recombinant DNA technology, and in 1989 Epogen was released in the United States and approved for the treatment of anemia. Procrit was licensed in 1991 for the treatment of chemotherapy-induced anemia. European formulations include Aranesp, Eprex and NeoRecorman.

EPO abuse in sport was believed to start as soon as the drug was available as a replacement for the older, more complex and dangerous doping technique referred to as "blood doping". In this technique an athlete donates his own blood several months before a competition, stores it and transfuses it back into himself prior to competing. This technique is fraught with problems and

health risk. EPO accomplishes this same effect by increasing red blood cells, which results in more oxygen in circulation. It was in 1998 at the Tour de France that French customs arrested Willy Voet, a physiotherapist of the Festina cycling team, for the illegal possession of needles, syringes and over 400 bottles containing EPO, hGH, steroids, amphetamines, narcotics and stimulants.

EPO used for medical treatments can cost thousands of US dollars a month and is administered by intravenous or subcutaneous injection. As with steroids and hGH, doping with EPO is often injected in supernormal doses that could cause increased blood viscosity, deep vein and coronary thromboses, cerebral thromboses, pulmonary embolism, arrhythmias, stroke and death. It has been estimated that 20 European cyclists have died since 1987 due to abuse of EPO, making it one of the most deadly doping agents. The genetically engineered form of EPO is indistinguishable from naturally occurring EPO, making routine blood testing useless to determine if an athlete is doping. At the 2000 Olympic Games in Sydney, the Australian WADA-certified laboratory first launched a sophisticated anti-doping test for EPO that required both urine and a blood sample. Over 300 tests were performed for EPO for the first time in Olympic history and no positives were reported. This could be due to the fact that the technology for the test was new and questions still existed about the assay.

3.Other at risk populations for doping:

Given the above history and current state of knowledge, it is not difficult to understand why there would be over a million abusers of steroids in the United States youth alone. Unlike professional athletes, these at-risk users will not have fame and fortune as a result of using steroids, only the side effects.

Pioneering studies in this area were done by Buckley et al in the early 1980s, when they interviewed 3403 male high school seniors nationwide . Their results reported in 1988 indicated that 6.6% of respondents had used steroids and more than two-thirds of the group started using steroids when they were 16 years old or younger. Twenty percent reported that health professionals were the primary source for obtaining steroids and 38% used injectable steroids. Pope et al studied 1,010 college men for use of steroids and also reported their findings in 1988 . The study found that only 2% of the respondents reported using steroids. The authors qualified their finding as potentially underestimating the true prevalence of steroid abuse. However, it is interesting to note that this study found that 25% of those reporting using steroids were not athletes. They abused steroids to improve personal appearance, a problem that continues today and is fueled by the media and "anti-aging" marketing. A review of published reports concluded that 3-12% of high school students used steroids, and of the group of abusers about half were adolescent females.

Contrary to popular belief and supported by Pope's early findings, steroid abuse is not exclusively related to performance enhancement. DuRant et al reported in 1993 that steroid abuse in ninth graders was associated with use of cocaine, injected drugs, alcohol, marijuana, cigarettes and smokeless tobacco . They then reviewed the 1991 Centers for Disease Control and Prevention Youth Risk Behavior Survey of over 12,272 male and female public and private high school students, and confirmed the earlier finding that there is an association between steroid abuse and multiple drug abuse. In a later review of the 1997 Centers for Disease Control and Prevention Youth Risk Behavior Survey of 16,262 high school students, Miller et al reported no significant correlation in male or female steroid-abusing high school students with physical activity, nor were athletic participation or

strength conditioning alone associated with lifetime steroid abuse . Rather, they found that athletic participation was less of a factor than behavior problems such as substance abuse, fighting, binge drinking, tobacco use and high risk sexual behavior. They suggested steroid abuse may be part of a much larger syndrome of problem behaviors. In 2002, Irving et al confirmed Miller's report that physical activity was not associated with steroid abuse. This group shed light on the fact that male and female adolescent steroid abuse may also be associated with unhealthy attitudes and behaviors to lose, gain or control weight and body shape . Clancy and Yates reported that steroid abusers may have a unique set of clinical differences and are distinct from other drug abusers . Bahrke et al associated a number of personal high-risk behaviors and other factors with a partially developed profile of an adolescent anabolic steroid abuser.

What has become evident is that not only high school and weekend athletes are potential steroid abusers. Steroid abuse may also include a wider population of non-athletes who have behavioral problems and may experiment with these now easily available performance-enhancing drugs. Their motivation may not be athletic enhancement, but rather cosmetic and body shaping purposes. To maintain youthful appearances, weekend athletes may experiment with hormones encouraged by "anti-aging" marketing, while adolescent females desirous of the long, lean female media images of "adult women" may use steroids and hGH to reduce fat and increase muscle tone.

4.Overview and different trends of Doping: Modern sports and the media's misplaced fixation on fame, fortune and winning at all costs have unintentionally created a growing market for doping substances. These substances, once only abused by elite athletes, are clearly spreading into our schools and health clubs worldwide. They are being accepted by a whole new generation of young customers who see reports daily in the newspapers of sports icons accused of abusing drugs only to continue playing, breaking records and claiming fortunes. These same performance-enhancing drugs are also abused by adolescents and weekend athletes and non-athletes who have wider behavioral and health risk problems. In addition, these drugs are now being abused by male and female adolescents for cosmetic purposes in an attempt to achieve the "cut" and sexy look promoted by the media. Continuing educational programs developed for these at-risk populations by national olympic organizations and athletic federations are important first steps to curb these dangerous behaviors . Testing for performance-enhancing drugs in high schools as a means of early detection, intervention and prevention is now being launched in New Jersey, with other states following their lead. Medical professionals, teachers, coaches and sports organizations must all be made aware of this continuing problem in our adolescent and at-risk populations and contribute to its solution by open, honest discussion. Most importantly, professional athletes must serve as role models and spokesmen for drug-free sport and lifestyle. This position must be actively supported by the media, owners of teams and international sports federations by providing consistent leadership and advocacy of anti-doping programs in sport, regardless of costs and consequences. Accepting the magnitude of doping in at-risk populations and developing education, prevention and treatment programs is the only way we can prevent the continuing spread of the abuse of doping in sport and its spread into the most fragile groups in our society, our youth and at-risk populations.

5. **Anabolic steroids:**

Anabolic steroids are synthetic, or human-made, variations of the male sex hormone testosterone. The proper term for these compounds is *anabolic-androgenic steroids*. "Anabolic" refers to muscle building, and "androgenic" refers to increased male sex characteristics. Some common names for anabolic steroids are Gear, Juice, Roids, and Stackers.

Image Anabolic steroids are synthetic, or human-made, variations of the male sex hormone testosterone. The proper term for these compounds is *anabolic-androgenic steroids*. "Anabolic" refers to muscle building, and "androgenic" refers to increased male sex characteristics. Some common names for anabolic steroids are Gear, Juice, Roids, and Stackers.

Image



Health care providers can prescribe steroids to treat hormonal issues, such as delayed puberty. Steroids can also treat diseases that cause muscle loss, such as cancer and AIDS. But some athletes and bodybuilders misuse these drugs in an attempt to boost performance or improve their physical appearance.

The majority of people who misuse steroids are male weightlifters in their 20s or 30s. Anabolic steroid misuse is much less common in women. It is difficult to measure steroid misuse in the United States because many national surveys do not measure it. However, use among teens is generally minimal. The 2016 NIDA-funded Monitoring the Future study has shown that past-year misuse of steroids has declined among 8th and 10th graders in recent years, while holding steady for 12th graders.

How do people misuse anabolic steroids?

People who misuse anabolic steroids usually take them orally, inject them into muscles, or apply them to the skin as a gel or cream. These doses may be 10 to 100 times higher than doses prescribed to treat medical conditions.

Commons patterns for misusing steroids include:

- cycling—taking multiple doses for a period of time, stopping for a time, and then restarting

- stacking—combining two or more different steroids and mixing oral and/or injectable types
- pyramiding—slowly increasing the dose or frequency of steroid misuse, reaching a peak amount, and then gradually tapering off to zero
- plateauing—alternating, overlapping, or substituting with another steroid to avoid developing a tolerance

There is no scientific evidence that any of these practices reduce the harmful medical consequences of these drugs.

How do anabolic steroids affect the brain?

Anabolic steroids work differently from other drugs of abuse; they do not have the same short-term effects on the brain. The most important difference is that steroids do not directly activate the reward system to cause a "high"; they also do not trigger rapid increases in the brain chemical dopamine, which reinforces most other types of drug taking behavior.

Misuse of anabolic steroids might lead to negative mental effects, such as:

- paranoid (extreme, unreasonable) jealousy
- extreme irritability and aggression ("roid rage")
- *delusions*—false beliefs or ideas
- impaired judgment
- mania

What are other health effects of anabolic steroids?

Anabolic Steroids and Infectious Diseases

People who inject steroids increase their risk of contracting or transmitting HIV/AIDS or hepatitis.

Aside from mental effects, steroid use commonly causes severe acne. It also causes the body to swell, especially in the hands and feet.

Long-Term Effects

Anabolic steroid misuse might lead to serious, even permanent, health problems such as:

- kidney problems or failure

- liver damage and tumors
- enlarged heart, high blood pressure, and changes in blood cholesterol, all of which increase the risk of stroke and heart attack, even in young people
- increased risk of blood clots

Several other effects are gender- and age-specific:

- In men:
    - shrinking testicles
    - decreased sperm count
    - baldness
    - development of breasts
    - increased risk for prostate cancer
- In women:
    - growth of facial hair or excess body hair
    - decreased breast size
    - male-pattern baldness
    - changes in or stop in the menstrual cycle
    - enlarged clitoris
    - deepened voice
- In teens:
    - stunted growth (when high hormone levels from steroids signal to the body to stop bone growth too early)
    - stunted height (if teens use steroids before their growth spurt)

Some of these physical changes, such as shrinking sex organs in men, can add to mental side effects such as mood disorders.

.

6**. Human Growth Hormone:**

GH is banned by the World Anti-Doping Agency as a performance-enhancing anabolic agent. Doping with GH likely began in the early 1980s and became more prevalent with the advent of recombinant technology well before any scientific evidence of benefit. The expectation that GH improves physical function stems from its anabolic and lipolytic properties. Athletic performance depends on muscle strength and the energy required to power muscle function. In recreational athletes, GH selectively improves anaerobic sprint capacity but has not been proven to significantly enhance muscle strength, power, or maximum rate of oxygen consumption. GH is secreted as a family of isoform peptides in a pulsatile manner reflecting intermittent secretion and rapid clearance. Its anabolic actions are largely mediated by IGF-I, which stimulates whole-body protein synthesis, including skeletal muscle and collagen proteins. Two methods have been validated for detecting GH abuse in athletes. The first (the isoform method) is based on distinguishing pure recombinant 22-kDa GH from the heterogeneous isoforms secreted from the pituitary. The second (the marker method) is based on measuring blood levels of GH-responsive proteins, specifically IGF-I and the N-terminal propeptide of type III collagen (P-III-NP). Only a handful of athletes have been caught since the implementation of GH doping tests in 2004. The low rate likely reflects the limitation of in-competition testing using current methods. Improved detection rates may be achieved by more out-of-competition testing, introducing athletes' biological passports, and the development of novel methods. Governance, operational, technical, and political factors influence the effectiveness of an anti-doping program.

Effects on Physical Performance:

This section reviews the outcomes of GH supplementation in athletes on four of the most common measures of physical performance: strength, power, endurance, and sprint capacity. We provide information on the assessment methodologies and select double-blind placebo control trials for analysis, unless otherwise stated.

Muscle strength:

Muscle strength is defined as maximal force (in newtons) or torque (in newton-meters) that is generated by a muscle or a group of muscles during maximal voluntary contraction. The force is determined by fast-twitch type II muscle fibers relying on preformed ATP for energy . Muscle strength is commonly assessed by measuring the force or torque produced during an isometric or isokinetic contraction. Isometric strength is the maximal voluntary contraction that can be developed against an immovable object without a change in joint angle, whereas isokinetic strength is a measure of torque/force through a range of motion in which the limb is moving at a constant velocity .

There is clear evidence that long-term replacement of GH normalizes muscle strength in adults with GH deficiency who have reduced isometric and isokinetic muscle strength . Whether the benefits are also seen in fit young adults has been investigated in three double-blind, placebo-controlled studies involving 83 healthy young adults treated with ∼2 to 3 mg/d of GH for between 6 and 12 weeks.

These studies assessed biceps strength , quadriceps strength , the strength of seven muscle groups , and isometric dead lift. These studies reported no significant effect of GH on muscle strength.

Effect on power:

Muscle power is defined as work performed per unit of time and is expressed in joules per second or watts. It is described in terms of aerobic and anaerobic power, depending on which energy source is predominantly used to do the work. Thus, muscle power can be assessed by measuring aerobic exercise capacity and anaerobic exercise capacity.

Aerobic exercise capacity:

Aerobic exercise capacity is a measure of endurance, that is, the muscle's ability to sustain work for a prolonged period with energy provided principally from mitochondrial oxidation of substrates. In the athletic world, it supports activities such as a marathon, football, and tennis, whereas in day-to-day life, it relates to activities such as walking. It is determined by the measurement of maximum rate of oxygen consumption (Vo_2 max) in L/min or mL/kg/min or maximal aerobic power output in watts or kilojoules during an incremental exercise test on a cycle ergometer or a treadmill.

Numerous double-blind, placebo-controlled and long-term open label trials have reported the positive effects on aerobic exercise capacity in adults with GH deficiency . However, there is no convincing evidence that Vo_2 max is affected by GH treatment in healthy young adults . Based on a review of three double-blind, placebo-controlled studies assessing GH treatment in >100 participants with doses of ∼2 to 3 mg/d, there was no treatment effect over placebo. The data indicate that GH supplementation in the doses used do not improve cardiorespiratory and muscle function in young healthy adults. Interestingly, in a double-blind, placebo-controlled, randomized trial in 56 recreational athletes, the administration of rhIGF-I combined with rhIGFBP3 led to a 7% increase in Vo_2 max with no significant change in body composition . The reasons for the different outcomes between GH and IGF-I supplementation are unknown but merit further study.

Anaerobic exercise capacity:

Anaerobic exercise capacity is defined as the total amount of work performed during a maximal exhausting exercise of a short duration that is powered by ATP supplied under anaerobic conditions. The Wingate test, which measures maximal power output during 30 seconds by cycle ergometry, is a widely used test of anaerobic capacity. Sporting activities that require short-term, high-intensity physical activity, such as sprinting, require considerable energy support from anaerobic ATP. All physical activities including activities of daily living also depend on anaerobic energy for initiation, for the first few seconds, before aerobic metabolism becomes the predominant energy source. Only one study has investigated the effects of GH on anaerobic exercise capacity. This double-blind, placebo-controlled study in recreational athletes reported a significant improvement of 3.8% in anaerobic exercise capacity after GH therapy for 8 weeks, as assessed by the Wingate test. When translated to proportionate time reductions, the 3.8% could equate to an improvement of 0.4 second in a 10-second sprint of 100 m or of 1.2 seconds in a 30-second swim of 50 m. This improvement occurred without a significant change in body cell mass or in muscle strength and power (jump height), suggesting that muscle anabolism is unlikely to explain the improvement in sprint capacity. Jump height represents instantaneous work whereas the Wingate test involves all-

out intensive exercise on a cycle ergometer for 30 seconds. Although both tests measure anaerobic power, the energy required for jumping is drawn from phosphocreatine stores whereas that for the longer Wingate test is drawn from phosphocreatine stores and ATP derived from glycolysis. Stimulation of ATP generation from anaerobic glycolysis enhances the production of lactate. The finding of higher lactate concentrations in people undergoing evaluation of physical capacity after GH treatment provides evidence that the anaerobic energy system is stimulated by GH. In a study , GH treatment significantly improved sprint capacity without affecting muscle strength or aerobic capacity in the same athletes under the same conditions. Along with previous studies in athletes reporting that GH treatment did not improve muscle strength or endurance, the collective evidence indicates that GH exerts a selective ergogenic effect on sprint capacity.

VALUE ADDED COURSE

Doping FMT VAC 09

4. List of Students Enrolled January 2020– June- 2020

2nd Year MBBS Student		
Sl. No	**Name of the Student**	**Reg No**
1	SUGANTHI CLARET D	U19MB381
2	SUJANA P	U19MB382
3	SURYAKANT BHARDWAJ	U19MB383
4	SUSHREE SANGEETA	U19MB384
5	SWATHI V	U19MB385
6	SWETHA HARIKUMAR	U19MB386
7	TANYA PACHORY	U19MB387
8	THENNARASU V A	U19MB388
9	TRIYAN HARSHIL SINGH	U19MB389
10	UBANISHA A	U19MB390
11	UGARSAN P	U19MB391
12	VAISNAVI R	U19MB392
13	VIJAY A M	U19MB393
14	VIJITHA VIJAYAN	U19MB394
15	VIMALAN D	U19MB395
16	VISHNUDEVAN V	U19MB396
17	R VISHVESHWER	U19MB397
18	XAVIER VASANTHA MARTINO P	U19MB398
19	YUKESH KANNA T	U19MB399
20	ZABIULLAH K A	U19MB400

RESOURCE PERSON **COORDINATOR**

VALUE ADDED COURSE

Doping FMT VAC 09

4. List of Students Enrolled July 2019– December- 2019

2nd Year MBBS Student		
Sl. No	**Name of the Student**	**Reg No**
1	SHREYASEE CHATTOPADHYAY	U18MB371
2	SHRI KIRTI RAAJA	U18MB372
3	SNEKA SE	U18MB373
4	SONALI HESSA	U18MB374
5	SOUMITRA MOHANTY	U18MB375
6	SREEHARI S NAIR	U18MB376
7	SREELEKSHMI S NAIR	U18MB377
8	SREENIDHI N B	U18MB378
9	SUBALAKSHMI V	U18MB379
10	SUDHARSAN .S	U18MB380
11	SUHAIL AHMAD	U18MB381
12	SUMAN KALYAN SAHOO	U18MB382
13	SUSMITA KHAN	U18MB383
14	SWAPNIL	U18MB384
15	SWARNAB JANA	U18MB385
16	SWATHI .K	U18MB386
17	TADAR YAMING	U18MB387
18	TECHI NADAM	U18MB388
19	THENDRAL NILAVAN .M	U18MB389
20	TINA CAROLINE J	U18MB390

RESOURCE PERSON **COORDINATOR**

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - IV

DOPING

MULTIPLE CHOICE QUESTIONS

Course Code: FMT 09

I. ANSWER ALL THE QUESTIONS

1) Anabolic Steroids benefit performance by
- **a)** increasing heart and respiratory rates and suppressing the symptoms of fatigue
- **b)** having a painkilling and sedating effect
- **c)** releasing hormones promoting growth, healing and body repair
- **d)** preventing the release of adrenaline

2) Stimulants benefit performance by
- **a)** increasing heart and respiratory rates and suppressing the symptoms of fatigue
- **b)** having a painkilling and sedating effect
- **c)** releasing hormones promoting growth, healing and body repair
- **d)** preventing the release of adrenaline

3) Some of the side effects of using anabolic steroids include
- **a)** suppressed appetite, increased blood pressure and body temperature
- **b)** addiction, suppressed appetite, toxicity
- **c)** impotency, infertility, arteriosclerosis, heart disease, liver and kidney cancer
- **d)** a damaging affect on endurance, heart disease

4) Sports which are well known for the use of diuretics
- **a)** Endurance Cycling
- **b)** Boxing
- **c)** Soccer
- **d)** Football

5) EPO is
- **a)** A hormone and widely used by endurance athletes
- **b)** A steroid and widely used by endurance athletes
- **c)** A hormone and widely used by power athletes

d) A steroid and widely used by power athletes

6) Codeine is an example of
- **a)** Diuretics
- **b)** Stimulants
- **c)** Narcotic analgesics
- **d)** Betablockers

7) Some of the side effects of using Betablockers include
- **a)** suppressed appetite, increased blood pressure and body temperature
- **b)** addiction, suppressed appetite, toxicity
- **c)** impotency, infertility, arteriosclerosis, heart disease, liver and kidney cancer
- **d)** a damaging affect on endurance, heart disease

8) Some of the side effects of using narcotic analgesic include
- **a)** suppressed appetite, increased blood pressure and body temperature
- **b)** addiction, suppressed appetite, toxicity
- **c)** impotency, infertility, arteriosclerosis, heart disease, liver and kidney cancer
- **d)** a damaging affect on endurance, heart disease

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that _____ has actively participated in the Value Added Course on *Doping* held during July 2019 – December 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr.S.N.Rathod

RESOURCE PERSON

Dr. Jayalakshmi

COORDINATOR

Student Feedback Form

Course Name: **Doping**

Subject Code: **FMT VAC 09**

Name of Student: _____ Roll No.: _____

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear					
2	Course contents met with your expectations					
3	Lecturer sequence was well planned					
4	Lectures were clear and easy to understand					
5	Teaching aids were effective					
6	Instructors encourage interaction and were helpful					
7	The level of the course					
8	Overall rating of the course	1	2	3	4	5

**** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory***

Suggestions if any:

Signature

Date:

Sri Lakshmi Narayana Institute of Medical Sciences
Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

Date: 2nd January 2020

From
Dr. S.N. Rathod,
Professor and Head,
Department of Forensic Medicine,
Sri Lakshmi Narayana Institute of Medical Sciences,
Bharath Institute of Higher Education and Research,
Chennai.

To
The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences,
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: Doping

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **Doping** from January 2020 – June 2020. We solicit your kind permission for the same.

Kind Regards

Dr. S.N. Rathod

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean:

The HOD:

The Expert:

The committee has discussed about the course and is approved.

Dean	Subject Expert	HOD
(Sign & Seal)	(Sign & Seal)	(Sign & Seal)

Sri Lakshmi Narayana Institute of Medical Sciences
Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

Circular

3rd January 2020

Sub: Organising Value-added Course: Doping

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research**, is organizing **Doping**(January 2020 to June 2020).

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before January 17th 2020. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

Encl: Copy of Course content and Registration form.

Course Proposal

Course Title: Doping

Course Objective: 1. Introduction to Doping

2. Most common doping substances and techniques

3. Other at risk populations for doping

4. Overview and different trends of doping

5. Anabolic steroids

6. Human Growth Hormone

Course Outcome: On successful completion of the course the students will be able diagnose and investigate and manage doping related issues.

Course Audience: 2nd year MBBS student

Course Coordinator: Dr. Jayalakshmi

Course Faculties with Qualification and Designation:

1. Dr. S.Prasanth Kumaran MBBS, MD (Forensic Medicine),
Assistant Professor

Course Curriculum/Topics with schedule (Min of 30 hours)

S.No	Date	Topic	Time	Hours
1	14-01- 20	Introduction to doping	2 pm to 5 pm	3
2	28-01- 20	Most common doping substances and techniques	2 pm to 5 pm	3
3	11-02- 20	Most common doping substances and techniques	2 pm to 5 pm	3
4	25-02- 20	Other at risk populations for doping	2 pm to 5 pm	3
5	08-03- 20	Overview of doping	2 pm to 5 pm	3
6	22-03- 20	Different trends of doping	2 pm to 5 pm	3
7	13-04- 20	Anabolic steroids-overview	2 pm to 5 pm	3

8	27-04-20	Anabolic steroids- overview	2 pm to 5 pm	3
9	24-05-20	Human growth hormone -overview	2 pm to 5 pm	3
10	08-06-20	Human growth hormone –overview	2 pm to 5 pm	3
			Total Hours	30

REFERENCE BOOKS: (Minimum 2)

1. Textbook of Doping

2. Handbook of Doping-current trends

Annexure 3

Bharath Institute of Higher Education and Research

Sri Lakshmi Narayana Institute of Medical Sciences,

Participant list of Value added course: **Doping on January 2020 – June 2020**

Sl.No	Reg.No	Name of the candidate	Signature
1.	U19MB381	SUGANTHI CLARET D	
2.	U19MB382	SUJANA P	
3.	U19MB383	SURYAKANT BHARDWAJ	
4.	U19MB384	SUSHREE SANGEETA	
5.	U19MB385	SWATHI V	
6.	U19MB386	SWETHA HARIKUMAR	
7.	U19MB387	TANYA PACHORY	
8.	U19MB388	THENNARASU V A	
9.	U19MB389	TRIYAN HARSHIL SINGH	
10.	U19MB390	UBANISHA A	

11.	U19MB391	UGARSAN P	
12.	U19MB392	VAISNAVI R	
13.	U19MB393	VIJAY A M	
14.	U19MB394	VIJITHA VIJAYAN	
15.	U19MB395	VIMALAN D	
16.	U19MB396	VISHNUDEVAN V	
17.	U19MB397	R VISHVESHWER	
18.	U19MB398	XAVIER VASANTHA MARTINO P	
19.	U19MB399	YUKESH KANNA T	
20.	U19MB400	ZABIULLAH K A	

Sri Lakshmi Narayana Institute of Medical Sciences
Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

Course/Training Feedback Form

Course: Doping
Date: January2020– June 2020
Name:
Reg NO.
Department: Forensic medicine and toxicology

Q 1: Please rate your overall satisfaction with the format of the course:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 2: Please rate course notes:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 3: The lecture sequence was well planned

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 4: The lectures were clear and easy to understand

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 5: Please rate the quality of pre-course administration and information:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 6: Any other suggestions:

Comments:

Thank you for taking the time to complete this survey, your comments are much appreciated.

***OPTIONAL Section*:** Name _____
Signature _____ Date _____

Sri Lakshmi Narayana Institute of Medical Sciences
Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

Date: 12-6-2020

From
Dr. S. N. Rathod
Forensic Medicine & Toxicology
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To
The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: Doping

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled **Doping** on January 2020– June 2020. We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards

Dr. Jayalakshmi

Dr. S.N. Rathod

Encl: Certificates

Photographs

Annexure 6 - SAMPLE CERTIFICATE TO BE ATTACHED



Sri Lakshmi Narayana Institute of Medical Sciences
Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that _____ has actively participated in the Value Added Course on "Moral Narration" held during July 2018 – Dec 2018 Organized by **Sri Lakshmi Narayana Institute of Medical Sciences**, Pondicherry- 605 502, India.

Dr. S.N. Rathod
RESOURCE PERSON

Dr. Jayalakshmi
COORDINATOR

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

Date: 2nd July 2019

From
Dr. S.N. Rathod,
Professor and Head,
Department of Forensic Medicine,
Sri Lakshmi Narayana Institute of Medical Sciences,
Bharath Institute of Higher Education and Research,
Chennai.

To
The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences,
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: Doping

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **Doping** from July 2019 – December 2019. We solicit your kind permission for the same.

Kind Regards

Dr. S.N. Rathod

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean:

The HOD:

The Expert:

The committee has discussed about the course and is approved.

Dean	Subject Expert	HOD
(Sign & Seal)	(Sign & Seal)	(Sign & Seal)

Sri Lakshmi Narayana Institute of Medical Sciences
Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

Circular

3rd July 2019

Sub: Organising Value-added Course: Doping

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research**, is organizing **Doping**(July 2019 to December 2019).

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before July 17th 2019. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

Encl: Copy of Course content and Registration form.

Course Proposal

Course Title: Doping

Course Objective: 1. Introduction to Doping

2. Most common doping substances and techniques

3. Other at risk populations for doping

4. Overview and different trends of doping

5. Anabolic steroids

6. Human Growth Hormone

Course Outcome: On successful completion of the course the students will be able diagnose and investigate and manage doping related issues.

Course Audience: 2nd year MBBS student

Course Coordinator: Dr. Jayalakshmi

Course Faculties with Qualification and Designation:

1. Dr. S.Prasanth Kumaran MBBS, MD (Forensic Medicine),
Assistant Professor

Course Curriculum/Topics with schedule (Min of 30 hours)

S.No	Date	Topic	Time	Hours
1	14-07- 19	Introduction to doping	2 pm to 5 pm	3
2	28-07- 19	Most common doping substances and techniques	2 pm to 5 pm	3
3	11-08- 19	Most common doping substances and techniques	2 pm to 5 pm	3
4	25-08- 19	Other at risk populations for doping	2 pm to 5 pm	3
5	08-09- 19	Overview of doping	2 pm to 5 pm	3
6	22-09- 19	Different trends of doping	2 pm to 5 pm	3
7	13-10- 19	Anabolic steroids-overview	2 pm to 5 pm	3

8	27-10-19	Anabolic steroids- overview	2 pm to 5 pm	3
9	24-11-19	Human growth hormone -overview	2 pm to 5 pm	3
10	08-12-19	Human growth hormone –overview	2 pm to 5 pm	3
			Total Hours	30

REFERENCE BOOKS: (Minimum 2)

1. Textbook of Doping

2. Handbook of Doping-current trends

Annexure 3

Bharath Institute of Higher Education and Research

Sri Lakshmi Narayana Institute of Medical Sciences,

Participant list of Value added course: **Doping on July 2019 – Dec 2019**

Sl.No	Reg.No	Name of the candidate	Signature
1.	U18MB371	SHREYASEE CHATTOPADHYAY	
2.	U18MB372	SHRI KIRTI RAAJA	
3.	U18MB373	SNEKA SE	
4.	U18MB374	SONALI HESSA	
5.	U18MB375	SOUMITRA MOHANTY	
6.	U18MB376	SREEHARI S NAIR	
7.	U18MB377	SREELEKSHMI S NAIR	
8.	U18MB378	SREENIDHI N B	
9.	U18MB379	SUBALAKSHMI V	
10.	U18MB380	SUDHARSAN .S	

11.	U18MB381	SUHAIL AHMAD	
12.	U18MB382	SUMAN KALYAN SAHOO	
13.	U18MB383	SUSMITA KHAN	
14.	U18MB384	SWAPNIL	
15.	U18MB385	SWARNAB JANA	
16.	U18MB386	SWATHI .K	
17.	U18MB387	TADAR YAMING	
18.	U18MB388	TECHI NADAM	
19.	U18MB389	THENDRAL NILAVAN .M	
20.	U18MB390	TINA CAROLINE J	

Sri Lakshmi Narayana Institute of Medical Sciences
Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

Course/Training Feedback Form

Course: Doping
Date: July 2019– Dec 2019
Name:
Reg NO.
Department: Forensic medicine and toxicology

Q 1: Please rate your overall satisfaction with the format of the course:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 2: Please rate course notes:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 3: The lecture sequence was well planned

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 4: The lectures were clear and easy to understand

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 5: Please rate the quality of pre-course administration and information:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 6: Any other suggestions:

Comments:

Thank you for taking the time to complete this survey, your comments are much appreciated.

***OPTIONAL Section*:** Name _____
Signature _____ Date _____

Sri Lakshmi Narayana Institute of Medical Sciences
Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

Date: 12-12-2019

From
Dr. S. N. Rathod
Forensic Medicine & Toxicology
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To
The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: Doping

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled **Doping** on July 2019– Dec 2019. We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards

Dr. Jayalakshmi

Dr. S.N. Rathod

Encl: Certificates

Photographs

Annexure 6 - SAMPLE CERTIFICATE TO BE ATTACHED



Sri Lakshmi Narayana Institute of Medical Sciences
Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that _____ has actively participated in the Value Added Course on "Moral Narration" held during July 2018 – Dec 2018 Organized by **Sri Lakshmi Narayana Institute of Medical Sciences**, Pondicherry- 605 502, India.

Dr. S.N. Rathod
RESOURCE PERSON

Dr. Jayalakshmi
COORDINATOR

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that _____

has actively participated in the Value Added Course on " **TRIAL COURT** " held during July 2019 – Dec 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. Prasanth
RESOURCE PERSON

Dr. Sitalal Rathod
COORDINATOR

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that _____

has actively participated in the Value Added Course on " **TRIAL COURT** " held during Jan 2020 – Jun 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. Prasanth
RESOURCE PERSON

Dr. Sitalal Rathod
COORDINATOR

Annexure 4

Course/Training Feedback Form

Course: **Trial Court**
Date: Jan 2020 - Jun 2020
Name:
Reg NO.
Department: Forensic Medicine and Toxicology

Q 1: Please rate your overall satisfaction with the format of the course:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 2: Please rate course notes:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 3: The lecture sequence was well planned

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 4: The lectures were clear and easy to understand

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 5: Please rate the quality of pre-course administration and information:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 6: Any other suggestions:

Comments:

Thank you for taking the time to complete this survey, your comments are much appreciated.

***OPTIONAL Section*:** Name _____

Signature _____ Date _____

Sri Lakshmi Narayana Institute of Medical Sciences
Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

Circular

3rd Jan 2020

Sub: Organising Value-added Course: "Trial Court" ..reg

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research**, is organizing **Trial Court**. The course content and registration form is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before January 10th 2020. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

Encl: Copy of Course content and Registration form.

Sri Lakshmi Narayana Institute of Medical Sciences
Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act, 1956)

Annexure 5

Date: 01-01-2020

From
Dr. Sitalal Rathod
Forensic Medicine & Toxicology
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To
The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: Trial Court

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled **" Trial Court "** on Jan 2020 - Jun 2020. We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards

Dr. Sitalal Rathod

Encl: Certificates

Photographs

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

Annexure 6 - SAMPLE CERTIFICATE TO BE ATTACHED

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that _____

has actively participated in the Value Added Course on " **TRIAL COURT** " held during Jan 2020 – Jun 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. Prasanth
RESOURCE PERSON

Dr. Sitalal Rathod
COORDINATOR

Judges of the sessions ..


Dr. Pammy Sinha


Dr. Abarna


Dr Somasundaram


Dr Asayas Bosco


Dr. S. Prasanth


Dr. Sitalal Rathod

VALUE ADDED COURSE

Trial Court and FMT VAC 06
List of Students Enrolled Jan 2020 – Jun 2020

2nd Year MBBS Student		
Sl. No	**Name of the Student**	**Roll No**
1	SIDDHARTH P S	U19MB371
2	SINDHU N	U19MB372
3	SIRIGIRI MANOJ KUMAR REDDY	U19MB373
4	SIRSHAK NANDY	U19MB374
5	SOWMIYA M	U19MB375
6	SRI HARI PRASAANTH A	U19MB376
7	B SRIMIDHA	U19MB377
8	SRINITHI R	U19MB378
9	SUBASHINI V	U19MB379
10	SUDARSHAN JAWAHAR	U19MB380
11	SUGANTHI CLARET D	U19MB381
12	SUJANA P	U19MB382
13	SURYAKANT BHARDWAJ	U19MB383
14	SUSHREE SANGEETA	U19MB384
15	SWATHI V	U19MB385
16	SWETHA HARIKUMAR	U19MB386
17	TANYA PACHORY	U19MB387
18	THENNARASU V A	U19MB388
19	TRIYAN HARSHIL SINGH	U19MB389
20	UBANISHA A	U19MB390

RESOURCE PERSON **COORDINATOR**

Professor & Head
Dept of Forensic Medicine
Sri Lakshmi Narayana Institute of
Medical Sciences, Puducherry

Annexure- II

VALUE ADDED COURSE

Trial Court and FMT VAC 06

List of Students Enrolled July 2019 – Dec 2019

2nd Year MBBS Student		
Sl. No	**Name of the Student**	**Roll No**
1	SHREYASEE CHATTOPADHYAY	U18MB371
2	SHRI KIRTI RAAJA	U18MB372
3	SNEKA SE	U18MB373
4	SONALI HESSA	U18MB374
5	SOUMITRA MOHANTY	U18MB375
6	SREEHARI S NAIR	U18MB376
7	SREELEKSHMI S NAIR	U18MB377
8	SREENIDHI N B	U18MB378
9	SUBALAKSHMI V	U18MB379
10	SUDHARSAN .S	U18MB380
11	SUHAIL AHMAD	U18MB381
12	SUMAN KALYAN SAHOO	U18MB382
13	SUSMITA KHAN	U18MB383
14	SWAPNIL	U18MB384
15	SWARNAB JANA	U18MB385
16	SWATHI .K	U18MB386
17	TADAR YAMING	U18MB387
18	TECHI NADAM	U18MB388
19	THENDRAL NILAVAN .M	U18MB389
20	TINA CAROLINE J	U18MB390

RESOURCE PERSON

COORDINATOR

Professor & Head
Dept. of Forensic Medicine
Sri Lakshmi Narayana Institute of
Medical Sciences, Puducherry

VALUE ADDED COURSE

1. Name of the programme & Code

Trial Court & FMT VAC 06

2. Duration & Period

35 hrs & July 2019– Dec 2019 & Jan 2020 – Jun 2020

3. Information Brochure and Course Content of Value-Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Multiple choice questions- *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

2 (TWO); July 2019– Dec 2019 & Jan 2020 – Jun 2020

8. Year of discontinuation: 2021

9. Summary report of each program year-wise

Value Added Course- July 2019 - Junet 2020					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	FMT VAC 06	Trial Court	Dr. Prasanth	2nd MBBS	50 (July 19 – Dec19)
2	FMT VAC 06	Trail Court	Dr. Prasanth	2nd MBBS	50 (Jan 20 – Jun 20)

10. Course Feed Back

Enclosed as Annexure- V

Dr. Prasanth

RESOURCE PERSON

Dr. Sitalal Rathod

Professor & Head
Department of Forensic Medicine
Sri Lakshmi Narayana Institute of
Medical Sciences, Puducherry

COORDINATOR

Annexure 5

Date: 01-01-2020

From
Dr. Sitalal Rathod
Forensic Medicine & Toxicology
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To
The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: Trial Court

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled **" Trial Court "** on July 2019 - Dec 2019. We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards

Dr. Sitalal Rathod

Professor & Head
Dept. of Forensic Medicine
Sri Lakshmi Narayana Institute of
Medical Sciences, Puducherry

Encl: Certificates

Photographs

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

Sri Lakshmi Narayana Institute of Medical Sciences
Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that _____

has actively participated in the Value Added Course on " **TRIAL COURT** " held during July 2019 – Dec 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry - 605 502, India.

Dr. Prasanth
RESOURCE PERSON

Dr. Sitalal Rathod
COORDINATOR

Judges of the sessions ..


Dr. Pammy Sinha


Dr. Aparna

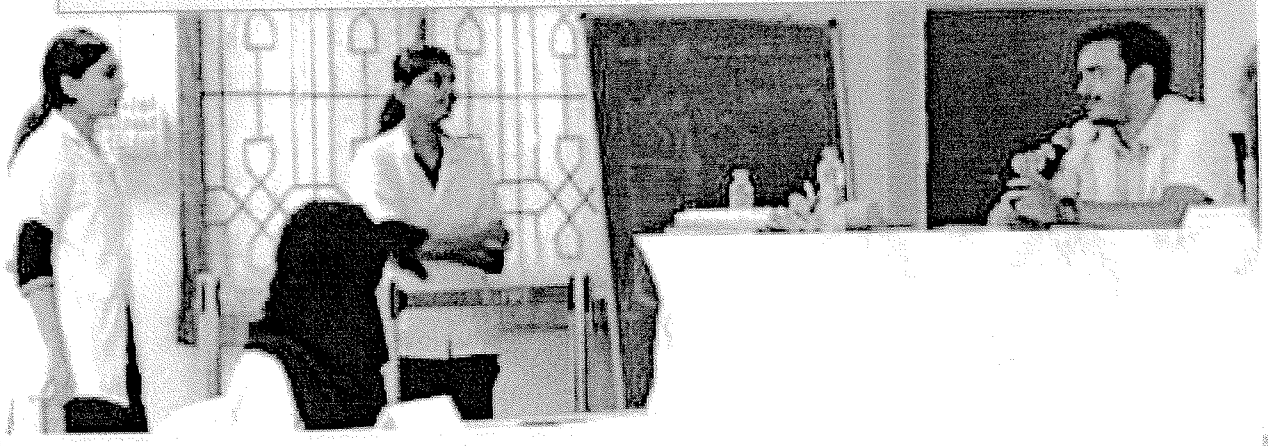

Dr Somasundaram


Dr Asayas Bosco


Dr. S. Prasanth


Dr. Sitalal Rathod

You can lead a jury to the truth, but you can't make them believe it.
-Herbert Leon Macdonell (Quoted in his book "The Evidence never lies")



Wound Certificate: EMS, Casualty Medical Officer/ Expert in the Witness Box
Role played – Aniket Sinha (Judge), Munaina K.V. (Public Prosecutor), Nidhi Sunil Krishnan (Defence Lawyer), Nayana (Doctor)

Sri Lakshmi Narayana Institute of Medical Sciences
Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

Circular

3rd July 2019

Sub: Organising Value-added Course: "Trial Court" ..reg

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research**, is organizing **Trial Court**. The course content and registration form is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before July 10th 2019. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

Encl: Copy of Course content and Registration form.

Annexure 4

Course/Training Feedback Form

Course: **Trial Court**
Date: July 2019 - Dec 2019
Name:
Reg NO.
Department: Forensic Medicine and Toxicology

Q 1: Please rate your overall satisfaction with the format of the course:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 2: Please rate course notes:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 3: The lecture sequence was well planned

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 4: The lectures were clear and easy to understand

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 5: Please rate the quality of pre-course administration and information:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 6: Any other suggestions:

Comments:

Thank you for taking the time to complete this survey, your comments are much appreciated.

***OPTIONAL Section*:** Name _____

Signature _____ Date _____

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - IV

Trial Court

MULTIPLE CHOICE QUESTIONS

Course Code: FMT VAC 06

I. ANSWER ALL THE QUESTIONS

1. Powers of a First-Class Magistrate is _____ imprisonment.
   A. Fine up to INR 10,000 and 3 years
   B. Fine up to INR10,000 and 5 years
   C. Fine up to INR 3000 and 5 years
   D. Unlimited fine and 7 years

2. In criminal cases, conduct money is paid by:
   A. Court
   B. Opposite party
   C. Judge
   D. No conduct money is given

3. When a doctor issues a false medical certificate, then he is liable under:
   A. Sec. 197 IPC
   B. Sec. 87 IPC
   C. Sec. 304A IPC
   D. Sec. 338 IPC

4. IPC 197 is related to:
   A. Causing disappearance of evidence
   B. Issuing false certificate by doctor
   C. Giving false evidence
   D. Examination of accused

5. If a patient survives after having given dying declaration, then it stands as:
   A. No value
   B. Valid for 48 h
   C. Corroborative evidence
   D. None

6. Dying declaration can be taken by:
   A. Village headman
   B. Doctor
   C. Magistrate
   D. Any one

7. According to recent SC judgment, doctor can be charged for medical negligence under 304-A, only if:
   A. He is from corporate hospital
   B. Negligence is from inadvertent error
   C. Simple negligence
   D. Gross negligence

8. Liability for wrong limb amputation can be considered under:
   A. Criminal negligence
   B. Civil negligence
   C. Both civil and criminal
   D. Contributory negligence

9. In civil negligence cases against the doctor, the onus of the proof lies with:
   A. Doctor
   B. Patient
   C. First class judicial magistrate
   D. Police not below the rank of sub-inspector

10. Doctrine of res ipsa loquitur means:
   A. Fact speaks for itself
   B. Medical mal-occurrence
   C. Common knowledge doctrine
   D. Mandatory oral evidence

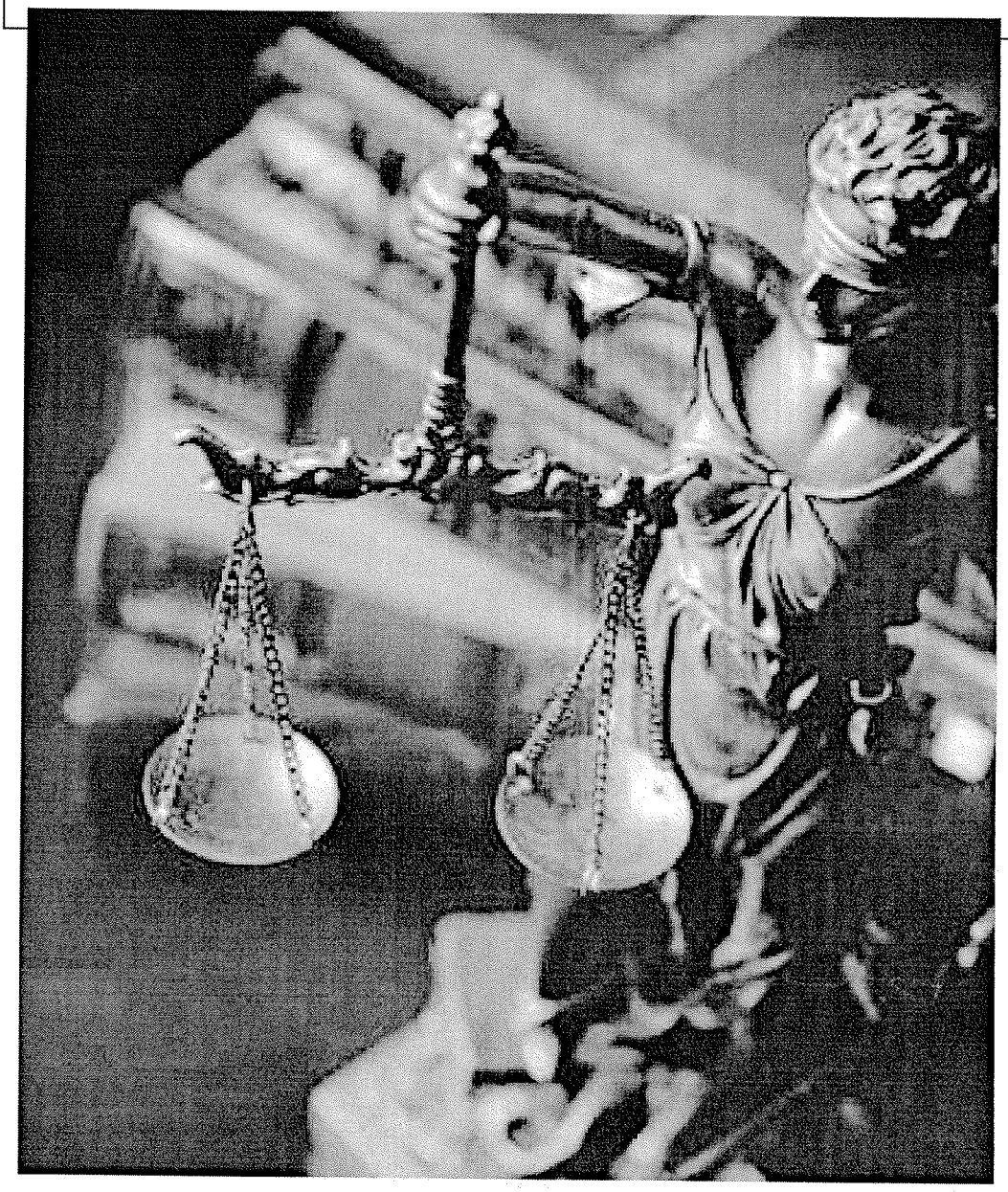
VALUE ADDED COURSE

Trial Court and FMT VAC 06
List of Students Enrolled Jan 2020 – Jun 2020

2nd Year MBBS Student		
Sl. No	**Name of the Student**	**Roll No**
1	SIDDHARTH P S	U19MB371
2	SINDHU N	U19MB372
3	SIRIGIRI MANOJ KUMAR REDDY	U19MB373
4	SIRSHAK NANDY	U19MB374
5	SOWMIYA M	U19MB375
6	SRI HARI PRASAANTH A	U19MB376
7	B SRIMIDHA	U19MB377
8	SRINITHI R	U19MB378
9	SUBASHINI V	U19MB379
10	SUDARSHAN JAWAHAR	U19MB380
11	SUGANTHI CLARET D	U19MB381
12	SUJANA P	U19MB382
13	SURYAKANT BHARDWAJ	U19MB383
14	SUSHREE SANGEETA	U19MB384
15	SWATHI V	U19MB385
16	SWETHA HARIKUMAR	U19MB386
17	TANYA PACHORY	U19MB387
18	THENNARASU V A	U19MB388
19	TRIYAN HARSHIL SINGH	U19MB389
20	UBANISHA A	U19MB390

RESOURCE PERSON **COORDINATOR**

Trial Court



PARTICIPANT HAND BOOK

BIHER

SLIMS

Annexure- II

VALUE ADDED COURSE

Trial Court and FMT VAC 06

List of Students Enrolled July 2019 – Dec 2019

2nd Year MBBS Student		
Sl. No	**Name of the Student**	**Roll No**
1	SHREYASEE CHATTOPADHYAY	U18MB371
2	SHRI KIRTI RAAJA	U18MB372
3	SNEKA SE	U18MB373
4	SONALI HESSA	U18MB374
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8	SREENIDHI N B	U18MB378
9	SUBALAKSHMI V	U18MB379
10	SUDHARSAN .S	U18MB380
11	SUHAIL AHMAD	U18MB381
12	SUMAN KALYAN SAHOO	U18MB382
13	SUSMITA KHAN	U18MB383
14	SWAPNIL	U18MB384
15	SWARNAB JANA	U18MB385
16	SWATHI .K	U18MB386
17	TADAR YAMING	U18MB387
18	TECHI NADAM	U18MB388
19	THENDRAL NILAVAN .M	U18MB389
20	TINA CAROLINE J	U18MB390

RESOURCE PERSON **COORDINATOR**

Student Feedback Form

Course Name: **Trial Court**

Subject Code: **FMT VAC 06**

Name of Student: _____ Roll No.: _____

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear					
2	Course contents met with your expectations					
3	Lecturer sequence was well planned					
4	Lectures were clear and easy to understand					
5	Teaching aids were effective					
6	Instructors encourage interaction and were helpful					
7	The level of the course					
8	Overall rating of the course	1	2	3	4	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

Date:

Signature

Sri Lakshmi Narayana Institute of Medical Sciences
Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

Annexure 1

Date: 2nd July 2019

From
Dr. Sitalal Rathod,
Professor and Head,
Department of Forensic Medicine,
Sri Lakshmi Narayana Institute of Medical Sciences,
Bharath Institute of Higher Education and Research,
Chennai.

To
The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences,
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: Basics in Trial Court

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **Trial Court** on July 2019 - Dec 2019. We solicit your kind permission for the same.

Kind Regards

Dr. Sitalal Rathod

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean:

The HOD: DR RATNAM

The Expert: DR. S. PRASANTH

The committee has discussed about the course and is approved.

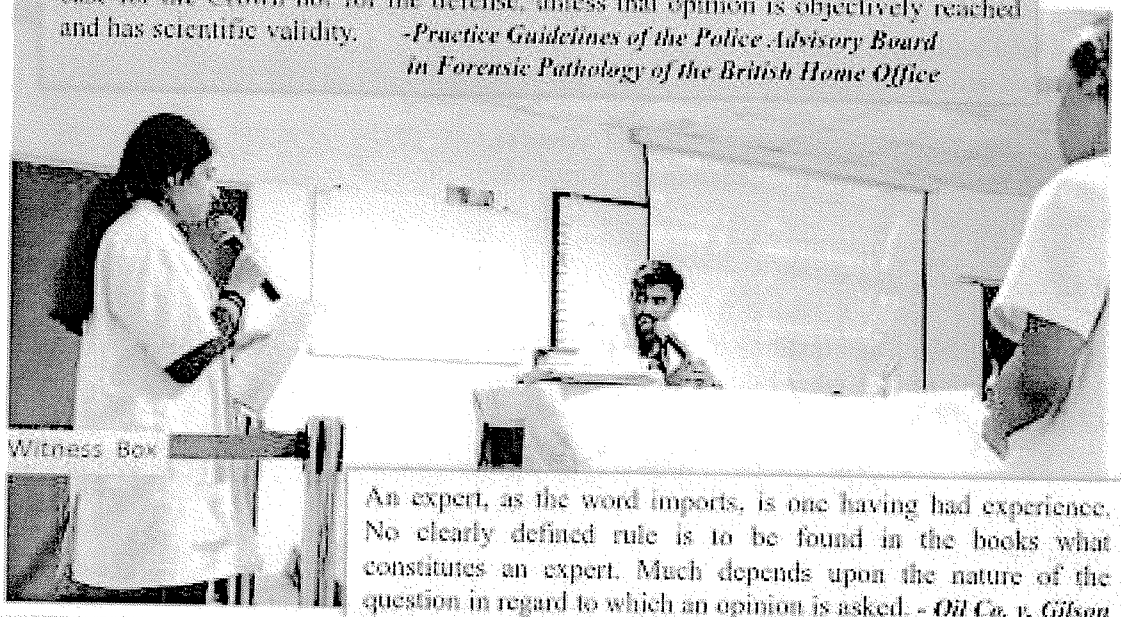
Dean	Subject Expert	HOD
(Sign & Seal)	(Sign & Seal)	(Sign & Seal)

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

The role of the expert witness is not to provide the evidence which supports the case for the Crown nor for the defense, unless that opinion is objectively reached and has scientific validity. *-Practice Guidelines of the Police Advisory Board in Forensic Pathology of the British Home Office*



An expert, as the word imports, is one having had experience. No clearly defined rule is to be found in the books what constitutes an expert. Much depends upon the nature of the question in regard to which an opinion is asked. - *Oil Co. v. Gibson*

Examination report of Alleged Accused of Sexual Assault: A Psychiatrist in the Witness Box

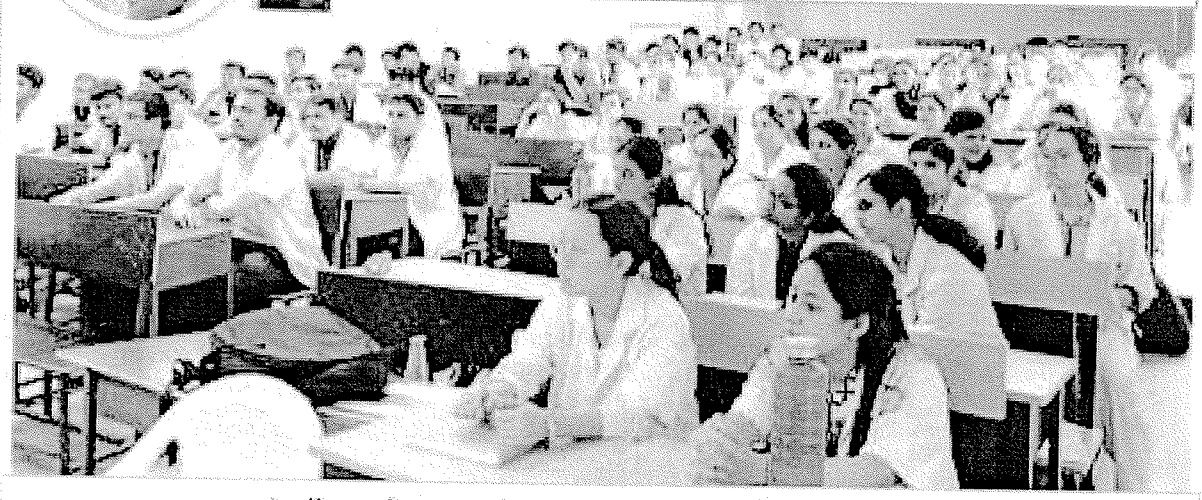
Role played – Dr. Vigneshwar.C, MD, Assistant Professor, Dept of Psychiatry (Judge), Manvitha G. (Public Prosecutor), Karishma G (Defence Lawyer), Monisha B (Doctor)

"It was an informative and enlightening experience. Many aspects of the Judicial system were covered with an emphasis on Medical Jurisprudence. It also allowed the students to get a practical experience in this important field."- Aditya Rai





"It was very useful and was enthusiastically participated by all students and faculties of various departments. The session was very interactive, everyone enjoyed. This kind of Integrated Teaching classes are required in the future." Saundharya.K



Audience (Learners) in the Court Room: MBBS - PHASE II

Sri Lakshmi Narayana Institute of Medical Sciences
Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

Annexure 1

Date: 2nd Jan 2019

From
Dr. Sitalal Rathod,
Professor and Head,
Department of Forensic Medicine,
Sri Lakshmi Narayana Institute of Medical Sciences,
Bharath Institute of Higher Education and Research,
Chennai.

To
The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences,
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: Basics in Trial Court

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **Trial Court** on Jan 2020 - Jun 2020. We solicit your kind permission for the same.

Kind Regards

Dr. Sitalal Rathod

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: Dr. JAYALAKSHMI

The HOD: Dr. SN RADHAN

The Expert: (Dr. S. PRASANTH)

The committee has discussed about the course and is approved.

Dean
(Sign & Seal)

Subject Expert
(Sign & Seal)

Dept. of Forensic Medicine
Sri Lakshmi Narayana Institute of
Medical Sciences Puducherry

HOD
(Sign & Seal)

Professor & Head
Dept. of Forensic Medicine
Sri Lakshmi Narayana Institute of
Medical Sciences Puducherry

Sri Lakshmi Narayana Institute of Medical Sciences
Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

Annexure 1

Date: 2nd July 2019

From
Dr. Sitalal Rathod,
Professor and Head,
Department of Forensic Medicine,
Sri Lakshmi Narayana Institute of Medical Sciences,
Bharath Institute of Higher Education and Research,
Chennai.

To
The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences,
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: Basics in Forensic Science Laboratory

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **Basics in Forensic Science Laboratory** on July 2019 - Dec 2019. We solicit your kind permission for the same.

Kind Regards

Dr. Sitalal Rathod

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: Dr. JAYALAKSHMI

The HOD: Dr S N RATHOD

The Expert: Dr S N RATHOD

The committee has discussed about the course and is approved.

Dean (Sign & Seal)

Subject Expert (Sign & Seal)

Professor & Head
Dept of Forensic Medicine
Sri Lakshmi Narayana Institute of
Medical Sciences, Puducherry

HOD (Sign & Seal)

Professor & Head
Dept of Forensic Medicine
Sri Lakshmi Narayana Institute of
Medical Sciences, Puducherry

Student Feedback Form

Course Name: **Basics in Forensic Science Laboratory**

Subject Code: **FMT VAC 07**

Name of Student: _____ Roll No.: _____

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear					
2	Course contents met with your expectations					
3	Lecturer sequence was well planned					
4	Lectures were clear and easy to understand					
5	Teaching aids were effective					
6	Instructors encourage interaction and were helpful					
7	The level of the course					
8	Overall rating of the course	1	2	3	4	5

**** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory***

Suggestions if any:

Signature

Date:

VALUE ADDED COURSE

1. Name of the programme & Code

Basics in Forensic Science Laboratory & (FMT VAC 07)

2. Duration & Period

30hrs, from July 2019– December 2019 & January 2020 – June 2020.

3. Information Brochure and Course Content of Value-Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Mini CEX- *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

(2) July 2019– December 2019 & January 2020 – June 2020.

8. Year of discontinuation: 2020

9. Summary report of each program year-wise

Value Added Course- July 2018 - June 2019					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	FMT VAC 07	**Basics in Forensic Science Laboratory**	Dr. Sitalal Rathod	2nd MBBS	20 (July 19 – Dec 19)
2	FMT VAC 07	**Basics in Forensic Science Laboratory**	Dr. Sitalal Rathod	2nd MBBS	20 (Jan 2020-June2020)

10. Course Feed Back

Enclosed as Annexure- V

RESOURCE PERSON

Professor & Head
Dept. of Forensic Medicine
Sri Lakshmi Narayana Institute of
Medical Sciences, Puducherry

COORDINATOR

Annexure- II

VALUE ADDED COURSE

Basics in Forensic Science Laboratory and FMT VAC 07

List of Students Enrolled July 2019 – Dec 2019

2nd Year MBBS Student		
Sl. No	**Name of the Student**	**Roll No**
1	SHREYASEE CHATTOPADHYAY	U18MB371
2	SHRI KIRTI RAAJA	U18MB372
3	SNEKA SE	U18MB373
4	SONALI HESSA	U18MB374
5	SOUMITRA MOHANTY	U18MB375
6	SREEHARI S NAIR	U18MB376
7	SREELEKSHMI S NAIR	U18MB377
8	SREENIDHI N B	U18MB378
9	SUBALAKSHMI V	U18MB379
10	SUDHARSAN .S	U18MB380
11	SUHAIL AHMAD	U18MB381
12	SUMAN KALYAN SAHOO	U18MB382
13	SUSMITA KHAN	U18MB383
14	SWAPNIL	U18MB384
15	SWARNAB JANA	U18MB385
16	SWATHI .K	U18MB386
17	TADAR YAMING	U18MB387
18	TECHI NADAM	U18MB388
19	THENDRAL NILAVAN .M	U18MB389
20	TINA CAROLINE J	U18MB390

RESOURCE PERSON **COORDINATOR** DEAN

Professor & Head
Dept. of Forensic Medicine
Sri Lakshmi Narayana Institute of
Medical Sciences, Puducherry

Annexure- II

VALUE ADDED COURSE

Basics in Forensic Science Laboratory and FMT VAC 07

List of Students Enrolled Jan 2019 – Jun 2019

2nd Year MBBS Student		
Sl. No	**Name of the Student**	**Roll No**
1	SIDDHARTH P S	U19MB371
2	SINDHU N	U19MB372
3	SIRIGIRI MANOJ KUMAR REDDY	U19MB373
4	SIRSHAK NANDY	U19MB374
5	SOWMIYA M	U19MB375
6	SRI HARI PRASAANTH A	U19MB376
7	B SRIMIDHA	U19MB377
8	SRINITHI R	U19MB378
9	SUBASHINI V	U19MB379
10	SUDARSHAN JAWAHAR	U19MB380
11	SUGANTHI CLARET D	U19MB381
12	SUJANA P	U19MB382
13	SURYAKANT BHARDWAJ	U19MB383
14	SUSHREE SANGEETA	U19MB384
15	SWATHI V	U19MB385
16	SWETHA HARIKUMAR	U19MB386
17	TANYA PACHORY	U19MB387
18	THENNARASU V A	U19MB388
19	TRIYAN HARSHIL SINGH	U19MB389
20	UBANISHA A	U19MB390

RESOURCE PERSON

Professor & Head
Dept of Forensic Medicine
Sri Lakshmi Narayana Institute of
Medical Sciences, Puducherry

COORDINATOR DEAN

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - IV

BASICS IN FORENSIC SCIENCE LABORATORY

MCQ

Course Code: FMT VAC 07

1. Blood samples should be preserved by adding approximately 10 mg of sodium fluoride and 30 gm of potassium oxalate per ----- ml blood

   A. 100
   B. 50
   C. 15
   D. 10

2. Commonly used in narco-analysis:
   A. Atropine sulphate
   B. Scopolamine hydrobromide
   C. Opium compounds
   D. Phenobarbital

3. blood in cases of suspected snake bite 5-10 ml of blood preserved in ---------- solution.

   A. Rectfied sprit
   B. Sodium chloride
   C. 40% Formalin
   D. 5% Sodium citrate

4. ----------is used as preservative in all cases of poisoning, excluding acid poisoning, but including carbolic acid poisoning
   A. Saturated salt solution.
   B. Hyposaturated salt solution.
   C. Formaline
   D. Rectified spirit

5. ----------should be sent in cases with history of poisoning by arsenic, lead etc

   A. A piece of long bone and plucked hair
   B. Skull and Pelvis
   C. Skeleton
   D. Canine tooth

Annexure 4

Course/Training Feedback Form

Course: **Basics in Forensic Science Laboratory**
Date: July 2019 - Dec 2019
Name:
Reg NO.
Department: Forensic Medicine and Toxicology

Q 1: Please rate your overall satisfaction with the format of the course:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 2: Please rate course notes:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 3: The lecture sequence was well planned

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 4: The lectures were clear and easy to understand

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 5: Please rate the quality of pre-course administration and information:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 6: Any other suggestions:

Comments:

Thank you for taking the time to complete this survey, your comments are much appreciated.

***OPTIONAL Section*:** Name _____

Signature _____ Date _____

Sri Lakshmi Narayana Institute of Medical Sciences
Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

Circular

3rd July 2019

Sub: Organising Value-added Course: Basics in Forensic Science Laboratory reg

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research**, is organizing **Basics in Forensic Science Laboratory**. The course content and registration form is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before July 10th 2019. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

Encl: Copy of Course content and Registration form.

Sri Lakshmi Narayana Institute of Medical Sciences
Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

Annexure 6 - SAMPLE CERTIFICATE TO BE ATTACHED

Sri Lakshmi Narayana Institute of Medical Sciences
Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that _____ has actively participated in the Value Added Course on "Basics in Forensic Scionce Laboratory " held during July 2019 – Dec 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502. India.

Dr. Sitalal Rathod
RESOURCE PERSON

Dr. Jayalakshmi
COORDINATOR

Annexure 5

Date: 01-01-2020

From
Dr. Sitalal Rathod
Forensic Medicine & Toxicology
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To
The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: Basics in Forensic Science Laboratory

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled **Basics in Forensic Science Laboratory** on July 2019 - Dec 2019. We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards

Dr. Jayalakshmi

Dr. Sitalal Rathod

Professor & Head
Dept. of Forensic Medicine
Sri Lakshmi Narayana Institute of
Medical Sciences, Puducherry

Encl: Certificates

Photographs

Circular

3rd January 2020

Sub: Organising Value-added Course: Basics in Forensic Science Laboratory reg

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research**, is organizing **Basics in Forensic Science Laboratory**. The course content and registration form is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before January 15th 2019. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

Encl: Copy of Course content and Registration form.

Annexure 1

Date: 2nd January 2020

From
Dr. Sitalal Rathod,
Professor and Head,
Department of Forensic Medicine,
Sri Lakshmi Narayana Institute of Medical Sciences,
Bharath Institute of Higher Education and Research,
Chennai.

To
The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences,
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: Basics in Forensic Science Laboratory

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **Basics in Forensic Science Laboratory** on Jan 2020 - June 2020. We solicit your kind permission for the same.

Kind Regards

Dr. Sitalal Rathod

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean:

The HOD: Dr SN Rathod

The Expert: Dr SN Rathod

The committee has discussed about the course and is approved.

Dean	Subject Expert	HOD
(Sign & Seal)	(Sign & Seal)	(Sign & Seal)

Professor & Head
Dept of Forensic Medicine
Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry

Annexure 5

Date: 01-07-2020

From
Dr. Sitalal Rathod
Forensic Medicine & Toxicology
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To
The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: Basics in Forensic Science Laboratory

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled **Forensic Science Laboratory** on Jan 2020 - June 2020. We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards

Dr. Jayalakshmi

Dr. Sitalal Rathod

Professor & Head
Dept. of Forensic Medicine
Sri Lakshmi Narayana Institute of
Medical Sciences, Puducher

Encl: Certificates

Photographs

Annexure 4

Course/Training Feedback Form

Course: **Basics in Forensic Science Laboratory**
Date: Jan 2020 - June 2020
Name:
Reg NO.
Department: Forensic Medicine and Toxicology

Q 1: Please rate your overall satisfaction with the format of the course:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 2: Please rate course notes:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 3: The lecture sequence was well planned

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 4: The lectures were clear and easy to understand

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 5: Please rate the quality of pre-course administration and information:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 6: Any other suggestions:

Comments:

Thank you for taking the time to complete this survey, your comments are much appreciated.

OPTIONAL Section: Name _____

Signature _____ Date _____

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that _____ has actively participated in the Value Added Course on "**Basics in Forensic Science Laboratory** " held during Jan 2020 – June 2020 Organized by **Sri Lakshmi Narayana Institute of Medical Sciences**, Pondicherry- 605 502, India.

Dr. Sitalal Rathod
RESOURCE PERSON

Dr. Jayalakshmi
COORDINATOR

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

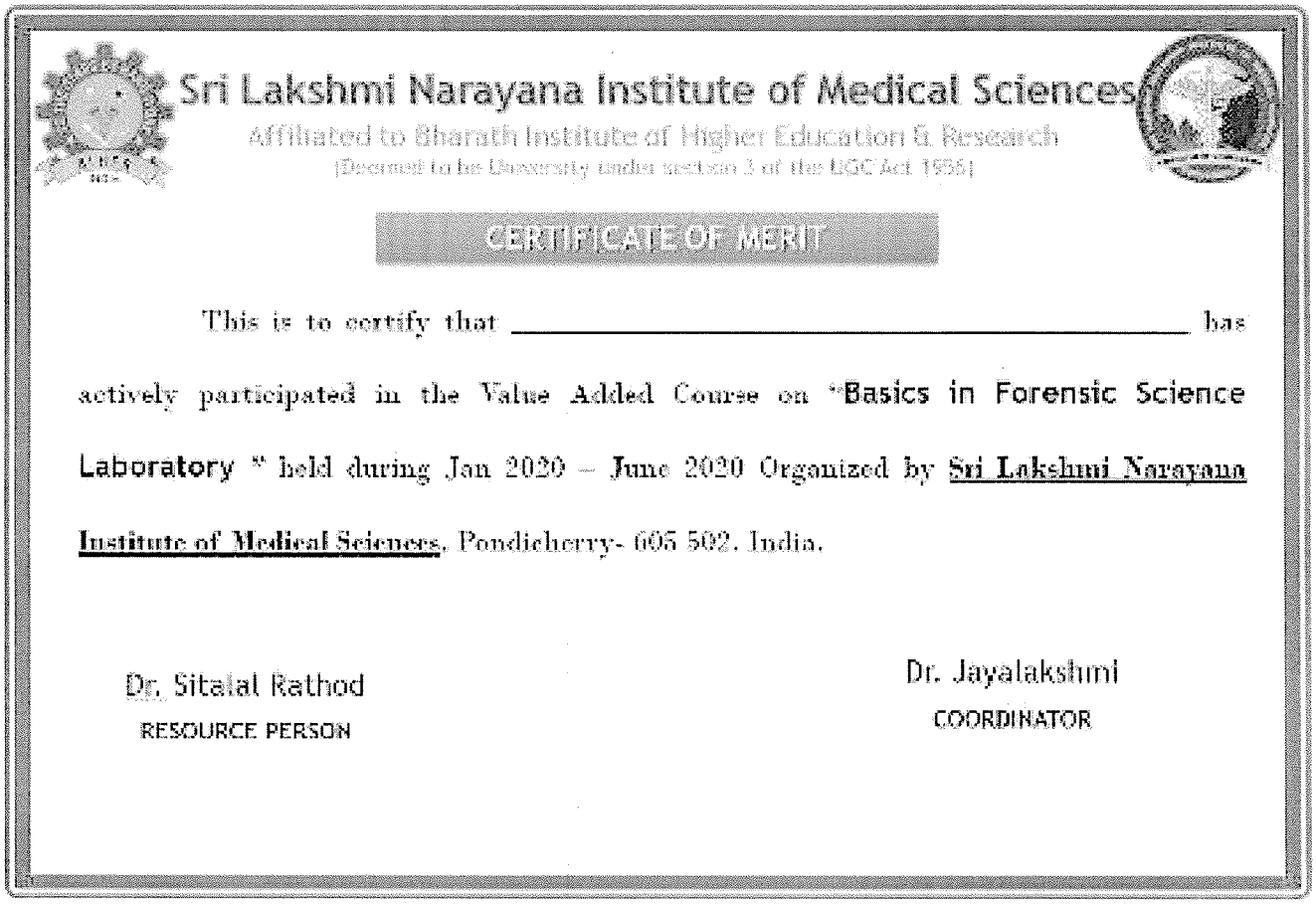
CERTIFICATE OF MERIT

This is to certify that _____ has actively participated in the Value Added Course on "**Basics in Forensic Science Laboratory** " held during July 2019 – Dec 2019 Organized by **Sri Lakshmi Narayana Institute of Medical Sciences**, Pondicherry- 605 502, India.

Dr. Sitalal Rathod
RESOURCE PERSON

Dr. Jayalakshmi
COORDINATOR

Annexure 6 - SAMPLE CERTIFICATE TO BE ATTACHED



Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that _____ has actively participated in the Value Added Course on "Basics in Forensic Science Laboratory " held during Jan 2020 – June 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502. India.

Dr. Sitalal Rathod
RESOURCE PERSON

Dr. Jayalakshmi
COORDINATOR

Sri Lakshmi Narayana Institute of Medical sciences

Date-20-06-19

From
Dr. K. Harsha Vardhan
Professor and Head,
Department of dermatology
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

To
The Dean
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: Urticaria

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled : Urticaria on 20-07-2019 .We solicit your kind permission for the same.

Kind Regards

Dr. K. Harsha Vardhan

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: Dr. Jayalakshmi

The HOD: Dr. A. Buvanaratchagan

The Expert: Dr. A. Buvanaratchagan
The committee has discussed about the course and is approved.



Dr. G. JAYALAKSHMI BSC., MBBS., DTCD., M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Agaram, Kudapakkam Post,
Villianur Commune, Puducherry - 605502.

Dean | Subject Expert | HOD

Sri Lakshmi Narayana Institute of Medical sciences

Date-20-06-19

From
Dr. K. Harsha Vardhan
Professor and Head,
Department of dermatology
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

To
The Dean
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: Urticaria

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled : Urticaria on 20-07-2019 .We solicit your kind permission for the same.

Kind Regards

Dr. K. Harsha Vardhan

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: Dr. Jayalakshmi

The HOD: Dr. A. Buvanaratchagan

The Expert: Dr. A. Buvanaratchagan
The committee has discussed about the course and is approved.

PROFESSOR & HEAD
DEPT. OF DERMATOLOGY
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
OSUDU PUDUCHERRY.

PROFESSOR & HEAD
DEPT. OF DERMATOLOGY
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
OSUDU PUDUCHERRY.

Dr. G. JAYALAKSHMI, BSC., MBBS., DTCD., M.D.,
Dean
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Agaram, Kudapakkam Post,
Villianur Commune, Puducherry - 605502.

Subject Expert

HOD

Scanned by TapScanner

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affliated to Bharath University, Chennai - TN]

Circular

27.06.2019

Sub: Organising Value-added Course: Urticaria (July 2019 – Oct 2019)

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research** is organizing **"Urticaria"**. The course content is enclosed below."

The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before 13-07-2019. Applications received after the mentioned date shall not be entertained under any circumstances.

Dr. G. JAYALAKSHMI, BSC., MBBS., DTCD., M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Agaram, Kudapakkam Post,
Villianur Commune, Puducherry - 605502.

Encl: Copy of Course content

COURSE PROPOSAL

Course Title: **Urticaria**

Course Objective: **To evaluate the predisposing factors and treatment of urticaria**

Course Outcome: **Completed**

Course Audience: **2nd year mbbs**

Course Coordinator: Dr. Bhuvanaratchagan

Course Faculties with Qualification and Designation:

Dr. Bhuvanaratchagan
Professor
Department of Dermatology

Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Time	Hours	Lecture taken by
1	20-7-19	Introduction	4 to 6 pm	2 hours	Dr. Bhuvanaratchagan
2	23-7-19	Predisposing factors	4:30 to 6:30 pm	2 hours	Dr. Bhuvanaratchagan
3	26-7-19	Etiology	5 to 7 pm	2 hours	Dr. Bhuvanaratchagan
4	30-7-19	Triggers	4 to 6 pm	2 hours	Dr. Bhuvanaratchagan
5	2-8-19	Clinical features	4:30 to 6:30 pm	2 hours	Dr. Bhuvanaratchagan
6	6-8-19	Types	5 to 7 pm	2 hours	Dr. Bhuvanaratchagan
7	13-8-19	Variants	4 to 6 pm	2 hours	Dr. Bhuvanaratchagan
8	16-8-19	Investigation	4:30 to 6:30 pm	2 hours	Dr. Bhuvanaratchagan
9	20-8-19	General management	5 to 7 pm	2 hours	Dr. Bhuvanaratchagan
10	23-8-19	What to avoid in urticaria	4 to 6 pm	2 hours	Dr. Bhuvanaratchagan
11	26-8-19	Case series	4:30 to 6:30 pm	2 hours	Dr. Bhuvanaratchagan
12	28-8-19	Newer treatment	5 to 7 pm	2 hours	Dr. Bhuvanaratchagan
13	3-9-19	Urticaria in emergency	4 to 6 pm	2 hours	Dr. Bhuvanaratchagan
14	10-9-19	Q&A	4:30 to 6:30 pm	2 hours	Dr. Bhuvanaratchagan
15	17-9-19	Mcqs	5 to 7 pm	2 hours	Dr. Bhuvanaratchagan
			Total Hours	30	

REFERENCE BOOKS:

Rooks Textbook of dermatology 9th edition

Fitzpatrick dermatology in general medicine

ABSTRACT -VALUE ADDED COURSE

1. Name of the programme & Code

Urticaria and DR11

2. Duration & Period

30 hrs & July 2019 to October 2019

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Multiple choice questions- *Enclosed as Annexure- III*

6. Course Feed Back

Enclosed as Annexure- IV

7. No. of times offered during the same

July 2019 to October 2019

8. Year of discontinuation: 2020

9. Summary report of each program year-wise

Value Added Course- July 2019 to October 2019					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	DR11	Urticaria	Dr. Buvanaratchagan	2nd yr MBBS	15 (july 2019– October 19)

10 Certificate model

Enclosed as Annexure- V

Dr. Buvanaratchagan

RESOURCE PERSON

Dr. Buvanaratchagan

COORDINATOR

ABSTRACT -VALUE ADDED COURSE

1. Name of the programme & Code

Urticaria and DR11

2. Duration & Period

30 hrs & July 2019 to October 2019

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Multiple choice questions- *Enclosed as Annexure- III*

6. Course Feed Back

Enclosed as Annexure- IV

7. No. of times offered during the same

July 2019 to October 2019

8. Year of discontinuation: 2020

9. Summary report of each program year-wise

Value Added Course- July 2019 to October 2019					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	DR11	Urticaria	Dr. Buvanaratchagan	2nd yr MBBS	15 (july 2019– October 19)

10 Certificate model

Enclosed as Annexure- V

Dr. Buvanaratchagan

PROFESSOR & HEAD
DEPT. OF DERMATOLOGY
JAWAHARLAL INSTITUTE OF
MEDICAL SCIENCES
OSUDU PUDUCHERRY

RESOURCE PERSON

Dr. Buvanaratchagan

PROFESSOR & HEAD
DEPT. OF DERMATOLOGY
JAWAHARLAL INSTITUTE OF
MEDICAL SCIENCES
OSUDU PUDUCHERRY.

COORDINATOR

ANNEXURE-1

URTICARIA



PARTICIPANT HAND BOOK

Course details

Particulars	Description
Course title	Urticaria overview
Course code	DR11
Objective	1)to learn about clinical features 2) to learn about diagnosis 3) to learn about treatment
Further learning oppurtunities	Recent advances in management
Key competencies	To make a diagnosis and provide adequate treatment
Target students	2nd year mbbs students
Duration	30 hours July 2019 to oct 2019
Theory session	10hrs
Practical Session	20 hrs
Assessment procedures	Mcq

Urticaria – an overview

What is urticaria?

Urticaria is characterised by weals (hives) or angioedema (swellings, in 10%) or both (in 40%). There are several types of urticaria. The name urticaria is derived from the common European stinging nettle *Urtica dioica*.

A weal (or wheal) is a superficial skin-coloured or pale skin swelling, usually surrounded by erythema (redness) that lasts anything from a few minutes to 24 hours. Usually very itchy, it may have a burning sensation.

Angioedema is deeper swelling within the skin or mucous membranes and can be skin-coloured or red. It resolves within 72 hours. Angioedema may be itchy or painful but is often asymptomatic.

Classification of urticaria

Urticaria is classified according to its duration.

- Acute urticaria (< 6 weeks duration, and often gone within hours to days)
- Chronic urticaria (> 6 weeks duration, with daily or episodic weals)

Chronic urticaria may be spontaneous or inducible. Both types may co-exist.

Inducible urticaria includes:

- Symptomatic dermographism
- Cold urticaria
- Cholinergic urticaria
- Contact urticaria
- Delayed pressure urticaria
- Solar urticaria
- Heat urticaria
- Vibratory urticaria
- Vibratory angioedema
- Aquagenic urticaria

Urticaria and angioedema







Who gets urticaria?

One in five children or adults has an episode of acute urticaria during their lifetime. It is more common in atopics. It affects all races and both sexes.

Chronic spontaneous urticaria affects 0.5–2% of the population; in some series, two-thirds are women. Inducible urticaria is more common. There are genetic and autoimmune associations.

What are the clinical features of urticaria?

Urticarial weals can be a few millimetres or several centimetres in diameter, coloured white or red, with or without a red flare. Each weal may last a few minutes or several hours and may change shape. Weals may be round, or form rings, a map-like pattern or giant patches.

Urticaria can affect any site of the body and tends to be distributed widely.

Angioedema is more often localised. It commonly affects the face (especially eyelids and perioral sites), hands, feet and genitalia. It may involve tongue, uvula, soft palate, or larynx.

Serum sickness due to blood transfusion and serum sickness-like reactions due to certain drugs cause acute urticaria leaving bruises, fever, swollen lymph glands, joint pain and swelling.

In chronic inducible urticaria, weals appear about 5 minutes after the stimulus and last a few minutes or up to one hour. Characteristically, weals are:

- Linear in symptomatic dermographism
- Tiny in cholinergic urticaria
- Confined to contact areas in contact urticaria
- Diffuse in cold urticaria—if large areas of skin are affected, they can lead to fainting (potentially dangerous if swimming in cold water)

The weals are more persistent in chronic spontaneous urticaria, but each has gone or has altered in shape within 24 hours. They may occur at certain times of the day.

Urticaria severity assessment

Visual analogue scales can be used to record and compare the degree of itch.

The activity of chronic spontaneous urticaria can be assessed using the UAS7 scoring system. The daily weal/itch scores are added up for seven days; the maximum score is 42.

Score	Weals/24 hours	Itch
0	None	None
1	<20	Mild
2	20–50	Moderate
3	>50	Intense

The emotional impact of urticaria and its effect on quality of life should also be assessed. The Dermatology Life Quality Index (DLQI) and CU-Q2oL, a specific questionnaire for chronic urticaria, have been validated for chronic urticaria, where sleep disruption is a particular problem.

What causes urticaria?

Wheals are due to release of chemical mediators from tissue mast cells and circulating basophils. These chemical mediators include histamine, platelet-activating factor and cytokines. The

mediators activate sensory nerves and cause dilation of blood vessels and leakage of fluid into surrounding tissues. Bradykinin release causes angioedema.

Several hypotheses have been proposed to explain urticaria. The immune, arachidonic acid and coagulation systems are involved, and genetic mutations are under investigation.

Acute urticaria

Acute urticaria can be induced by the following factors, but the cause is not always identified.

- Acute viral infection—upper respiratory infection, viral hepatitis, infectious mononucleosis, mycoplasma
- Acute bacterial infection—dental abscess, sinusitis
- Food allergy (IgE mediated)—usually milk, egg, peanut, shellfish
- Drug allergy (IgE mediated drug-induced urticaria)—often an antibiotic
- Drug-induced urticaria due to pseudoallergy—aspirin, nonselective nonsteroidal anti-inflammatory drugs, opiates, radiocontrast media; these cause urticaria without immune activation
- Vaccination
- Bee or wasp stings
- Widespread reaction following localised contact urticaria — for example, rubber latex

Severe allergic urticaria may lead to anaphylactic shock (bronchospasm, collapse).

Immune complexes due to blood transfusion cause serum sickness and certain drugs cause serum sickness-like reactions (urticaria leaving bruises, fever, swollen lymph glands, joint pain and swelling).

A single episode or recurrent episodes of angioedema without urticaria can be due to an angiotensin-converting enzyme (ACE) inhibitor drug.

Chronic urticaria

Chronic spontaneous urticaria is mainly idiopathic (cause unknown). An autoimmune cause is likely. About half of investigated patients carry functional
IgG autoantibodies to immunoglobulin IgE or high-affinity receptor FcεRIα.

Chronic spontaneous urticaria has also been associated with:

- Chronic underlying infection, such as *Helicobacter pylori*, bowel parasites
- Chronic autoimmune diseases, such as systemic lupus erythematosus, thyroid disease, coeliac disease, vitiligo and others

Wheals in chronic spontaneous urticaria may be aggravated by:

- Heat

- Viral infection
- Tight clothing
- Drug pseudoallergy—aspirin, nonsteroidal anti-inflammatory drugs, opiates
- Food pseudoallergy—salicylates, azo dye food colouring agents such as tartrazine, benzoate preservatives and other food additives

Inducible urticaria is a response to a physical stimulus.

Type of inducible urticaria	Examples of stimuli inducing wealing
Symptomatic dermographism	• Stroking or scratching the skin • Tight clothing • Towel drying after a hot shower
Cold urticaria	• Cold air on exposed skin • Cold water • Ice block • Cryotherapy
Cholinergic urticaria	• Sweat induced by exercise • Sweat induced by emotional upset • Hot shower
Contact urticaria	• Eliciting substance absorbed through the skin or mucous membrane • Allergens (IgE-mediated): white flour, cosmetics, textiles, latex, saliva, meat, fish, vegetables • Pseudoallergens or irritants: stinging nettle, hairy caterpillar, medicines
Delayed pressure urticaria	• Pressure on affected skin several hours earlier • Carrying heavy bag • Pressure from a seat belt • Standing on a ladder rung • Sitting on a horse
Solar urticaria	• Sun exposure to non-habituated body sites • Often spare face, neck, hands • May involve long wavelength UV or visible light
Heat urticaria	• Hot water bottle • Hot drink

Vibratory urticaria	• Jackhammer
Aquagenic urticaria	• Hot or cold water • Fresh, salt or chlorinated water

Recurrent angioedema without urticaria can be due to inherited or acquired complement C1 esterase deficiency.

How is urticaria diagnosed?

Urticaria is diagnosed in people with a history of weals that last less than 24 hours with or without angioedema. A family history should be elicited. A thorough physical examination should be undertaken.

Skin prick tests and radioallergosorbent tests (RAST) or CAP fluoroimmunoassay may be requested if a drug or food allergy is suspected in acute urticaria.

There are no routine diagnostic tests in chronic spontaneous urticaria apart from blood count and C-reactive protein (CBC, CRP), but investigations may be undertaken if an underlying disorder is suspected.

The autologous serum skin test is sometimes carried out in chronic spontaneous urticaria, but its value is uncertain. It is positive if an injection of the patient's serum under the skin causes a red weal.

Inducible urticaria is often confirmed by inducing the reaction, eg scratching the skin in dermographism or applying an ice cube in suspected cold urticaria.

Investigations for a systemic condition or autoinflammatory disease should be undertaken in urticaria patients with fever, joint or bone pain, and malaise. Patients with angioedema without weals should be asked if they take ACE inhibitor drugs and tested for complement C4; C1-INH levels, function and antibodies; and C1q.

Biopsy of urticaria can be non-specific and difficult to interpret. The pathology shows oedema in the dermis and dilated blood vessels, with a variable mixed inflammatory infiltrate. Vessel-wall damage indicates urticarial vasculitis.

What is the treatment for urticaria?

The main treatment of all forms of urticaria in adults and children is with an oral second-generation antihistamine chosen from the list below. If the standard dose (eg 10 mg for cetirizine) is not effective, the dose can be increased up to fourfold (eg, 40 mg cetirizine daily).

They are stopped when the acute urticaria has settled down. There is not thought to be any benefit from adding a second antihistamine.

- Cetirizine
- Loratadine
- Fexofenadine
- Desloratadine
- Levocetirizine
- Rupatadine
- Bilastine

Terfenadine and astemizole should not be used, as they are cardiotoxic in combination with ketoconazole or erythromycin. They are no longer available in New Zealand.

Although systemic treatment is best avoided during pregnancy and breastfeeding, there have been no reports that second-generation antihistamines cause birth defects. If treatment is required, loratadine and cetirizine are currently preferred.

Conventional first-generation antihistamines such as promethazine or chlorpheniramine are no longer recommended for urticaria:

- They are short-lasting.
- They have sedative and anticholinergic side effects.
- They impair sleep, learning and performance.
- They cause drowsiness in nursing infants if taken by the mother.
- They interact with alcohol and other medications.
- Lethal overdoses are reported.

Avoidance of trigger factors

In addition to antihistamines, the cause of urticaria should be eliminated if known (eg, drug or food allergy). Avoidance of relevant type 1 (IgE-mediated) allergens clears urticaria within 48 hours.

- Treat identified chronic infections such as H pylori.
- Avoid aspirin, opiates and nonsteroidal anti-inflammatory drugs (paracetamol is generally safe).
- Minimise dietary pseudoallergens for a trial period of at least three weeks.
- Avoid known allergens that have been confirmed by positive specific IgE/skin prick tests if these have clinical relevance for urticaria.
- Cool the affected area with a fan, cold flannel, ice pack or soothing moisturising lotion.

The physical triggers for inducible urticaria should be minimised; see examples below. However, symptoms often persist.

- Symptomatic dermographism: reduce friction, eg avoid tight clothing.

- Cold urticaria: dress up carefully in cold or windy conditions and avoid swimming in cold water.
- Delayed pressure urticaria: broaden the contact area eg of a heavy bag.
- Solar urticaria: dress up and apply broad-spectrum sunscreens.

Some patients with inducible urticaria benefit from daily induction of symptoms to induce tolerance. Phototherapy may be helpful for symptomatic dermographism.

Treatment of acute refractory urticaria

If non-sedating antihistamines are not effective, a 4 to 5-day course of oral prednisone (prednisolone) may be warranted in severe acute urticaria.

Intramuscular injection of adrenaline (epinephrine) is reserved for life-threatening anaphylaxis or swelling of the throat.

Treatment of chronic refractory urticaria

Patients with chronic urticaria that has failed to respond to maximum-dose second-generation oral antihistamines taken for four weeks should be referred to a dermatologist, immunologist or medical allergy specialist.

There is good evidence to support treatment with omalizumab or ciclosporin, which each have a 65% response rate in antihistamine-resistant patients.

- Omalizumab is a monoclonal antibody directed against IgE, with low toxicity. Omalizumab is not funded by PHARMAC in New Zealand for urticaria (2015).
- Ciclosporin is a calcineurin inhibitor, with potentially serious side effects (eg, may increase blood pressure and reduce renal function).

Other treatments that are sometimes used off-label in chronic urticaria include:

- Leukotriene antagonist, montelukast
- Tricyclic antidepressants
- Methotrexate
- Dapsone
- Phototherapy
- Anti-TNF alpha agents, for example infliximab, adalimumab
- Intravenous immunoglobulins

Long-term systemic corticosteroids are not recommended, as high doses are required to reduce symptoms of urticaria and they have inevitable adverse effects that can be serious.

The effectiveness of treatment can be objectively monitored using urticaria control test. Patients are asked to score the physical symptoms of urticaria they have experienced in the previous four

weeks, quality of life affected by urticaria, how often treatment was not enough to control symptoms, and overall control of urticaria.

Differential diagnosis of urticaria

Scombroid fish poisoning

Histamine release from decomposing scombroid fish causes erythema without weals, tachycardia, abdominal pain, diarrhoea and diaphoresis.

Papular urticaria

Insect bites are localised, often clustered in groups of 3–5 lesions, and they appear in crops. Bites persist for days. Close inspection reveals a central punctum. Chronic hypersensitivity to insect bites is often called papular urticaria.

Mastocytosis

The most common form of mastocytosis, maculopapular cutaneous mastocytosis is also called urticaria pigmentosa. Itchy brown patches or freckles on the skin are due to abnormal collections of mast cells.

Urticarial vasculitis

Urticarial vasculitis causes persistent urticaria-like plaques that last more than 24 hours and resolve with bruising. Biopsy reveals leukocytoclastic vasculitis.

Autoinflammatory syndromes

Urticarial rashes are rarely due to autoinflammatory syndromes, which are mediated by interleukin (IL) 1.

Urticarial rashes in autoinflammatory syndromes differ from urticaria:

- Patches are flat
- Lesions persist longer
- Distribution is symmetrical
- Systemic symptoms
- Elevated inflammatory markers such as C-reactive protein (CRP)
- Biopsy of skin lesion shows dense neutrophilic infiltrate
- Lack of response to antihistamines

What is the outlook for chronic urticaria?

Although chronic urticaria clears up in most cases, 15% continue to have wealing at least twice weekly after two years.

Annexure 2

Bharath Institute of Higher Education and Research

Sri Lakshmi Narayana Institute of Medical Sciences

Participant list of Value-added course: **URTICARIA-DR11**

(July 2019 – Oct 2019)

2nd Year MBBS Student			
Sl. No	**Name of the Student**	**Reg No**	**Signature**
1	SHREYASEE CHATTOPADHYAY	U18MB371	Shreyasee
2	SHRI KIRTI RAAJA	U18MB372	Shri. Kirti.
3	SNEKA SE	U18MB373	Sneka SE
4	SONALI HESSA	U18MB374	Sonali
5	SOUMITRA MOHANTY	U18MB375	Soum
6	SREEHARI S NAIR	U18MB376	Sreehari
7	SREELEKSHMI S NAIR	U18MB377	sreelakshmi.
8	SREENIDHI N B	U18MB378	Sreenidhi.
9	SUBALAKSHMI V	U18MB379	Subala
10	SUDHARSAN .S	U18MB380	Sudhar.
11	SUHAIL AHMAD	U18MB381	Suhail.
12	SUMAN KALYAN SAHOO	U18MB382	Suman Kalyan.
13	SUSMITA KHAN	U18MB383	susmita khan.
14	SWAPNIL	U18MB384	Swapnil.
15	SWARNAB JANA	U18MB385	Swarnab.

Dr. A. BUVANARATCHAGAN, MD.,
Asso. Professor, Dermatology
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

Dr. Buvanaratchagan

RESOURCE PERSON

Dr. A. BUVANARATCHAGAN, MD.,
Reg. No: 37159
Asso. Professor, Dermatology
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

Dr. Buvanaratchagan

COORDINATOR

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ANNEXURE-3

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

Annexure – III

URTICARIA

MULTIPLE CHOICE QUESTIONS

Course code: DR11

ANSWER ALL THE QUESTIONS

1. In urticaria what is seen?
    a) Wheals
    b) Angioedema
    c) Both
    d) None
2. Acute urticaria is?
    a) Less than 3 weeks
    b) Less than 3 months
    c) Less than 6 weeks
    d) Less than 6 months
3. What is not a feature of anaphylaxis?
    a) Stridor
    b) Joint pain
    c) Hypertension
    d) Hypotension
4. Doxepine can be given in urticaria
    a) True
    b) False
    c) Neither true or false
5. What is preferred in urticaria in pregnancy?
    a) First gen antihistamines
    b) Second gen
    c) All of the above
    d) None of the above
6. Which drug can be given in chronic urticaria?
    a) Rituximab
    b) Omalizumab
    c) Etanercept
    d) Adalimumab

7. Wheals are at which level?
    a) Epidermis only
    b) Upto upper dermis
    c) Subcutaneous
    d) Dermis only
8. Bradykinin induced urticaria produce
    a) Wheals
    b) Angioedema
    c) Both
    d) None of the above
9. Urticaria vasculitis produce
    a) Wheals
    b) Angioedema
    C) Both
    d) None of the above
10. Urticaria is a Mast cell driven disease
    a) True
    b) False
    c) Neither true nor false

ANNEXURE-3

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

Annexure – III

URTICARIA

MULTIPLE CHOICE QUESTIONS

SREENIDHI NB

Course code: DR11

ANSWER ALL THE QUESTIONS

9/10

17/9/19

1. In urticaria what is seen?
   a) Wheals
   b) Angioedema
   c) Both
   d) None
2. Acute urticaria is?
   a) Less than 3 weeks
   b) Less than 3 months
   c) Less than 6 weeks
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3. What is not a feature of anaphylaxis?
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   c) All of the above
   d) None of the above
6. Which drug can be given in chronic urticaria?
   a) Rituximab
   b) Omalizumab
   c) Etanercept

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d) Adalimumab

7. Wheals are at which level?
   a) Epidermis only
   b) Upto upper dermis
   c) Subcutaneous
   d) Dermis only

8. Bradykinin induced urticaria produce
   a) Wheals
   b) Angioedema
   c) Both
   d) None of the above

9. Urticaria vasculitis produce
   a) Wheals
   b) Angioedema
   C) Both
   d) None of the above

10. Urticaria is a Mast cell driven disease
   a) True
   b) False
   c) Neither true nor false

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ANNEXURE-3

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

Annexure – III

URTICARIA

MULTIPLE CHOICE QUESTIONS

SNEKASE

Course code: DR11

ANSWER ALL THE QUESTIONS

9/10

17/9/19

1. In urticaria what is seen?
   a) Wheals
   b) Angioedema
   c) Both
   d) None
2. Acute urticaria is?
   a) Less than 3 weeks
   b) Less than 3 months
   c) Less than 6 weeks
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3. What is not a feature of anaphylaxis?
   a) Stridor
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   d) Hypotension
4. Doxepine can be given in urticaria
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5. What is preferred in urticaria in pregnancy?
   a) First gen antihistamines
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   c) All of the above
   d) None of the above
6. Which drug can be given in chronic urticaria?
   a) Rituximab
   b) Omalizumab
   c) Etanercept

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d) Adalimumab

7. Wheals are at which level?
   a) Epidermis only
   b) Upto upper dermis
   c) Subcutaneous
   d) Dermis only

8. Bradykinin induced urticaria produce
   a) Wheals
   b) Angioedema
   c) Both
   d) None of the above

9. Urticaria vasculitis produce
   a) Wheals
   b) Angioedema
   C) Both
   d) None of the above

10. Urticaria is a Mast cell driven disease
   a) True
   b) False
   c) Neither true nor false

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ANNEXURE-4

Student Feedback Form

Course Name: **URTICARIA**

Subject Code: **DR11**

Name of Student: _____ Roll No.: _____

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear					
2	Course contents met with your expectations					
3	Lecturer sequence was well planned					
4	Lectures were clear and easy to understand					
5	Teaching aids were effective					
6	Instructors encourage interaction and were helpful					
7	The level of the course					
8	Overall rating of the course	1	2	3	4	5

**** Rating: 5– Outstanding; 4- Excellent; 3– Good; 2– Satisfactory; 1- Not-Satisfactory***

Suggestions if any:

Signature

Date:17-09-2019

ANNEXURE-4

Student Feedback Form

Course Name: **URTICARIA**

Subject Code: **DR11**

Name of Student: SNEHASE Roll No.: U18MB373

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear			✓		
2	Course contents met with your expectations				✓	
3	Lecturer sequence was well planned					✓
4	Lectures were clear and easy to understand				✓	
5	Teaching aids were effective		✓	✓		
6	Instructors encourage interaction and were helpful			✓		
7	The level of the course				✓	
8	Overall rating of the course	1	2	3	4	5

**** Rating: 5– Outstanding; 4- Excellent; 3– Good; 2– Satisfactory; 1- Not-Satisfactory***

Suggestions if any:

Sneka SE.

Signature

Date:17-09-2019

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ANNEXURE-4

Student Feedback Form

Course Name: **URTICARIA**

Subject Code: **DR11**

Name of Student: SREENADH M NAIR Roll No.: U18MB378

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear	✓				
2	Course contents met with your expectations		✓			
3	Lecturer sequence was well planned			✓		
4	Lectures were clear and easy to understand			✓		
5	Teaching aids were effective				✓	
6	Instructors encourage interaction and were helpful			✓		
7	The level of the course				✓	
8	Overall rating of the course	1	2	3	4	5

**** Rating: 5– Outstanding; 4- Excellent; 3– Good; 2– Satisfactory; 1- Not-Satisfactory***

Suggestions if any:

Sreenadh

Signature

Date:17-09-2019

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Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that SNEKA SE has actively participated in the Value Added Course on *Urticaria* held during July 2019 – Oct 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. Buvanaratchagan
RESOURCE PERSON

Dr. Buvanaratchagan
COORDINATOR

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Annexure 5

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that SREENIDHI N.B has actively participated in the Value Added Course on *Urticaria* held during July 2019 – Oct 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. Buvanaratchagan
RESOURCE PERSON

Dr. Buvanaratchagan
COORDINATOR

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Course completion letter

Date-21-09-19

From
Dr. Bhuvanaratchagan
Department of Dermatology
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To
The Dean
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: urticaria

Dear Sir,

With reference to the subject mentioned above, the department has conducted thevalue-added course title: **urticaria** on 20-7-19. We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards

Dr. Bhuvanaratchagan

<HOD Sign and Seal>

Encl: Certificates

Photographs

Course completion letter

Date-21-09-19

From
Dr. Bhuvanaratchagan
Department of Dermatology
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To
The Dean
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: urticaria

Dear Sir,

With reference to the subject mentioned above, the department has conducted thevalue-added course title: **urticaria** on 20-7-19. We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards

Dr. Bhuvanaratchagan

PROFESSOR & HEAD
DEPT. OF DERMATOLOGY
SRI LAKSHMI NARAYANA INSTITUTE OF
MEDICAL SCIENCES
OSUDU, PUDUCHERRY.

<HOD Sign and Seal>

Encl: Certificates

Photographs


URTICARIA

Sri Lakshmi Narayana Institute of Medical Sciences

Annexure 1

Date 28/06/2019

From
Prof.D.Baba, MS
Professor and Head,
Ophthalmology,
Sri Lakshmi Narayana Institute Of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

To
The Dean,
Sri Lakshmi Narayana Institute Of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: SLIT LAMP BIOMICROSCOPY

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **SLIT LAMP BIOMICROSCOPY** on **JULY-2019 – OCT -2019**. We solicit your kind permission for the same.

Kind Regards

PROF.D.BABA, MS
HOD, OPHTHALMOLOGY

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: Prof.K.Balagurunathan M.S,

The HOD: Prof.D.Baba M.S,

The Expert: Dr.R.Shobana, DNB,

The committee has discussed about the course and is approved.

DEAN
Prof.K.BALAGURUNATHAN,M.S
(General surgeon)
SRI LAKSHMI NARAYANA
INSTITUTE OF MEDICAL SCIENCES
OSUDU PONDICHERRY

Subject Expert

HOD
PROFESSOR & HOD
DEPARTMENT OF OPHTHALMOLOGY,
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
PUDUCHERRY-605 502.

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affliated to Bharath University, Chennai - TN]

Ref. No. SLIMS/Dean Off/VAC / OPH12 **Date: 28.06.2019**

From
The Dean
Sri Lakshmi Narayana Institute of Medical sciences,
Pondicherry – 605502

To
The Registrar,
Bharath Institute of Higher Education and Research,
Chennai - 600073.

Respected Sir

Sub: Request for permission and approval of Syllabus for certificate course (Value Added course) for the academic year 2019-2020 - Reg
Ref: Requesting letter received from Departments

*****

With reference to the above, herewith forwarding the proposed list of Value-added courses for necessary permission and approval of syllabus to conduct the same.

1. RETINOPATHY OF PREMATURITY
2. SLIT LAMP BIOMICROSCOPY

This is for your kind information and needful action.

Thanking you

Yours faithfully

[DEAN]

DEAN
Prof.K.BALAGURUNATHAN M.S
(General surgeon)
SRI LAKSHMI NARAYANA
INSTITUTE OF MEDICAL SCIENCES
OSUDU, PONDICHERRY

Encl's:

1. Requesting letter received from department
2. Syllabus of the course
3. Details of faculty handling course

Sri Lakshmi Narayana Institute of Medical Sciences,

Puducherry

VALUE ADDED COURSE –

1. RETINOPATHY OF PREMATURITY
2. SLIT LAMP BIOMICROSCOPY

COURSE CO-ORDINATOR DETAILS

Faculty Name: Prof.D.Baba, MS

Email ID: ophthalmologyprof@gmail.com

Mobile number: 8585485988

Bharath
INSTITUTE OF HIGHER EDUCATION AND RESEARCH
(Declared as Deemed - to - be - University under section 3 of UGC Act 1956)

Ref. No. BHIER/ VAC / OPH12 **Date: 30.06.2019**

From

The Registrar,
Bharath Institute of Higher Education and Research,
Chennai - 600073.

To

The Dean
Sri Lakshmi Narayana Institute of Medical sciences,
Pondicherry – 605502

Sir / Madam,

Sub: Approval of Syllabus to conduct certificate course (Value Added course) for the academic year 2015-2016 – Reg.

Ref: Ref. No. SLIMS/Dean Off/VAC /OPH12 Dated: 28.06.2019

*****

With reference to the above, it is to inform that the proposal submitted to conduct Value Added Course has been accepted and approved by BIHER, council meeting. List of the VAC are mentioned below for the academic year 2019– 2020. The abstract of the VAC course completion detail should be submitted to the Registrar office.

1. RETINOPATHY OF PREMATURITY
2. SLIT LAMP BIOMICROSCOPY

Thanking you

Yours faithfully

REGISTRAR

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affliated to Bharath University, Chennai - TN]

Circular

01.07.2019

Sub: Organising Value-added Course: SLIT LAMP BIOMICROSCOPY

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research** is organizing **"SLIT LAMP BIOMICROSCOPY"**. The course content and registration form is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before 05TH JULY 2019. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

DEAN
Prof.K.BALAGURUNATHAN M.S
(General surgeon)
SRI LAKSHMI NARAYANA
INSTITUTE OF MEDICAL SCIENCES
OSUDU PONDICHERRY

Encl: Copy of Course content

VALUE ADDED COURSE

1. Name of the programme & Code

Slit Lamp Biomicroscopy

2. Duration & Period

30 hrs & July-2019 – Oct-2019

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Multiple choice questions- *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

July-2019 – Oct-2019 (1)

8. Year of discontinuation: 2017

9. Summary report of each program year-wise

Value Added Course- July-2019 – Oct-2019					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	**OPH12**	**Slit lamp biomicroscopy**	Dr.R.Shobana S.R. - Ophthal	30	2019

10. Course Feed Back

Enclosed as Annexure- V

Dr.R.Shobana S.R.
RESOURCE PERSON

Prof. D. Baba, M.S,
COORDINATOR

PROFESSOR & HOD
DEPARTMENT OF OPHTHALMOLOGY,
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
PUDUCHERRY-605 502.

Annexure 2 – Course Proposal

Course Title: SLIT LAMP BIOMICROSCOPY

Course Objective:

1. **Optical design**
2. **Models & accessories**
3. **Examination**
4. **Colour coding of corneal lesions**
5. **How to view fundus using slit lamp & 90D**
6. **Various lenses used for fundus examination**

Course Outcome: On successful completion of the course the students will be able to use the Slit lamp for ophthalmic examination purposes.

Course Audience: MBBS UNDERGRADUATES

Course Coordinator: PROF.D.BABA, MS,

Course Faculties with Qualification and Designation:

1. **Prof.D.Baba, MS, - HOD Ophthalmology**
2. **Dr.R.Shobana S.R.**

Course Curriculum/Topics with schedule (Min of 30 hours)

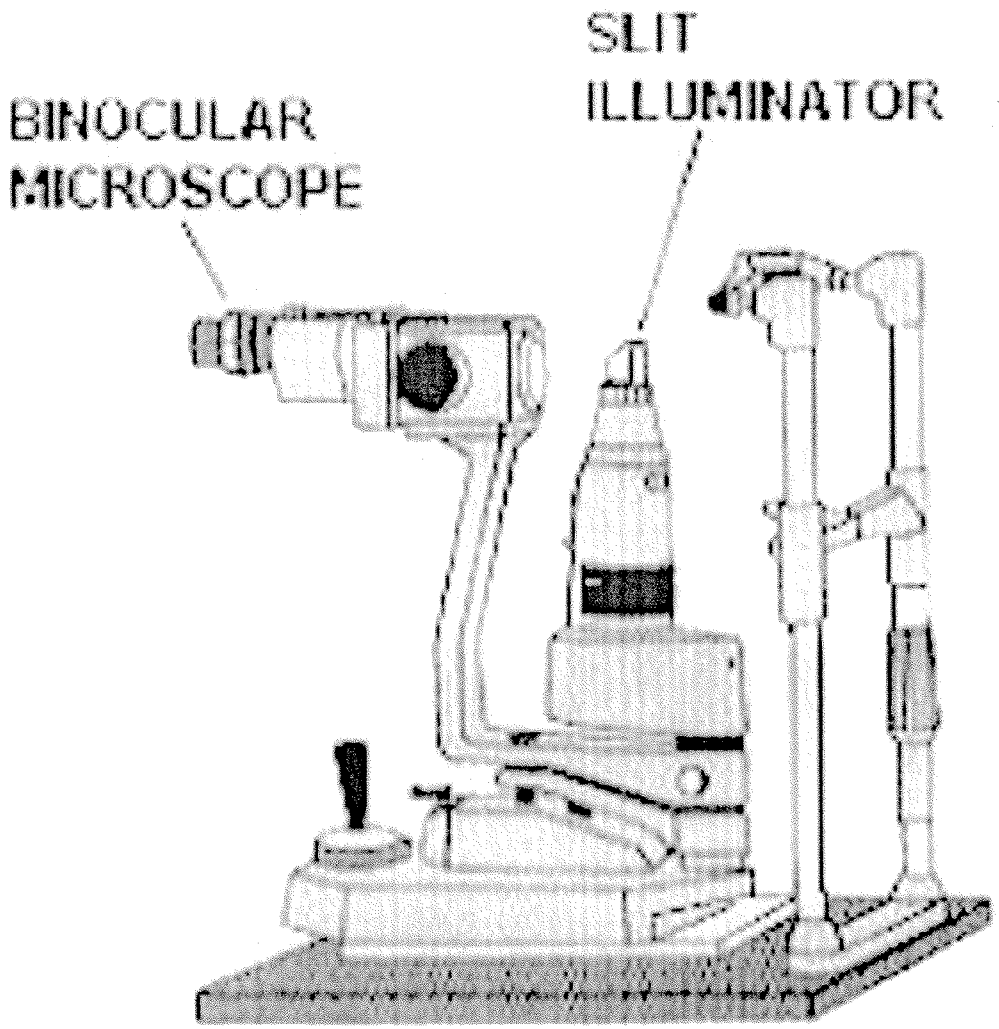
SlNo	Date	Topic	Time	Hours
1.	10/7/2019	**Optical design**	4-6PM	2
2.	19/7/2019	**Optical design**	4-7PM	3
3.	24/7/2019	**Models & accessories**	4-6PM	3
4.	27/7/2019	**Models & accessories**	4-6PM	2
5.	28/7/2019	**Examination**	4-7PM	3
6.	09/8/2019	**Examination**	4-7PM	3
7.	12/8/2019	**Colour coding of corneal lesions**	4-7PM	3
8.	16/8/2019	**Colour coding of corneal lesions**	4-6PM	2
9.	19/8/2019	**How to view fundus using slit lamp & 90**	4-6PM	2
10.	21/8/2019	**How to view fundus using slit lamp & 90D**	4-7PM	3
11.	24/8/2019	**Various lenses used for fundus examination**	4-6PM	2
12.	28/8/2019	**Various lenses used for fundus examination**	4-6PM	2

			TOTAL HOURS	30

REFERENCE BOOKS: (Minimum 2)

1. JACK J KANSKI clinical ophthalmology a systemic approach-6th edition.
2. PARSON'S Diseases of the eye – 19th edition

SLIT LAMP BIOMICROSCOPY



PARTICIPANT HAND BOOK

BIHER SLIMS

COURSE DETAILS

Particulars	Description
Course Title	Slit Lamp Biomicroscopy
Course Code	OPH01
Objective	1. Role of Slit Lamp in ophthalmology 2. Principle, Parts and its functions 3. How To Use a Slit Lamp 4. Methodological Information 5. Illumination Techniques 6. Fundoscopy with 90D lens 7. Hruby Lens fundoscopy 8. Applanation Tonometry 9. Flourescein Staining and Cobalt Blue Filter 10. Red free green filter 11. Portable Hand-held slit lamp
Further learning opportunities	Slit Lamp Digital Imaging and Videography
Key Competencies	On successful completion of the course the students will have skill in handling and observing the structures of the eye using a slit lamp
Target Student	3rd MBBS Students
Duration	30hrs Every September 2016– January 2017 & February – August 2017
Theory Session	10hrs
Practical Session	20hrs
Assessment Procedure	Multiple choice questions

A slit-lamp is a binocular microscope used for eye examination using a slit-like light beam. In 1911, **Allvar Gullstrand,** a Swedish Ophthalmologist designed table-mounted binocular eyepiece for 3-dimensional visualization of optically clear eye structures. Later **Otto Henker**, combined Gullstrand slit lamp with Czapski's binocular microscope resulting in first slit lamp biomicroscope, allowing hand-free examination of an eye.

The optical design of the Slit-Lamp Biomicroscope (SLB).

Due to the miniature size of the anterior segment of the eye, we need high magnification and clarity to appreciate finer details. This can be achieved by having 2 convex lenses at the observer end (eyepiece) separated at its focal distance (astronomical telescope type alignment) and, a concave-convex combination (Galilean telescope type alignment) at the examinee's end for further magnification of the image. Telescopic arrangements of lenses need to be focused at near, hence a plus power objective lens is fixed at the examinee's end. The eyepiece lenses invert image by default hence a porro-abbe prism is placed in front of it for erect image visualization. Lastly, one eyepiece for each eye aids in binocular visualization and depth perception. [2] (Figure-1)

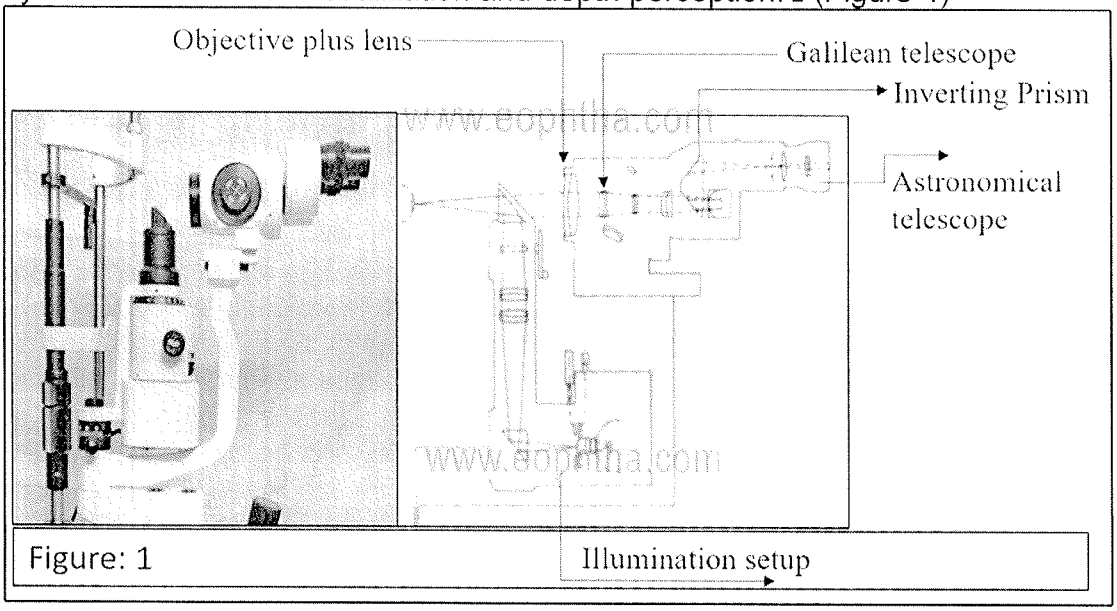


Figure: 1

The illumination system is either a halogen or xenon lamp. Light passes through a slit diaphragm converting diffuse light into a slit beam. Both the observing system and illumination units are fixed around the same center of rotation for para focal movement to ensure slit beam and observing focus fall on the same point of interest. Both the illuminating system and the observing unit are fixed over the mechanical stand. A joystick allows the to-fro, side-to-side, and up & down moments of both units. Chinrest and fixation targets allow the examinee to rest and fixate. (Figure-2a).

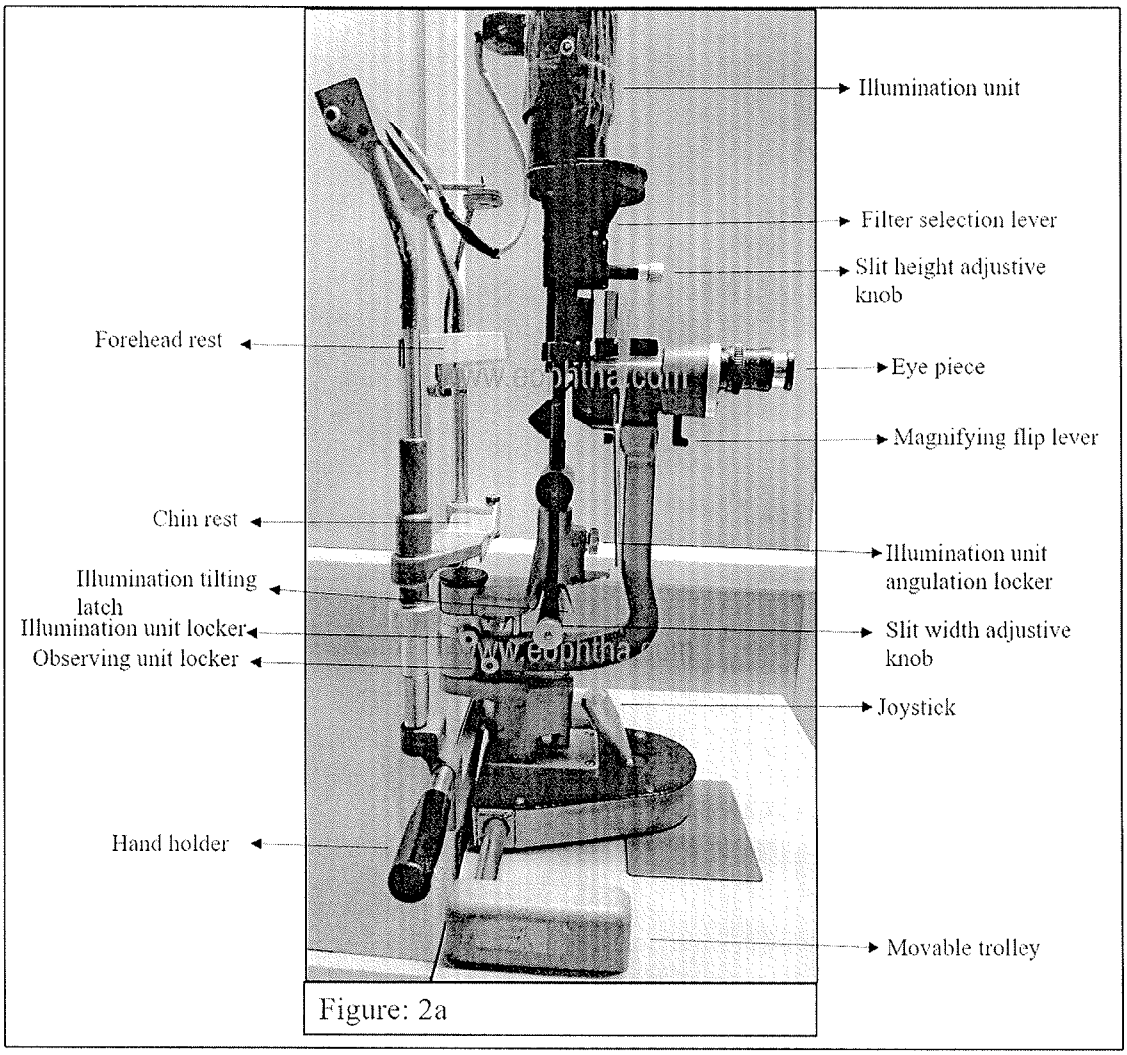


Figure: 2a

Models and accessories:

The illumination unit may be vertically oriented with a light source at the top (Haag Streit) model or the light source may be at the bottom with a horizontal prism reflecting the light (Zeiss model). In general, the magnification is achieved by a flip lever in the Haag Streit model (Greenough type) or knob to change magnification as in Zeiss model (Galilean changer type) (Figure 2b)

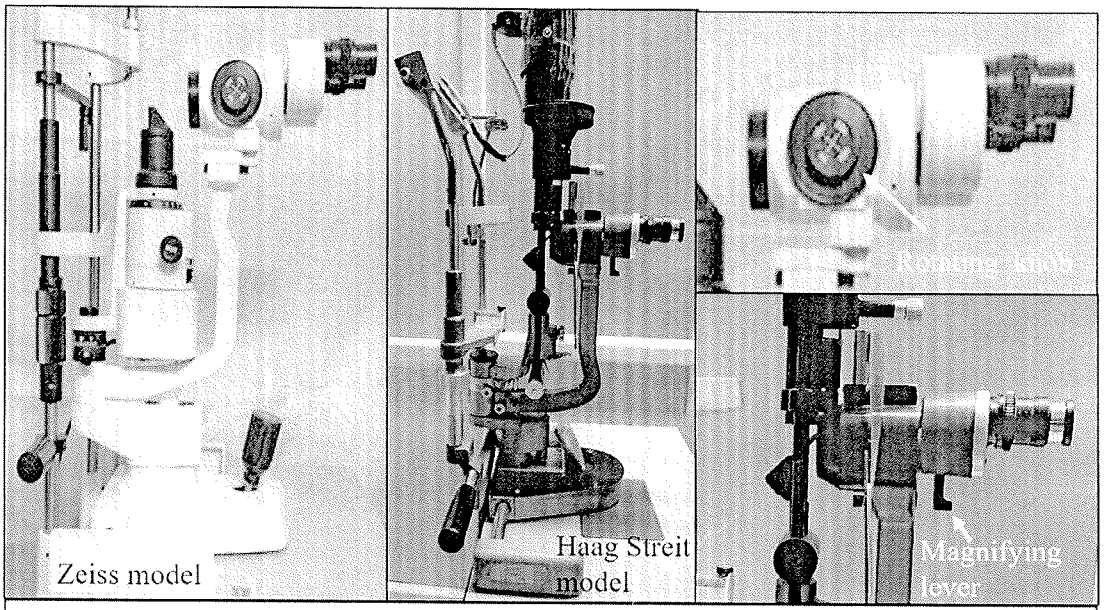


Figure:2b

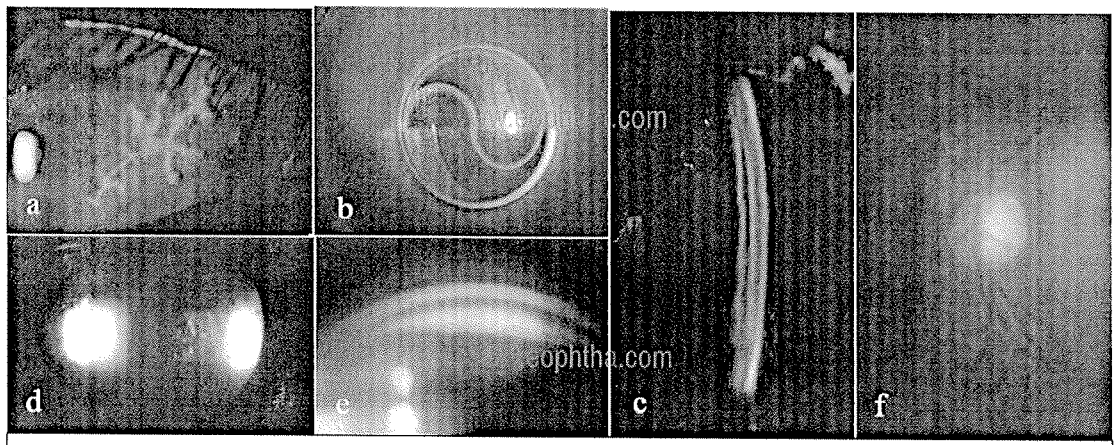


Figure: 3

Just like filters in indirect ophthalmoscope, SLB is also fitted with a blue filter which, along with fluorescein stain is used to study the integrity of conjunctiva and cornea (Figure-3a) and also during applanation tonometry. (Figure-3b)

Red free filters help in better visualization of blood vessels and hemorrhages. Neutral density filter decreases brightness comforting the patient. Polarising filters reduces unwanted specular reflections. Special yellow filters enhance contrast when used with fluorescein or cobalt blue filter.

Slit beam with its freedom of adjustable height, width, rotation, and intensity, allows examination of the anterior segment in different ways. A calibrated knob is provided to adjust the height of the slit and is used to measure the dimensions of lesions. A narrow slit beam at limbus can be used to measure the depth of the

anterior segment angle (Figure-3c), Conical (pinpoint) slit through the anterior chamber appreciates Tyndal moment of cells and aqueous turbidity (Figure-3d). Angles can be studied by goniolens (Figure-3e) and fundus by +90diopter lenses. (Figure-3f)

A diffuse slit-free illumination is used for gross pathologies of the lid margin, conjunctiva, and cornea. (Figure-4a) A direct slit illumination passes a narrow slit of light through the transparent tissues and helps in the cross-sectional study of opaque lesions like corneal and lens opacities (Figure-4b). The light directing at the sclera glows the cornea through total internal reflection and indirectly highlights subtle corneal pathologies (Figure-4c). Light is made to reflect from the iris (Iris retro illumination) or fundus (fundus retro illumination) to visualize corneal and lens opacities better. (Figure-4d). A parallelopiped beam of light focused at an angle over the cornea delineates enface architecture (Figure-4e). Tangential beam used for visualization of iris and lens surfaces.

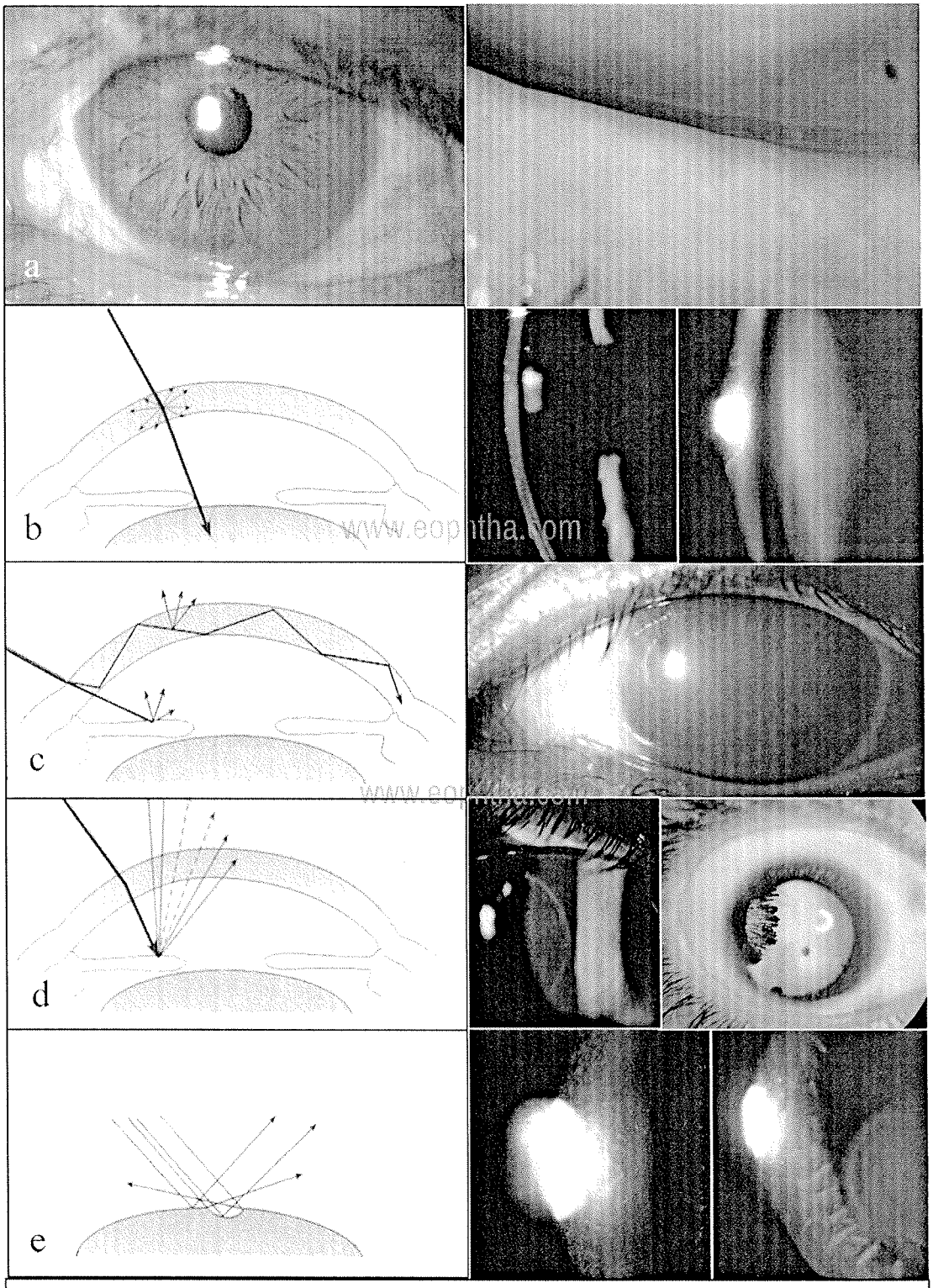


Figure: 4

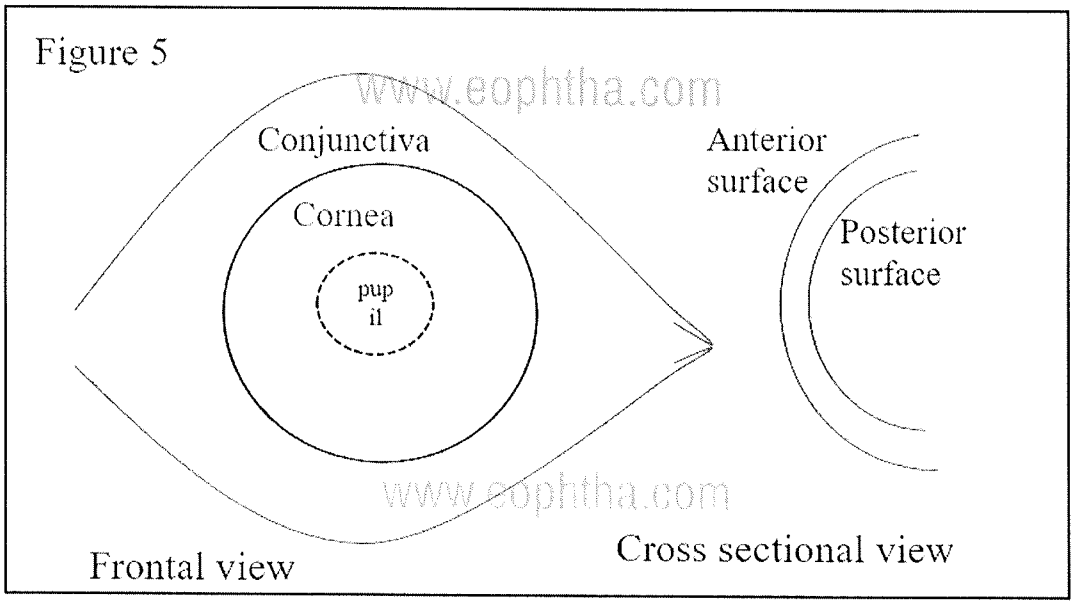
Additional fittings: A beam splitter can be fitted to a viewing system to share

visualization with secondary attachments like an observer tube to teach students or capture videos/ digital photos. Additional attachments like pachymetry, keratometry, OCT for angle study, smartphone camera system, and fundus camera can be fixed for respective uses. Collagen cross-linking system fixed to slitlamp for cross-linking can be carried as OPD procedures. Software programs can be inculcated into slit-lamp for remote operating which is under the evolving stage in the field of teleophthalmology. A miniature portable slit-lamp is a handy and mobile piece to examine bed-ridden patients and in operation theatres.

Examination and drawings

A slit-lamp examination is done in a semi-dark room. After comfortable positioning of the examinee, adjust the chinrest position such that the patient lateral canthus is aligned with the mark on the headset bar. Target is given to fix during the examination. With appropriate illumination examine eyelids and lashes, tear film, conjunctiva, cornea, anterior chamber, iris and pupil, lens, and vitreous in order.

Drawing slit-lamp examination findings and pseudo coloring are important for follow-up and also for teaching purposes: (Figure: 5) Red for blood vessels and bleeds, Blue for edematous tissue, green for surface defects, yellow for infiltrates, hypopyon, and lastly blue/black for pigmented regions/lesions.



Fundus visualisation and lenses

The high refractive power of cornea does not allow direct visualization of the fundus. Contact lenses are used to nullify the curvature effect of the cornea like Goldman fundus lens, Hruby Lens, Zeiss 4-mirror goniolenses. Here images are virtual and upright. Non-contact lenses with very high power can be used (+78, +90Diopter spherical lenses) to visualize the aerial image of the fundus just like an IDO (upside down and laterally inverted images).3 (Figure:6) With these

lenses, SLB gives a magnified, stereoscopic view of the posterior pole. Panoramic fundus view up to the periphery can be obtained with appropriate lenses.

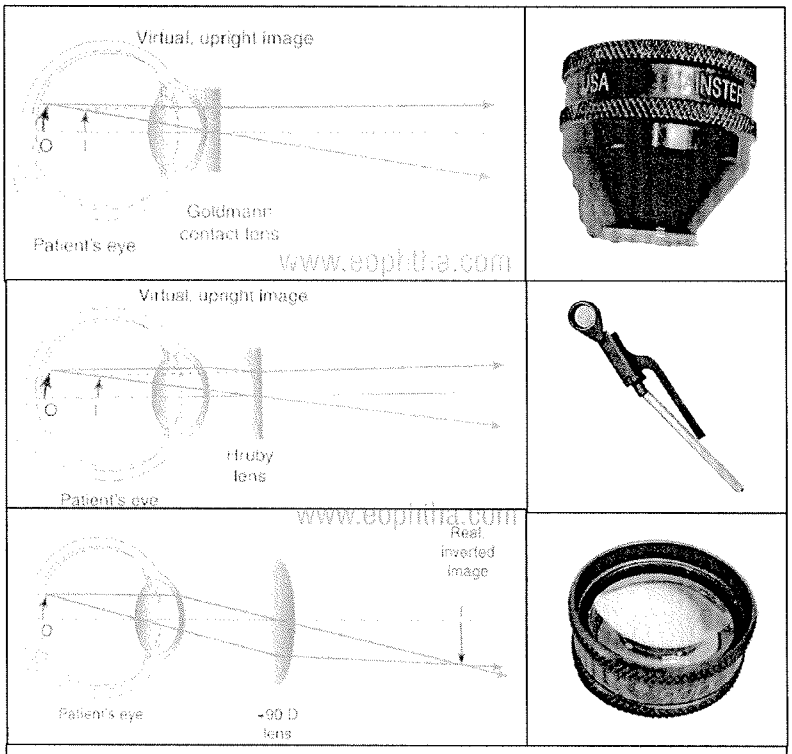


Figure 6: source- AAO series

Relative magnification, the field of view depends on the power of the lens and refractive status of the eye. In general, the higher the power of the lens, the lesser the magnification and wider is the field of view. The details are addressed in the appendix-2. Generally, +78/90 non-contact lenses are used in OPD settings for quick examination of the posterior pole (magnification factor for 78 is nearly ×1, hence often used for macular examination and disc examination). For laser delivery and other therapeutic procedures, contact lens methods are used which have a higher field of view than non-contact lenses.

Haagstriet models have an illumination unit with tilting latch. Dissociation of parafocality is done by the tilting illumination unit. This trick coupled with a horizontal slit beam for 90/78D lens use avoids unnecessary reflexes allowing reflex-free fundus examination. (Figure:7)

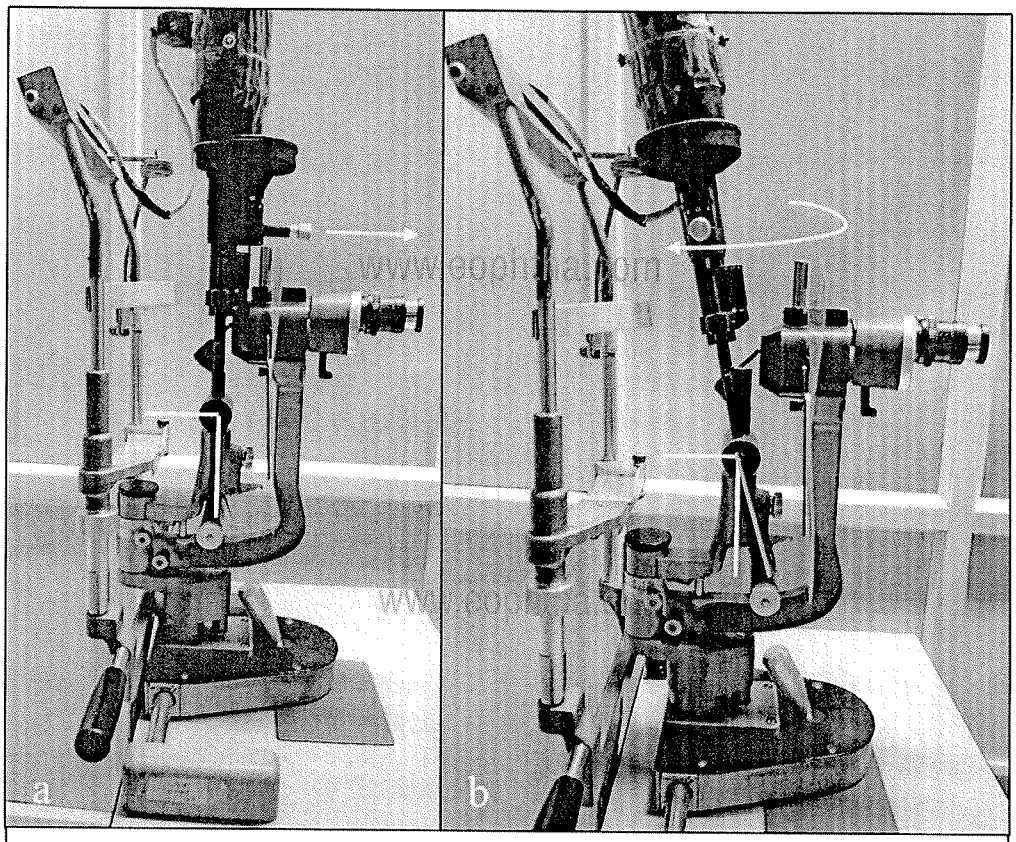


Figure: 7 Angulation of illuminating system for fundus visualization

Mastering fundus visualisation in slitlamp

The technique of visualizing the fundus image in a non-contact method is the same as IDO. Just that a high magnifying lens is used here and working distance is brought down with the use of additional lenses in slit-lamp. The observer (observing unit) – lens-pupil of examinee should be on the same axis to visualize the fundus. The contact method examination involves a coupling agent like lubricant gel (4 mirror gonio lens may not need a coupling agent) and the lens is placed over the cornea for examination. After comfortable seating, both upper and lower lids are pulled and the examinee is asked to look upwards. The contact lens is placed from below over fornix and the examinee is asked to look straight while the observer slowly guides the contact lens over the cornea. (Figure 8a-d) The non-contact lenses are kept at an approximately 1-2 centimeter distance from cornea while fingers are used to separate both eyelids. (Figure 8 e&f).



Figure 8: Steps of contact (a-d) and non contact (e&f) lens placing for fundus visualization

Macular details can be visualized by macular contact lenses and larger areas can be visualized by pan-fundus lenses. Additionally, goniolenses are designed specifically for both angle assessment and fundus visualization. The mirrors are angulated and designed to visualize a specific portion of the posterior segment.

Maintenance of Slit lamp and lenses.

A lint-free cloth moistened with alcohol is used to clean the headrest, chin rest, and hand holder. If paper strips are used for chin rest, they have to be replaced with every use. Gonio lens, +90D/78D to be washed with soap and water and air-dried.

Take-home tips:

1. Learning para focal illumination and focusing comes with practice. The majority of anterior segment lesions are best appreciated when techniques are perfectly executed.
2. Make the best use of filters for different conditions and at different times of examination.
3. Angulation of the illuminating unit removes unwanted reflexes during fundus examination by contact and non-contact lenses.

4. Keeping the slit-beam horizontal makes macular visualization more comfortable and convenient.
5. Don't miss an opportunity of using and learning the contact method fundus visualization technique which is easier with a better view than non-contact one.

LENS	MAGNIFICATION	FIELD OF VIEW (Degrees)
78 D	0.93x	81/97
90 D	0.76x	74/89
GOLDMANN 3 MIRROR	1.06	60/66/76
AREA-CENTRALIS	1.06x	70/84
TRANSEQUATORIAL	0.7x	110/132
QUADRASPHERIC	0.5X	120/144

Appendix-1.

Illumination	Diffuse	Parallelepiped	optic section	Conical section	Sclerotic scatter	Fundus retro illumination	Iris Retro-illumination	Specular reflection
Beam angle	450 to 600	450 to 600	450 to 600	600 to 750	600	00	600	(usually 450)
Beam height	Maximum	Maximum	maximum	3-4mm	Maximum	Maximum	Maximum	maximum
Beamwidth	4mm to wide open	1-2mm	0.2-0.3mm	0.5-0.6mm	1mm	1-2mm	1-2mm	1-2mm
Magnification	Low	Start low then increase	Increase as necessary	20-30X	Low	Low to high as necessary	Low to high as necessary	High
Illumination level	Low	Low	Moderate to high	Maximum	Moderate	Moderate	Moderate	moderate

Source: Textbook of Optometry science and clinical management

Appendix-2: Lenses and its magnifying power, field of view.

Annexure- II

VALUE ADDED COURSE

SLIT LAMP BIOMICROSCOPY

4. List of Students Enrolled JULY - 2019– OCT -2019

SL. No.	University Reg. No.	Name of the student	Signature
1	U19MB251	AAYESHA TAUHEED	
2	U19MB252	ABHIJITH A	
3	U19MB253	ABIHA SHERIN M	
4	U19MB254	ABINAYA SHANMUGAM	
5	U19MB255	ADHITI PRAKASH	
6	U19MB256	ADITHYA S KUMAR	
7	U19MB257	S M AISHMEKA SAIRA	
8	U19MB258	AISHU MUPPANENI	
9	U19MB259	AJETH R	
10	U19MB260	AKASH P	
11	U19MB261	AMIR FAJURA A	
12	U19MB262	AMLAN KUMAR KAR	
13	U19MB263	ANANDHA VIGNESHVAR A	
14	U19MB264	ANISHA C	
15	U19MB265	ANMOL KAUL	
16	U19MB266	ANNET GERIZIM	
17	U19MB267	ANUSHA MOL VINCENT VJP	
18	U19MB268	ARAVIND N	
19	U19MB269	ARNAB ADHIKARI	
20	U19MB270	ARNAB JYOTI DAS	
21	U19MB271	ARTHY M	
22	U19MB272	ARUNESHWARAN N	
23	U19MB273	ARUSHI MAHINDRA GAIKWAD	
24	U19MB274	ASHA J	

25	U19MB275	ASHMI RAHIMAN	
26	U19MB276	ATHULYA RAVINDRAN	
27	U19MB277	BALAJI M	
28	U19MB278	BALAJI S	
29	U19MB279	BAVINENI RAMYA SAI SREE	
30	U19MB280	BHUVAN SUNDAR M	

Dr.R.Shobana, S.R

RESOURCE PERSON

Prof.D.Baba, MS-HOD

COORDINATOR

PROFESSOR & HOD
DEPARTMENT OF OPHTHALMOLOGY,
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
PUDUCHERRY-605 502.

AAYESHA TAUHEED
U19MB257

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - IV

10

SLIT LAMP BIOMICROSCOPY

MULTIPLE CHOICE QUESTIONS

Course Code: OPH12

I. ANSWER ALL THE QUESTIONS

1. Inventor of Slit Lamp

   a. Allvar Gullstrand

   b. Von Graffe

   c. Von Helmholtz

   d. Gallielio

2. Parts of a Slit Lamp

   a. Illumination Sysytem

   b. Magnification System

   c. Chinrest Stand

   d. All of the above

3. Filters in a Slit Lamp

   a. Cobalt Blue Filter

   b. UV Filter

   c. X ray Filter

   d. None of the above

4. Illumination Technique in a Slit Lamp

   a. Diffuse

   b. Parellopiped

   c. Both A & B are Correct

   d. None of the above

5. Which of the following are filter is not present

a. Green Filter

b. Blue Filter

c. White Filter

d. None of the above

6. Which of the following is not visualized by a Slit Lamp?

a. Cornea

b. Lens

c. Retina

d. None of the above

7. Which Lens is not used with a Slit Lamp?

a. 90D

b. Hruby Lens

c. 20D

d. 78D

8. What is the magnification of 90D lens?

a. 0.93x

b. 0.76x

c. 1.06x

d. None of the above

9. Images produced in Slit Lamp?

a. Real Image

b. Virtual image

c. Both Real & Virtual image

d. None of the above

10. Additional Uses of Slit Lamp

a. Fundus Examination

b. Applanation Tonometry

c. Both A & B are Correct

d. None of the above

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act, 1956)

CERTIFICATE OF MERIT

This is to certify that AAYESHA TAUHEED (U19MB251) has actively participated in the Value Added Course on SLIT LAMP BIOMICROSCOPY held during JULY 2019 TO OCT 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr.R.Shobana
Senior Resident – Ophthal
RESOURCE PERSON

Prof.D.Baba, MS,
Prof & HOD -Ophthal
COORDINATOR

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that ABHIJITH A (U19MB252) has actively participated in the Value Added Course on SLIT LAMP BIOMICROSCOPY held during JULY 2019 TO OCT 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr.R.Shobana
Senior Resident – Ophthal
RESOURCE PERSON

Prof.D.Baba, M.S,
Prof & HOD - Ophthal
COORDINATOR

Student Feedback Form

Course Name: **SLIT LAMP BIOMICROSCOPY**

Subject Code: **OPH12**

Name of Student: _____ Roll No.: _____

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear					✓
2	Course contents met with your expectations					✓
3	Lecturer sequence was well planned					✓
4	Lectures were clear and easy to understand					✓
5	Teaching aids were effective					✓
6	Instructors encourage interaction and were helpful					✓
7	The level of the course					✓
8	Overall rating of the course	1	2	3	4	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

Aayesha

Signature

Date:

Annexure 5

Date : 29/4/2018

From
Prof.D.Baba, MS,
Professor and Head,
Ophthalmology,
Sri Lakshmi Narayana Institute Of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To
The Dean,
Sri Lakshmi Narayana Institute Of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: SLIT LAMP BIOMICROSCOPY

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: **SLIT LAMP BIOMICROSCOPY** for 30students in JULY-OCT 2019. We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

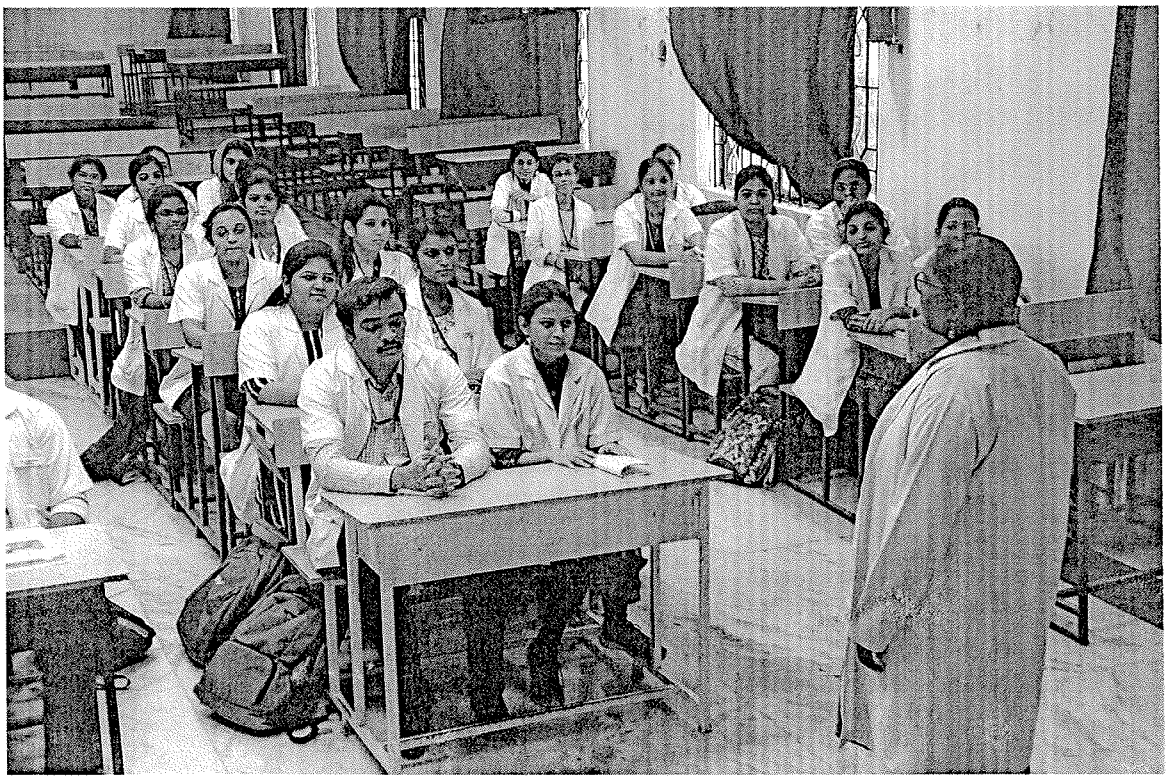
Kind Regards

Prof.D.Baba, MS

HOD ,Ophthalmology

Encl: Certificates

Photographs



Sri Lakshmi Narayana Institute of Medical Sciences

Date:02.06.2019

From
DR.V.R Sridhar
Professor and Head,
Department of Psychiatry,
Sri Lakshmi Narayana Institute Of Medical Sciences,
Bharath Institute Of Higher Education And Research,
Chennai.

To
The Dean,
Sri Lakshmi Narayana Institute Of Medical Sciences,
Bharath Institute Of Higher Education And Research,
Chennai.

Sub: Permission to conduct value-added course: Sexual Medicine, Paraphilia, Gender Identity issues and their management

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **Sexual Medicine, Paraphilia, Gender Identity issues and their management**on 1/07/2019. We solicit your kind permission for the same.

Kind Regards

Dr.V.R. Sridhar

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: **Dr. Jayalakshmi**

The HOD: **Dr. Sridhar**

The Expert: **Dr. Arun Seetharaman.**The committee has discussed about the course and is approved.

Dean (Sign &Seal)

Dr. G. JAYALAKSHMI, BSC., MBBS., DTCD., M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Agaram, Kudapakkam Post,
Villianur Commune, Puducherry - 605502.

Subject Expert (Sign &Seal)

Dr. ARUN SEETHARAMAN, MD.,
Reg. No: 91440
Associate Professor, Psychiatry
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

HOD (Sign &Seal)

Dr. V. R. SRIDHAR, MD.,D.P.M.,
Reg. No: 30995
Professor & HOD, Psychiatry
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affliated to Bharath University, Chennai - TN]

Circular

13.06.2019

Sub: Sexual Medicine, Paraphilia, Gender Identity issues and their management

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research** is organizing **"Sexual Medicine, Paraphilia, Gender Identity issues and their management"**. The course content and registration form is enclosed below.

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before 29 June, 2019. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

Dr. G. JAYALAKSHMI, BSC., MBBS., DTCD., M.D.,
DEAN
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Encl: Copy of Course content

Course Proposal

Course Title: **Sexual Medicine, Paraphilia, Gender Identity issues and their management**

CourseObjective:

Male Hypoactive Sexual Desire Disorder

Female Sexual Interest/Arousal Disorder

Male Erectile Disorder

Female Orgasmic Disorder

Delayed Ejaculation

Premature (Early) Ejaculation

Genito -Pelvic Pain/ Penetration Disorder

Sexual Dysfunction Due To A General Medical Condition

Treatment

Paraphilic disorders

CourseOutcome:

Course Audience: FINAL YEAR STUDENTS of 2019 Batch
Course Coordinator: Dr.V.R. Sridhar
Course Faculties with Qualification and Designation:
1.Dr.V.R.SRIDHAR, Professor & HOD
2.Dr.Arun, Associate Professor
Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Resource person	Time	Hours
1.	01.07.2019	Introduction	Dr.Arun	4-5p.m	1
2.	03.07.2019	Male Hypoactive Sexual Desire Disorder	Dr.Arun	2-3p.m	1
3.	05.07.2019	Female Sexual Interest/Arousal Disorder	Dr.Arun	4-6p.m	2
4.	08.07.2019	Male Erectile Disorder	Dr.Arun	4-6p.m	2
5.	10.07.2019	Female Orgasmic Disorder	Dr.Arun	4-6p.m	2
6.	12.07.2019	Delayed Ejaculation	Dr.Arun	4-5p.m	2
7.	15.07.2019	Premature (Early) Ejaculation	Dr.Arun	4-5P.M	1
8.	17.07.2019	Genito -Pelvic Pain/	Dr.Arun	4-5p.m	1

		Penetration Disorder			
9.	19.07.2019	Sexual Dysfunction Due To A General Medical Condition	Dr. Shridhar	4-6p.m	1
10.	22.07.2019	Treatment	Dr.Arun	4-6p.m	2
11.	24.07.2019	Paraphilia disorders	Dr.Arun	4-6p.m	1
12.	26.07.2019	Gender identity disorders	Dr.Arun	4-6p.m	2
13.	29.07.2019	Pre course and Post Course evaluation, Feedback analysis from Likert scale	Dr.Arun	2-5p.m	3
		Practical Class I	Dr. Shridhar		
14.	01.08.2019	HISTORY TAKING	Dr. Shridhar	2-3 PM	1
15.	03.08.2019	MENTAL STATUS EXAMINATION	Dr. Shridhar	2-3 PM	1
16.	05.08.2019	EVALUATION AND ASSESSMENT	Dr. Shridhar	2-4 PM	2
17.	08.08.2019	COUPLE THERAPY -DEMO	Dr. Shridhar	2-4 PM	2
18.	10.08.2019	CASE PRESENTATION	Dr. Shridhar	2-4p.m	2
		Total			30 hrs

REFERENCE BOOKS:

- **Comprehensive textbook of psychiatry – Kaplan & Saddock**
- **Oxford Textbook Of Psychiatry**
- **Synopsis - Kaplan & Saddock**
- **Stahl's essential psychopharmacology**

VALUE ADDED COURSE

1. Name of the programme& Code

Sexual Medicine, Paraphilia, Gender Identity issues and their management

2. Duration& Period

30 hrs&July– December 2019

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Assessment Evolution by MCQ method - *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7.No. of times offered during the same year:

1 timeJuly– December 2019

8. Year of discontinuation: 2019

9. Summary report of each program year-wise

Value Added Course- July– December 2019 &January– March 2020& April – June 2020					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength& Year**
1	**PSYC10**	Sexual Medicine, Paraphilia, Gender Identity issues and their management	Dr. V.R. Sridhar Dr.Arun Seetharaman	FINAL YEAR STUDENTS	15 students JULY to DEC 2019

10. Course Feed Back

Enclosed as Annexure- V

RESOURCE PERSON

1. **Dr.V.R. Sridhar**
2. **Dr. Arun Seetharaman**

COORDINATOR

Dr..V.R. Sridhar

Sexual dysfunction and its management



PARTICIPANT HAND BOOK

BIHER SLIMS

COURSE DETAILS

Particulars	**Description**
Course Title	Sexual dysfunction and management
Course Code	PSYC10
Objective	1. Introduction 2. Male Hypoactive Sexual Desire Disorder 3.Female Sexual Interest/Arousal Disorder 4. Male Erectile Disorder 5.Female Orgasmic Disorder 6. Delayed Ejaculation 7. Premature (Early) Ejaculation 8.Genito -Pelvic Pain/ Penetration Disorder 9.Sexual Dysfunction Due To A General Medical Condition 10. Treatment 11. Paraphilic disorders
Further learning opportunities	Sexual medicine
Key Competencies	On successful completion of the course the students will have skill in handling sexual medicine cases
Target Student	3RDyear MBBS Students
Duration	30hrs Every July – December 2019
Theory Session	10hrs
Practical Session	20hrs
Assessment Procedure	Multiple choice questions

DESIRE, INTEREST, AND AROUSAL DISORDERS

Male Hypoactive Sexual Desire Disorder

This dysfunction is characterized by a de□ciency or absence of sexual fantasies and desire for sexual activity for a minimum duration of approximately 6 months (Table 17.2-1). Men for whom this is a lifelong condition have never experienced many spontaneous erotic/sexual thoughts. Minimal spontaneous sexual thinking or minimal desire for sex ahead of sexual experiences is not considered a diagnosable disorder in women, particularly if desire is triggered during the sexual encounter. The reported prevalence of low desire is greatest at the younger and older ends of the age spectrum, with only 2 percent of men ages 16 to 44 a□ected by this disorder. A reported 6 percent of men ages 18 to 24, and 40 percent of men ages 66 to 74, have problems with sexual desire. Some men may confuse decreased desire with decreased activity. Their erotic thoughts and fantasies are undiminished, but they no longer act on them due to health issues, unavailability of a partner, or another sexual dysfunction such as erectile disorder.

Table 17.2-1

DSM-5 Diagnostic Criteria for Male Hypoactive Sexual Desire Disorder

A variety of causative factors are associated with low sexual desire. Patients with desire problems often use inhibition of desire defensively, to protect against unconscious fears about sex. Sigmund Freud conceptualized low sexual desire as the result of inhibition during the phallic psychosexual phase of development and of unresolved oedipal con□icts.

Some men, fixated at the phallic state of development, are fearful of the vagina and believe that they will be castrated if they approach it. Freud called this concept *vagina dentata;* he theorized that men avoid contact with the vagina when they unconsciously believe that the vagina has teeth. Lack of desire can also result from chronic stress, anxiety, or depression.

Abstinence from sex for a prolonged period sometimes results in suppression of sexual impulses. Loss of desire may also be an expression of hostility to a partner or the sign of a deteriorating relationship. The presence of desire depends on several factors: biological drive, adequate self-esteem, the ability to accept oneself as a sexual person, the availability of an appropriate partner, and a good relationship in nonsexual areas with a partner. Damage to, or absence of, any of these factors can diminish desire.

In making the diagnosis, clinicians must evaluate a patient's age, general health, any medication regimen, and life stresses. The clinician must attempt to establish a baseline of sexual interest before the disorder began. The need for sexual contact and satisfaction varies among

persons and over time in any given person. The diagnosis should not be made unless the lack of desire is a source of distress to a patient.

Female Sexual Interest/Arousal Disorder

The combination of interest (or desire) and arousal into one dysfunction category re□ects the recognition that women do not necessarily move stepwise from desire to arousal, but often experience desire synchronously with, or even following, beginning feelings of arousal. This is particularly true for women in long-term relationships. As a corollary, women experiencing sexual dysfunction may experience either/or both inability to feel interest or arousal, and they may often have di□culty achieving orgasm or experience pain in addition. Some may experience dysfunction across the entire range of sexual response/pleasure. Complaints in this dysfunction category present variously as a decrease or paucity of erotic feelings, thoughts, or fantasies; a decreased impulse to initiate sex; a decreased or absent receptivity to partner overtures; or an inability to respond to partner stimulation (Table 17.2-2).

Table 17.2-2

DSM-5 Diagnostic Criteria for Female Sexual Interest/Arousal Disorder

A complicating factor in this diagnosis is that a subjective sense of arousal is often poorly correlated with genital lubrication in both normal and dysfunctional women. Therefore, complaints of lack of pleasure are su□cient for this diagnosis even when vaginal lubrication and congestion are present. A woman complaining of lack of arousal may lubricate vaginally, but may not experience a subjective sense of excitement. Some studies using functional magnetic resonance imaging (fMRI) have revealed a low correlation between brain activation in areas controlling genital response and simultaneous ratings of subjective arousal. Physiological studies of sexual dysfunctions indicate that a hormonal pattern may contribute to responsiveness in women who have arousal dysfunction. William Masters and Virginia Johnson found that women are particularly desirous of sex before the onset of the menses. Other women report feeling the greatest sexual excitement immediately after the menses or at the time of ovulation. Alterations in testosterone, estrogen, prolactin, and thyroxin levels have been implicated in female sexual arousal disorder. In addition, medications with antihistaminic or anticholinergic properties cause a decrease in vaginal lubrication.

Factors such as life stresses, aging, menopause, adequate sexual stimulation, general health, and medication regimen must be evaluated

before making this diagnosis. Relationship problems are particularly relevant to acquired interest/arousal disorder. In one study of couples with markedly decreased sexual interaction, the most prevalent etiology was marital discord.

Male Erectile Disorder

Male erectile disorder was historically called *impotence.* The term was dropped for a more medical designation, but also because it was considered derogatory and had negative connotations for the man with the problem. However, it describes with accuracy the feelings of powerlessness, helplessness, and resultant low self-esteem men with this dysfunction frequently su□er (Table 17.2-3). A man with lifelong male erectile disorder has never been able to obtain an erection su□cient for insertion. In acquired male erectile disorder, a man has successfully achieved penetration at some time in his sexual life but is later unable to do so. In situational male erectile disorder, a man is able to have coitus in certain circumstances but not in others; for example, he may function e□ectively with a prostitute but be unable to have an erection when with his partner.

DSM-5 Diagnostic Criteria for Male Erectile Disorder

Acquired male erectile disorder has been reported in 10 to 20 percent of all men. Freud declared it common among his patients. Erectile disorder is the chief complaint of more than 50 percent of all men treated for sexual disorders. Lifelong male erectile disorder is rare; it occurs in about 1 percent of men younger than age 35. The incidence of erectile disorder increases with age. It has been reported variously as 2 to 8 percent of the young adult population. Alfred Kinsey reported that 75 percent of all men were impotent at age 80. There is a reported incidence of 40 to 50 percent in men between ages of 60 and 70. All men older than 40, Masters and Johnson claimed, have a fear of impotence, which the researchers believed re□ected the masculine fear of loss of virility with advancing age. Male erectile disorder, however, is not universal in aging men; having an available sex partner is related to continuing potency, as is a history of consistent sexual activity and the absence of vascular, neurologic, or endocrine disease. Twenty percent of men fear erectile dysfunction prior to their □rst coitus; the reported incidence of actual erectile dysfunction during □rst coitus is 8 percent. As Stephen Levine has stated, the □rst sexual encounter "is a horse race between excitement and anxiety."

Male erectile disorder can be organic or psychological, or a combination of both, but in young and middle-aged men the cause is usually psychological. A good history is of primary importance in determining the cause of the dysfunction. If a man reports having spontaneous

erections at times when he does not plan to have intercourse, having morning erections, or having good erections with masturbation or with
partners other than his usual one, the organic causes of his erectile disorder can be considered negligible, and costly diagnostic procedures
can be avoided. Male erectile disorder caused by a general medical condition or a pharmacological substance is discussed later in this
section.

Freud ascribed one type of erectile disorder to an inability to reconcile feelings of a□ection toward a woman with feelings of desire for her. Men with such con□icting feelings
can function only with women whom they see as degraded (Madonna–Putana complex). Other factors that have been cited as contributing to impotence include a punitive superego,
an inability to trust, and feelings of inadequacy or a sense of being undesirable as a partner. A man may be unable to express a sexual impulse because of fear, anxiety, anger, or
moral prohibition. In an ongoing relationship, the disorder may re□ect di□culties between the partners, particularly when a man cannot communicate his needs or his anger in a
direct and constructive way. In addition, episodes of erectile disorder are reinforcing, with the man becoming increasingly anxious before each sexual encounter.

Mr. Y came for therapy after his wife complained about their lack of sexual interaction. The patient avoided sex because of his frequent
erectile dysfunction and the painful feelings of inadequacy he su□ered after his "failures." He presented as an articulate, gentle, and selfblaming
man.

He was faithful to his wife but masturbated frequently. His fantasies involved explicit sadistic components, including hanging and biting
women. The contrast between his angry, aggressive fantasies and his loving, considerate behavior toward his wife symbolized his con□icts
about his sexuality, his masculinity, and his mixed feelings about women. He was diagnosed with erectile disorder, situational type.

ORGASM DISORDERS

Female Orgasmic Disorder

Female orgasmic disorder, sometimes called *inhibited female orgasm* or *anorgasmia,* is de□ned as the recurrent or persistent inhibition of
female orgasm, as manifested by the recurrent delay in, or absence of orgasm after a normal sexual excitement phase that a clinician judges
to be adequate in focus, intensity, and duration—in short, a woman's inability to achieve orgasm by masturbation or coitus .

Women who can achieve orgasm by one of these methods are not necessarily categorized as anorgasmic, although some sexual inhibition

may be postulated. The complaint is reported by the woman, herself. However, some anorgasmic women are not distressed by the lack of climax and derive pleasure from sexual activity. In the latter instance, a woman may present with this complaint because her partner is troubled by her lack of orgasm.

Table 17.2-4

DSM-5 Diagnostic Criteria for Female Orgasmic Disorder

Research on the physiology of the female sexual response has shown that orgasms caused by clitoral stimulation and those caused by vaginal stimulation are physiologically identical. Freud's theory that women must give up clitoral sensitivity for vaginal sensitivity to achieve sexual maturity is now considered misleading, but some women report that they gain a special sense of satisfaction from an orgasm precipitated by coitus. Some researchers attribute this satisfaction to the psychological feeling of closeness engendered by the act of coitus, but others maintain that the coital orgasm is a physiologically di□erent experience. Many women achieve orgasm during coitus by a combination of manual clitoral stimulation and penile vaginal stimulation.

A woman with lifelong female orgasmic disorder has never experienced orgasm by any kind of stimulation. A woman with acquired orgasmic disorder has previously experienced at least one orgasm, regardless of the circumstances or means of stimulation, whether by masturbation or while dreaming during sleep. Studies have shown that women achieve orgasm more consistently with masturbation than with partnered sex. Kinsey found that 5 percent of married women older than age 35 years had never achieved orgasm by any means. The incidence of never having experienced orgasm is reported as 10 percent among all women. The incidence of orgasm increases with age.

According to Kinsey, the □rst orgasm occurs during adolescence in about 50 percent of women as a result of masturbation or genital caressing with a partner; the rest usually experience orgasm as they get older. Lifelong female orgasmic disorder is more common among unmarried women than married women. Increased orgasmic potential in women older than 35 years of age has been explained on the basis of less psychological inhibition, greater sexual experience, or both.

Acquired female orgasmic disorder is a common complaint in clinical populations. One clinical treatment facility reported having about four times as many nonorgasmic women in its practice as female patients with all other sexual disorders. In another study, 46 percent of women complained of di□culty reaching orgasm. Inhibition of arousal and orgasmic

problems often occur together. The overall prevalence of female orgasmic disorder from all causes is estimated to be 30 percent. A recent twin study suggests that orgasmic
dysfunction in some females has a genetic basis and cannot be attributed solely to psychological di□erences. That study demonstrated an estimated heritability for di□culty reaching
orgasm with intercourse of 34 percent and an estimated heritability in women who could not climax with masturbation of 45 percent.
Numerous psychological factors are associated with female orgasmic disorder. They include fears of impregnation, rejection by a sex
partner, and damage to the vagina; hostility toward men; poor body image; and feelings of guilt about sexual impulses. Some women equate
orgasm with loss of control or with aggressive, destructive, or violent impulses; their fear of these impulses may be expressed through
inhibition of arousal or orgasm. Cultural expectations and social restrictions on women are also relevant. Many women have grown up to
believe that sexual pleasure is not a natural entitlement for so-called decent women. Nonorgasmic women may be otherwise symptom free
or may experience frustration in a variety of ways; they may have such pelvic complaints as lower abdominal pain, itching, and vaginal
discharge, as well as increased tension, irritability, and fatigue.

Delayed Ejaculation

In male delayed ejaculation, sometimes called *retarded ejaculation,* a man achieves ejaculation during coitus with great di□culty, if at all. The problem is rarely present with masturbation, but appears as a problem during partnered sex. A man with lifelong
delayed ejaculation has never been able to ejaculate during partnered sexual activity. The problem is usually most pronounced during coital
activity. The disorder is diagnosed as acquired if it develops after previously normal functioning. Some researchers think that orgasm and
ejaculation should be di□erentiated, especially in the case of men who ejaculate but complain of a decreased or absent subjective sense of
pleasure during the orgasmic experience (orgasmic anhedonia).

DSM-5 Diagnostic Criteria for Delayed Ejaculation

The incidence of male orgasmic disorder is much lower than the incidence of premature ejaculation or erectile disorder. Masters and
Johnson reported an incidence of delayed ejaculation of only 3.8 percent in one group of 447 men with sexual dysfunctions. A general
prevalence of 5 percent has been reported. However, an increase in the presentation of this disorder in sex therapy programs has been seen
in the last decade. This has been attributed to the increasing use of antidepressants, which can have a side e□ect of delayed ejaculation, as

well as a high use of Internet pornography sites. These sites o□er a level of stimulation involving such variety of people and acts that they
may inure the man to the stimulation of more typical partnered activity. Recent studies of adolescent males who use these sites frequently,
prior to live sexual interaction, have reported that these teens do not develop neuronal synapses that will enable them to respond to usual
partnered interactions with sufficient pleasure to allow them to achieve climax.
Lifelong delayed ejaculation indicates severe psychopathology. A man may come from a rigid, puritanical background; he may perceive sex as sinful and the genitals as dirty; and
he may have conscious or unconscious incest wishes and guilt. He usually has di□culty with closeness in areas beyond those of sexual relations. In a few cases, the condition is
aggravated by an attention-deficit/hyperactivity disorder. A man's distractibility prevents sufficient arousal for climax to occur.
In an ongoing relationship, acquired male delayed ejaculation disorder frequently re□ects interpersonal di□culties. The disorder may be a man's way of coping with real or
fantasized changes in a relationship, such as plans for pregnancy about which the man is ambivalent, the loss of sexual attraction to the partner, or demands by the partner for
greater commitment as expressed by sexual performance. In some men, the inability to ejaculate re□ects unexpressed hostility toward a woman. The problem is more common among
men with obsessive-compulsive disorder (OCD) than among others.
A couple presented with the man as the identi□ed patient; he was unable to ejaculate with intercourse. He had always had di□culty
reaching climax, except in rare circumstances. He ejaculated once when he was with two women at the same time and once when he was
experimenting with cocaine. He currently was not using any substances except for a moderate use of alcohol. This patient was committed
to his marriage, although he had extramarital sexual experiences. He did not ejaculate with coitus in those situations either, although he
could climax with oral sex. He stated he was more interested in "the conquest" than in the sex itself. He could climax with masturbation,
although he rarely masturbated himself, but went to massage parlors. He had issues with anger at women and considered his wife to be
excessively critical.
He had di□culty doing any of the exercises that required him to pleasure his wife. His di□culty giving also made it hard for him to
enjoy mutual pleasuring. It was easier for him to be the recipient of stimulation. Because of this patient's problems with impulsiveness,

narcissism, and dependency, it was necessary to combine introspective psychotherapy with a regimen of behavioral exercises.
The patient was diagnosed with delayed ejaculation, lifelong type.

Premature (Early) Ejaculation

In premature ejaculation, men persistently or recurrently achieve orgasm and ejaculation before they wish to. The diagnosis is made when a man regularly ejaculates before or within approximately 1 minute after penetration. DSM-5 refers only to "vaginal penetration" in its diagnostic criteria, even though it is entirely possible for the disorder to occur in men who are homosexual and do not engage in vaginal penetration. DSM-5 de□nes the disorder as mild if ejaculation occurs within approximately 30 seconds to 1 minute of vaginal penetration, moderate if ejaculation occurs within approximately 15 to 30 seconds of vaginal penetration, and severe when ejaculation occurs at the start of sexual activity or within approximately 15 seconds of vaginal penetration. A di□culty with these speci□ers involves time distortions, which patients make in both overestimating and underestimating time from penetration to climax. Clinicians need to consider factors that a□ect the duration of the excitement phase of the sexual response, such as age, the novelty of the sex partner, and the frequency of coitus. As with the other sexual dysfunctions, premature ejaculation is not diagnosed when it is caused exclusively by organic factors or when it is symptomatic of another clinical psychiatric syndrome.

DSM-5 Diagnostic Criteria for Premature (Early) Ejaculation

Premature ejaculation is more commonly reported among college-educated men than among men with less education. The complaint is thought to be related to their concern for partner satisfaction, but the true cause of this increased frequency has not been determined.
Premature ejaculation is the chief complaint of about 35 to 40 percent of men treated for sexual disorders. In DSM-5, the writers state that the disorder, with its newly de□ned time parameter, would now be an accurate diagnosis for only 1 to 3 percent of men. Some researchers divide men who experience premature ejaculation into two groups: those who are physiologically predisposed to climax quickly because of shorter nerve latency time and those with a psychogenic or behaviorally conditioned cause. Difficulty in ejaculatory control can be associated with anxiety regarding the sex act, with unconscious fears about the vagina, or with negative cultural conditioning. Men whose early sexual contacts occurred largely with prostitutes who demanded that the sex act proceed quickly or whose sexual contacts took place in situations in which discovery would be embarrassing (e.g., in a shared dormitory room or in the parental home) might have been conditioned to

achieve orgasm rapidly. With young, inexperienced men, who have the problem, it may resolve in time. In ongoing relationships, the partner has a great influence on a premature ejaculator, and a stressful marriage exacerbates the disorder. The developmental background and the psychodynamics found in premature ejaculation and in erectile disorder are similar.

SEXUAL PAIN DISORDERS

Genito-Pelvic Pain/Penetration Disorder

In DSM-5, this disorder refers to one or more of the following complaints, of which any two or more may occur together: difficulty having intercourse; genito-pelvic pain; fear of pain or penetration; and tension of the pelvic floor muscles. Previously, these pain disorders were diagnosed as *dyspareunia* or *vaginismus.* These former diagnoses could coexist or one could lead to the other and could understandably lead to fear of pain with sex. Thus, it is reasonable to gather these diagnoses into one diagnostic category. For the purposes of clinical discussion, however, the distinct categories of dyspareunia and vaginismus remain clinically useful.

Dyspareunia. Dyspareunia is recurrent or persistent genital pain occurring before, during, or after intercourse. Dyspareunia is related to, and often coincides with, vaginismus. Repeated episodes of vaginismus can lead to dyspareunia and vice versa; in either case, somatic causes must be ruled out. A pain disorder should not be diagnosed when an organic basis for pain is found or when it is caused by a lack of lubrication. DSM-5 cites that 15 percent of women in North America report recurrent pain during intercourse.

In most cases, dynamic factors are considered causative. Chronic pelvic pain is a common complaint in women with a history of rape or childhood sexual abuse. Painful coitus can result from tension and anxiety about the sex act that cause women to involuntarily contract their pelvic floor muscles. The pain is real and makes intercourse unpleasant or unbearable. Anticipation of further pain may cause women to avoid coitus altogether. If a partner proceeds with intercourse regardless of a woman's state of readiness, the condition is aggravated. There is an increase in reported dyspareunia postmenopausally due to hormonally induced physiological changes in the vagina; however, specific complaints of difficulty having intercourse occur more often in premenopausal women. There is some increase in dyspareunia in the immediate postpartum population, but it is usually temporary. Dyspareunia may present as any of the four complaints listed under genitopelvic pain/penetration disorder and should be diagnosed as genito-pelvic pain/penetration disorder.

Vaginismus. Defined as a constriction of the outer third of the vagina due to involuntary pelvic floor muscle tightening or spasm,
vaginismus interferes with penile insertion and intercourse. This response may occur during a gynecological examination when involuntary
vaginal constriction prevents the introduction of the speculum into the vagina. The diagnosis is not made when the dysfunction is caused
exclusively by organic factors or when it is symptomatic of another mental disorder.
Vaginismus may be complete, that is no penetration of the vagina is possible, whether by the penis, □ngers, a speculum during
gynecologic exam, or even if the woman tries to use the smallest size tampon. Many women who discover this complaint when they become
sexually active have avoided the use of tampons previously. In a less severe form of vaginismus, pelvic □oor muscle tightening due to pain
or fear of pain makes penetration di□cult, but not impossible. Penetration may be achieved with the smallest size speculum or little □ngers.
In mild cases, the muscles relax after the initial di□culty with penetration and the woman can continue with sexual play, sometimes even
with coitus.
Miss B was a 27-year-old single woman who presented for therapy because of an inability to have intercourse. She described episodes
with a recent boyfriend in which he had tried vaginal penetration but had been unable to enter. The boyfriend did not have erectile
dysfunction. Miss B experienced desire and was able to achieve orgasm through manual or oral stimulation. For almost a year, she and
her boyfriend had sex play without intercourse. However, he complained increasingly about his frustration at the lack of coitus, which he
had enjoyed in previous relationships. Miss B had a conscious fear of penetration and dreaded going to the gynecologist, although she
was able to use tampons when she menstruated. She was diagnosed with genito-pelvic pain/penetration disorder, lifelong type.
Vaginismus is less prevalent than female orgasmic disorder. It most often a□icts highly educated women and those in high socioeconomic
groups. Women with vaginismus may consciously wish to have coitus, but unconsciously wish to keep a penis from entering their bodies. A
sexual trauma, such as rape, may cause vaginismus. Anticipation of pain at the □rst coital experience may cause vaginismus. Clinicians have
noted that a strict religious upbringing in which sex is associated with sin is frequent in these patients. Other women have problems in
dyadic relationships; if women feel emotionally abused by their partners, they may protest in this nonverbal fashion. Some women who
have experienced signi□cant pain in childhood due to surgical or dental interventions become guarded about any breach of body integrity

and develop vaginismus. Vaginismus may present as any of the four complaints under genito-pelvic pain/penetration disorder and should be diagnosed as genito-pelvic pain/penetration disorder.

SEXUAL DYSFUNCTION DUE TO A GENERAL MEDICAL CONDITION

Male Erectile Disorder Due to a General Medical Condition

The incidence of psychological, as opposed to organic, male erectile disorder has been the focus of many studies. Statistics indicate that 20 to 50 percent of men with erectile disorder have an organic basis for the disorder. A physiologic etiology is more likely in men older than 50 and the most likely cause in men older than age 60. The organic causes of male erectile disorder are listed in. Side e□ects of medication can impair male sexual functioning in a variety of ways. Castration (removal of the testes) does not always lead to sexual dysfunction, because erection may still occur. A re□ex arc, □red when the inner thigh is stimulated, passes through the sacral cord erectile center to account for the phenomenon.

Diseases and Other Medical Conditions Implicated in Male Erectile Disorder

Some Pharmacological Agents Implicated in Male Sexual Dysfunctions

A number of procedures, benign and invasive, are used to help di□erentiate organically caused erectile disorder from functional erectile disorder. The procedures include monitoring nocturnal penile tumescence (erections that occur during sleep), normally associated with rapid eye movement; monitoring tumescence with a strain gauge; measuring blood pressure in the penis with a penile plethysmograph or an ultrasound (Doppler) □owmeter, both of which assess blood □ow in the internal pudendal artery; and measuring pudendal nerve latency time. Other diagnostic tests that delineate organic bases for impotence include glucose tolerance tests, plasma hormone assays, liver and thyroid function tests, prolactin and follicle-stimulating hormone (FHS) determinations, and cystometric examinations. Invasive diagnostic studies include penile arteriography, infusion cavernosonography, and radioactive xenon penography. Invasive procedures require expert interpretation and are used only for patients who are candidates for vascular reconstructive procedures.

Dyspareunia Due to a General Medical Condition

An estimated 30 percent of all surgical procedures on the female genital area result in temporary dyspareunia. In addition, 30 to 40 percent of women with the complaint who are seen in sex therapy clinics have pelvic pathology. Organic abnormalities leading to dyspareunia and vaginismus include irritated or infected hymenal remnants, episiotomy scars, Bartholin's gland infection, various forms of vaginitis and cervicitis, endometriosis, and adenomyosis. Postcoital pain has been reported by women with myomata, endometriosis, and adenomyosis, and is attributed to the uterine contractions during orgasm. Postmenopausal women may have dyspareunia resulting from thinning of the vaginal mucosa and reduced lubrication.

Two conditions not readily apparent on physical examination that produce dyspareunia are vulvar vestibulitis and interstitial cystitis. The former may present with chronic vulvar pain and the latter produces pain most intensely following orgasm. Dyspareunia can also occur in men, but it is uncommon and is usually associated with an organic condition, such as Peyronie's disease, which consists of sclerotic plaques on the penis that cause penile curvature.

Male Hypoactive Sexual Desire Disorder and Female Interest/Arousal Disorder Due to a General Medical Condition

Sexual desire commonly decreases after major illness or surgery, particularly when the body image is a□ected after such procedures as mastectomy, ileostomy, hysterectomy, and prostatectomy. Illnesses that deplete a person's energy, chronic conditions that require physical and psychological adaptation, and serious illnesses that can cause a person to become depressed can all markedly lessen sexual desire.

In some cases, biochemical correlates are associated with hypoactive sexual desire disorder. A recent study found markedly lower levels of serum testosterone in men complaining of low desire than in normal controls in a sleep-laboratory situation. Drugs that depress the central nervous system (CNS) or decrease testosterone production can decrease desire.

Neurophysiology of Sexual Dysfunction

Other Male Sexual Dysfunction Due to a General Medical Condition

Delayed ejaculation can have physiological causes and can occur after surgery on the genitourinary tract, such as prostatectomy. It may also be associated with Parkinson's disease and other neurological disorders involving the lumbar or sacral sections of the spinal cord. The

antihypertensive drug guanethidine monosulfate (Ismelin), methyldopa (Aldomet), the phenothiazines, the tricyclic drugs, and the selective serotonin reuptake inhibitors (SSRIs), among others, have been implicated in retarded ejaculation. In addition, delayed ejaculation must be differentiated from retrograde ejaculation, in which ejaculation occurs but the seminal fluid passes backward into the bladder. Retrograde ejaculation always has an organic cause. It can develop after genitourinary surgery and it is also associated with medications that have anticholinergic adverse effects, such as the phenothiazines.

Other Female Sexual Dysfunction Due to a General Medical Condition

Some medical conditions—specifically, endocrine diseases such as hypothyroidism, diabetes mellitus, and primary hyperprolactinemia—can affect a woman's ability to have orgasms. Several drugs also affect some women's capacity to have orgasms (Table 17.2-10) Antihypertensive medications, CNS stimulants, tricyclic drugs, SSRIs, and, frequently, monoamine oxidase inhibitors (MAOIs) have interfered with female orgasmic capacity. One study of women taking MAOIs, however, found that after 16 to 18 weeks of pharmacotherapy, the adverse effect of the medication disappeared and the women were able to re-experience orgasms, although they continued taking an undiminished dose of the drug.

Some Antipsychotic Drugs Implemented in Inhibited Female Orgasm*a*

Substance/Medication-Induced Sexual Dysfunction

The diagnosis of substance-induced sexual dysfunction is used when evidence of substance intoxication or withdrawal is apparent from the history, physical examination, or laboratory findings. The disturbance in sexual function must be predominant in the clinical picture.

Distressing sexual dysfunction occurs soon after significant substance intoxication or withdrawal, or after exposure to a medication or a change in medication use. Specified substances include alcohol, amphetamines or related substances, cocaine, opioids, sedatives, hypnotics, or anxiolytics, and other or unknown substances.

Abused recreational substances affect sexual function in various ways. In small doses, many substances enhance sexual performance by decreasing inhibition or anxiety or by causing a temporary elevation of mood. With continued use, however, erectile engorgement and orgasmic and ejaculatory capacities become impaired. The abuse of sedatives, anxiolytics, hypnotics, and particularly opiates and opioids nearly always depresses desire. Alcohol may foster the initiation of sexual activity by removing inhibition, but it also

impairs performance. Cocaine and amphetamines produce the following similar e□ects: Although no direct evidence indicates that sexual drive is enhanced, users initially have
feelings of increased energy and may become sexually active; ultimately, dysfunction occurs. Men usually go through two stages: an experience of prolonged erection without
ejaculation, and then a gradual loss of erectile capability.
Patients recovering from substance dependency may need therapy to regain sexual function, partly because of psychological readjustment to a nondependent state. Many substance
abusers have always had di□culty with intimate interactions. Others who spent their crucial developmental years under the in□uence of a substance have missed the experiences
that would have enabled them to learn social and sexual skills.

Pharmacological Agents Implicated In Sexual Dysfunction

Almost every pharmacological agent, particularly those used in psychiatry, has been associated with an e□ect on sexuality. In men, these
e□ects include decreased sex drive, erectile failure, decreased volume of ejaculate, and delayed or retrograde ejaculation. In women,
decreased sex drive, decreased vaginal lubrication, inhibited or delayed orgasm, and decreased or absent vaginal contractions may occur.
Drugs may also enhance the sexual responses and increase the sex drive, but this is less common than adverse e□ects. The e□ects of
psychoactive drugs are detailed later in this section.

Antipsychotic Drugs. Most antipsychotic drugs are dopamine receptor antagonists that also block adrenergic and cholinergic
receptors, thus accounting for the adverse sexual effects (Table 17.2-11). Chlorpromazine (Thorazine) and trifluoperazine (Stelazine) are
potent anticholinergics, and they impair erection and ejaculation. With some drugs, the seminal fluid backs up into the bladder rather than
being propelled through the penile urethra. Patients still have a pleasurable sensation, but the orgasm is dry. When urinating after orgasm,
the urine may be milky white because it contains the ejaculate. The condition is startling but harmless. Paradoxically, some rare cases of
priapism have been reported with antipsychotics.

Diagnostic Issues with Sex and Some Antipsychotic Drugs

Antidepressant Drugs. The tricyclic and tetracyclic antidepressants have anticholinergic effects that interfere with erection and delay
ejaculation. Because the anticholinergic effects vary among the cyclic antidepressants, those with the fewest effects (e.g., desipramine
[Norpramin]) produce the fewest sexual adverse effects. The effects of the tricyclics and tetracyclics have not been documented sufficiently

in women; however, few women seem to complain of any effects.
Some men report increased sensitivity of the glans that is pleasurable and that does not interfere with erection, although it delays ejaculation. In some cases, however, the tricyclic causes painful ejaculation, perhaps as the result of interference with seminal propulsion caused by interference with, in turn, urethral, prostatic, vas, and epididymal smooth muscle contractions. Clomipramine (Anafranil) has been reported to increase sex drive in some persons. Selegiline (Deprenyl), a selective MAO type B (MAOB) inhibitor, and bupropion (Wellbutrin) have also been reported to increase sex drive, possibly by dopaminergic activity and increased production of norepinephrine.
Venlafaxine (E□exor) and the SSRIs most often have adverse e□ects because of the rise in serotonin levels. A lowering of the sex drive and di□culty reaching orgasm occur in both sexes. Reversal of those negative e□ects has been achieved with cyproheptadine (Periactin), an antihistamine with antiserotonergic e□ects, and with methylphenidate (Ritalin), which has adrenergic e□ects. Trazodone (Desyrel) is associated with the rare occurrence of priapism, the symptom of prolonged erection in the absence of sexual stimuli. That symptom appears to result from the α2-adrenergic antagonism of trazodone.
The MAOIs a□ect biogenic amines broadly. Accordingly, they produce impaired erection, delayed or retrograde ejaculation, vaginal dryness, and inhibited orgasm. Tranylcypromine (Parnate) has a paradoxical sexually stimulating e□ect in some persons, possibly as a result of its amphetamine-like properties.
Mr. W presented with the complaint of inability to achieve orgasm. His problem dated from the time, 18 months previously, when he had been placed on □uoxetine (Prozac). Before that time, he had been able to achieve orgasm through masturbation and through coitus with his wife.
Mr. W tried several other SSRIs, as well as venlafaxine, but the side e□ect of delayed ejaculation persisted. None of the usual antidotes to SSRI-induced anorgasmia proved e□ective, and the patient then was tried on antidepressants of other categories. Mr. W was able to respond to bupropion and clonazepam (Klonopin). This combination treated his depression and anxiety, and his delayed ejaculation resolved.
He was diagnosed with pharmacologically induced delayed ejaculation.
GENERAL EFFECTS. Because depression is associated with a decreased libido, varying levels of sexual dysfunction and anhedonia are part of the disease process. Some patients report improved sexual functioning as their depression improves as a result of antidepressant medication.

The phenomenon makes the evaluation of sexual side effects difficult; also, the side effects may disappear with time, perhaps because a biogenic amine homeostatic mechanism comes into play.

Lithium. Lithium (Eskalith) regulates mood and, in the manic state, may reduce hypersexuality, possibly by a dopamine antagonist activity. In some patients, impaired erection has been reported.

Sympathomimetics. Psychostimulants, which are sometimes used in the treatment of depression, include amphetamines, methylphenidate, and pemoline (Cylert), which raise the plasma levels of norepinephrine and dopamine. Libido is increased; however, with prolonged use, men may experience a loss of desire and erections.

α-Adrenergic and β-Adrenergic Receptor Antagonists. α-Adrenergic and β-adrenergic receptor antagonists are used in the treatment of hypertension, angina, and certain cardiac arrhythmias. They diminish tonic sympathetic nerve outflow from vasomotor centers in the brain. As a result, they can cause impotence, decrease the volume of ejaculate, and produce retrograde ejaculation. Changes in libido have been reported in both sexes.

Suggestions have been made to use the side effects of drugs therapeutically. Thus, a drug that delays or interferes with ejaculation (e.g., fluoxetine) might be used to treat premature ejaculation.

Anticholinergics. The anticholinergics block cholinergic receptors and include such drugs as amantadine (Symmetrel) and benztropine (Cogentin). They produce dryness of the mucous membranes (including those of the vagina) and erectile disorder. However, amantadine may reverse SSRI-induced orgasmic dysfunction through its dopaminergic effect.

Antihistamines. Drugs such as diphenhydramine (Benadryl) have anticholinergic activity and are mildly hypnotic. They may inhibit sexual function as a result. Cyproheptadine, although an antihistamine, also has potent activity as a serotonin antagonist. It is used to block the serotonergic sexual adverse effects produced by SSRIs, such as delayed orgasm.

Antianxiety Agents. The major class of anxiolytics is the benzodiazepines (e.g., diazepam [Valium]). They act on the γ-aminobutyric acid (GABA) receptors, which are believed to be involved in cognition, memory, and motor control. Because benzodiazepines decrease plasma epinephrine concentrations, they diminish anxiety, and as a result they improve sexual function in persons inhibited by anxiety.

Alcohol. Alcohol suppresses CNS activity generally and can produce erectile disorders in men as a result. Alcohol has a direct gonadal effect that decreases testosterone levels in men; paradoxically, it can produce a slight rise in testosterone levels in women. The latter finding

may account for women who report increased libido after drinking small amounts of alcohol. The long-term use of alcohol reduces the ability of the liver to metabolize estrogenic compounds. In men, that produces signs of feminization (such as gynecomastia as a result of testicular atrophy).

Opioids. Opioids, such as heroin, have adverse sexual effects, such as erectile failure and decreased libido. The alteration of consciousness may enhance the sexual experience in occasional users.

Hallucinogens. The hallucinogens include lysergic acid diethylamide (LSD), phencyclidine (PCP), psilocybin (from some mushrooms), and mescaline (from peyote cactus). In addition to inducing hallucinations, the drugs cause loss of contact with reality and an expanding and heightening of consciousness. Some users report that the sexual experience is similarly enhanced, but others experience anxiety, delirium, or psychosis, which clearly interfere with sexual function.

Cannabis. The altered state of consciousness produced by cannabis may enhance sexual pleasure for some persons. Its prolonged use depresses testosterone levels.

Barbiturates and Similarly Acting Drugs. Barbiturates and similarly acting sedative-hypnotic drugs may enhance sexual responsiveness in persons who are sexually unresponsive as a result of anxiety. They have no direct effect on the sex organs; however, they do produce an alteration in consciousness that some persons find pleasurable. These drugs are subject to abuse, and use can be fatal when combined with alcohol or other CNS depressants.

Methaqualone (Quaalude) acquired a reputation as a sexual enhancer, which had no biological basis in fact. It is no longer marketed in the United States.

TREATMENT

Before 1970, the most common treatment of sexual dysfunctions was individual psychotherapy. Classic psychodynamic theory holds that sexual inadequacy has its roots in early developmental con□icts, and the sexual disorder is treated as part of a pervasive emotional disturbance. Treatment focuses on the exploration of unconscious con□icts, motivation, fantasy, and various interpersonal di□culties. One of the assumptions of therapy is that removal of the con□icts allows the sexual impulse to become structurally acceptable to the ego, and thereby the patient □nds appropriate means of satisfaction in the environment. The symptoms of sexual dysfunctions, however, frequently become secondarily autonomous and continue to persist, even when other problems evolving from the patients' pathology have been resolved. The addition of behavioral techniques is often necessary to cure the sexual problem.

Dual-Sex Therapy

The theoretical basis of dual-sex therapy is the concept of the marital unit or dyad as the object of therapy; the approach represented the major advance in the diagnosis and treatment of sexual disorders in the 20th century. The methodology was originated and developed by Masters and Johnson. In dual-sex therapy, treatment is based on a concept that the couple must be treated when a dysfunctional person is in a relationship. Because both are involved in a sexually distressing situation, both must participate in the therapy program. The sexual problem often re□ects other areas of disharmony or misunderstanding in the relationship so that the entire relationship is treated, with emphasis on the sexual functioning of the partners.

The keystone of the program is the roundtable session in which a male and female therapy team clari□es, discusses, and works through problems with the couple. The four-way sessions require active participation by the patients. Therapists and patients discuss the psychological and physiological aspects of sexual functioning, and therapists have an educative attitude. Therapists suggest speci□c sexual activities for the couple to follow in the privacy of their home. The aim of the therapy is to establish or reestablish communication within the partner unit. Sex is emphasized as a natural function that □ourishes in the appropriate domestic climate, and improved communication is encouraged toward that end. In a variation of this therapy that has proved e□ective, one therapist may treat the couple. Treatment is short term and is behaviorally oriented. The therapists attempt to re□ect the situation as they see it, rather than interpret underlying dynamics. An undistorted picture of the relationship presented by the therapists often corrects the myopic, narrow view held by each partner. This new perspective can interrupt the couple's destructive pattern of relating and can encourage improved, more e□ective communication. Speci□c exercises are prescribed for the couple to treat their particular problems. Sexual inadequacy often involves lack of information, misinformation, and performance fear. Therefore, the couple is speci□cally prohibited from any sexual play other than that prescribed by the therapists. Beginning exercises usually focus on heightening sensory awareness to touch, sight, sound, and smell. Initially, intercourse is interdicted, and the couple learn to give and receive bodily pleasure without the pressure of performance or penetration. At the same time, they learn how to communicate nonverbally in a mutually satisfactory way, and they learn that sexual foreplay is an enjoyable alternative to intercourse and orgasm.

During the sensate focus exercises, the couple receives much reinforcement to reduce anxiety. They are urged to use fantasies to distract

them from obsessive concerns about performance (spectatoring). The needs of both the dysfunctional partner and the nondysfunctional partner are considered. If either partner becomes sexually excited by the exercises, the other is encouraged to bring him or her to orgasm by manual or oral means. Open communication between the partners is urged, and the expression of mutual needs is encouraged. Resistances, such as claims of fatigue or not enough time to complete the exercises, are common and must be dealt with by the therapists. Issues of body image, fear of being touched, and difficulty touching oneself arise frequently. Genital stimulation is eventually added to general body stimulation. The couple is instructed sequentially to try various positions for intercourse, without necessarily completing the act, and to use varieties of stimulating techniques before they are instructed to proceed with intercourse.

Psychotherapy sessions follow each new exercise period, and problems and satisfactions, both sexual and in other areas of the couple's lives, are discussed. Specific instructions and the introduction of new exercises geared to the individual couple's progress are reviewed in each session. Gradually, the couple gains confidence and learns to communicate, verbally and sexually. Dual-sex therapy is most effective when the sexual dysfunction exists apart from other psychopathology.

Specific Techniques and Exercises

Various techniques are used to treat the various sexual dysfunctions. In cases of vaginismus, a woman is advised to dilate her vaginal opening with her fingers or with size-graduated dilators. Dilators are also used to treat cases of dyspareunia. Sometimes, treatment is coordinated with specially trained physiotherapists who work with the patients to help them relax their perineal muscles.

In cases of premature ejaculation, an exercise known as the squeeze technique is used to raise the threshold of penile excitability. In this exercise, the man or the woman stimulates the erect penis until the earliest sensations of impending ejaculation are felt. At this point, the woman forcefully squeezes the coronal ridge of the glans, the erection is diminished, and ejaculation is inhibited. The exercise program eventually raises the threshold of the sensation of ejaculatory inevitability and allows the man to focus on sensations of arousal without anxiety and develop confidence in his sexual performance. A variant of the exercise is the stop–start technique developed by James H. Semans, in which the woman stops all stimulation of the penis when the man first senses an impending ejaculation. No squeeze is used.

Research has shown that the presence or absence of circumcision has no bearing on a man's ejaculatory control; the glans is equally sensitive

in the two states. Sex therapy has been most successful in the treatment of premature ejaculation.

A man with a sexual desire disorder or male erectile disorder is sometimes told to masturbate to prove that full erection and ejaculation are possible. Delayed ejaculation is managed initially by extravaginal ejaculation and then by gradual vaginal entry after stimulation to a point near ejaculation. Most importantly, the early exercises forbid ejaculation to remove the pressure to climax and allow the man to immerse himself in sexual pleasuring.

In cases of lifelong female orgasmic disorder, the woman is directed to masturbate, sometimes using a vibrator. The shaft of the clitoris is the masturbatory site most preferred by women, and orgasm depends on adequate clitoral stimulation. An area on the anterior wall of the vagina has been identi□ed in some women as a site of sexual excitation, known as the *G-spot;* but reports of an ejaculatory phenomenon at orgasm in women following the stimulation of the G-spot have not been satisfactorily verified.

Hypnotherapy

Hypnotherapists focus speci□cally on the anxiety-producing situation—that is, the sexual interaction that results in dysfunction. The successful use of hypnosis enables patients to gain control over the symptom that has been lowering self-esteem and disrupting psychological homeostasis. The patient's cooperation is □rst obtained and encouraged during a series of nonhypnotic sessions with the therapist. Those discussions permit the development of a secure doctor–patient relationship, a sense of physical and psychological comfort on the part of the patient, and the establishment of mutually desired treatment goals. During this time, the therapist assesses the patient's capacity for the trance experience. The nonhypnotic sessions also permit the clinician to take a psychiatric history and perform a mental status examination before beginning hypnotherapy. The focus of treatment is on symptom removal and attitude alteration. The patient is instructed in developing alternative means of dealing with the anxiety-provoking situation, the sexual encounter.

In addition, patients are taught relaxation techniques to use on themselves before sexual relations. With these methods to alleviate anxiety, the physiological responses to sexual stimulation can more readily result in pleasurable excitation and discharge. Psychological impediments to vaginal lubrication, erection, and orgasms are removed, and normal sexual functioning ensues. Hypnosis may be added to a basic individual psychotherapy program to accelerate the effects of psychotherapeutic intervention.

Behavior Therapy

Behavioral approaches were initially designed for the treatment of phobias but are now used to treat other problems as well. Behavior therapists assume that sexual dysfunction is learned maladaptive behavior, which causes patients to be fearful of sexual interaction. Using traditional techniques, therapists set up a hierarchy of anxiety-provoking situations, ranging from least threatening (e.g., the thought of kissing) to most threatening (e.g., the thought of penile penetration). The behavior therapist enables the patient to master the anxiety through a standard program of systematic desensitization, which is designed to inhibit the learned anxious response by encouraging behaviors antithetical to anxiety. The patient first deals with the least anxiety-producing situation in fantasy and progresses by steps to the most anxiety-producing situation. Medication, hypnosis, and special training in deep muscle relaxation are sometimes used to help with the initial mastery of anxiety.

Assertiveness training is helpful in teaching patients to express sexual needs openly and without fear. Exercises in assertiveness are given in conjunction with sex therapy; patients are encouraged to make sexual requests and to refuse to comply with requests perceived as unreasonable. Sexual exercises may be prescribed for patients to perform at home, and a hierarchy may be established, starting with those activities that have proved most pleasurable and successful in the past.

One treatment variation involves the participation of the patient's sexual partner in the desensitization program. The partner, rather than the therapist, presents items of increasing stimulation value to the patient. A cooperative partner is necessary to help the patient carry gains made during treatment sessions to sexual activity at home.

Mindfulness

Mindfulness is a cognitive technique that has been helpful in the treatment of sexual dysfunction. The patient is directed to focus on the moment and maintain an awareness of sensations—visual, tactile, auditory, and olfactory—that he or she experiences in the moment. The aim is to distract the patient from spectatoring (watching him or herself) and center the person on the sensations that lead to arousal and/or orgasm. Hopefully, this shift in focus allows patients to become immersed in the pleasure of the experience and remove themselves from self-judgment and performance anxiety.

Group Therapy

Group therapy has been used to examine both intrapsychic and interpersonal problems in patients with sexual disorders. A therapy group provides a strong support system for a patient who feels ashamed, anxious, or guilty about a particular sexual problem. It is a useful forum

in which to counteract sexual myths, correct misconceptions, and provide accurate information about sexual anatomy, physiology, and varieties of behavior.

Groups for the treatment of sexual disorders can be organized in several ways. Members may all share the same problem, such as premature ejaculation; members may all be of the same sex with di□erent sexual problems; or groups may be composed of both men and women who are experiencing a variety of sexual problems. Group therapy can be an adjunct to other forms of therapy or the prime mode of treatment. Groups organized to treat a particular dysfunction are usually behavioral in approach.

Groups composed of married couples with sexual dysfunctions have also been e□ective. A group provides the opportunity to gather accurate information, o□ers consensual validation of individual preferences, and enhances self-esteem and self-acceptance. Techniques, such as role playing and psychodrama, may be used in treatment. Such groups are not indicated for couples when one partner is uncooperative, when a patient has a severe depressive disorder or psychosis, when a patient □nds explicit sexual audiovisual material repugnant, or when a patient fears or dislikes groups.

Analytically Oriented Sex Therapy

One of the most e□ective treatment modalities is the use of sex therapy integrated with psychodynamic and psychoanalytically oriented psychotherapy. The sex therapy is conducted over a longer period than usual, which allows learning or relearning of sexual satisfaction under the realities of patients' day-to-day lives. The addition of psychodynamic conceptualizations to behavioral techniques used to treat sexual dysfunctions allows the treatment of patients with sexual disorders associated with other psychopathology.

The material and dynamics that emerge in patients in analytically oriented sex therapy are the same as those in psychoanalytic therapy, such as dreams, fear of punishment, aggressive feelings, di□culty trusting a partner, fear of intimacy, oedipal feelings, and fear of genital mutilation. The combined approach of analytically oriented sex therapy is used by the general psychiatrist who carefully judges the optimal timing of sex therapy and the ability of patients to tolerate the directive approach that focuses on their sexual difficulties.

Biological Treatments

Biological treatments, including pharmacotherapy, surgery, and mechanical devices, are used to treat speci□c cases of sexual disorder. Most of the recent advances involve male sexual dysfunction. Current studies are under way to test biological treatment of sexual dysfunction in

women.

Pharmacotherapy. The major new medications to treat sexual dysfunction are sildenafil (Viagra) and its congeners .

oral phentolamine (Vasomax); alprostadil (Caverject), and injectable medications; papaverine, prostaglandin E1, phentolamine, or some combination of these (Edex); and a transurethral alprostadil (MUSE), all used to treat erectile disorder.

Pharmacokinetics of the PDE-5 Inhibitors

Sildena□l is a nitric oxide enhancer that facilitates the in□ow of blood to the penis necessary for an erection. The drug takes e□ect about 1 hour after ingestion, and its e□ect can last up to 4 hours. Sildena□l is not e□ective in the absence of sexual stimulation. The most common adverse events associated with its use are headaches, □ushing, and dyspepsia. The use of sildena□l is contraindicated for persons taking organic nitrates. The concomitant action of the two drugs can result in large, sudden, and sometimes fatal drops in systemic blood pressure.

Sildena□l is not e□ective in all cases of erectile dysfunction. It fails to produce an erection that is su□ciently rigid for penetration in about 50 percent of men who have had radical prostate surgery or in those with long-standing insulin-dependent diabetes. It is also ine□ective in certain cases of nerve damage.

A small number of patients developed nonarteritic ischemic optic neuropathy (NAION) soon after use of sildena□l. Six patients had vision loss within 24 hours after use of the agent. Both eyes were a□ected in one individual. All a□ected individuals had preexisting hypertension, diabetes, elevated cholesterol, or hyperlipidemia. Although very rare, sildenafil may provoke NAION in individuals with an arteriosclerotic risk profile. Very rare cases of hearing loss have also been reported.

Sildena□l use in women results in vaginal lubrication, but not in increased desire. Anecdotal reports, however, describe individual women who have experienced intensified excitement with sildenafil.

Oral phentolamine and apomorphine are not US Food and Drug Administration (FDA) approved at present, but have proved e□ective as potency enhancers in men with minimal erectile dysfunction. Phentolamine reduces sympathetic tone and relaxes corporeal smooth muscle.

Adverse events include hypotension, tachycardia, and dizziness. Apomorphine e□ects are mediated by the autonomic nervous system and result in vasodilation that facilitates the inflow of blood to the penis. Adverse events include nausea and sweating.

In contrast to the oral medications, injectable and transurethral forms of alprostadil act locally on the penis and can produce erections in

the absence of sexual stimulation. Alprostadil contains a naturally occurring form of prostaglandin E, a vasodilating agent. Alprostadil may be administered by direct injection into the corpora cavernosa or by intraurethral insertion of a pellet through a canula. The □rm erection produced within 2 to 3 minutes after administration of the drug may last as long as 1 hour. Infrequent and reversible adverse e□ects of injections include penile bruising and changes in liver function test results. Possible hazardous sequelae exist, including priapism and sclerosis of the small veins of the penis. Users of transurethral alprostadil sometimes complain of burning sensations in the penis.

Two small trials found di□erent topical agents e□ective in alleviating erectile dysfunction. One cream consists of three vasoactive substances known to be absorbed through the skin: aminophylline, isosorbide dinitrate, and co-dergocrine mesylate, which is a mixture of ergot alkaloids. The other is a gel containing alprostadil and an additional ingredient, which temporarily makes the outer layer of the skin more permeable.

In addition, a cream incorporating alprostadil has been developed to treat female sexual arousal disorder; the initial results are promising. In a trial of postmenopausal women with arousal problems who were already on hormonal therapy, vaginally applied phentolamine mesylate, an α-receptor antagonist, signi□cantly increased vasocongestion and a subjective sense of arousal. A drug to increase desire in women, flibanserin, has been resubmitted for approval to the FDA. It was previously denied approval.

The pharmacological treatments described in the preceding text are useful in the treatment of arousal dysfunction of various causes: neurogenic, arterial insu□ciency, venous leakage, psychogenic, and mixed. When coupled with insight-oriented or behavioral sex therapy, the use of medications can reverse psychogenic arousal disorder that is resistant to psychotherapy alone, the ultimate goal being pharmacologically unassisted sexual functioning.

Other Pharmacological Agents. Numerous other pharmacological agents have been used to treat the various sexual disorders.

Intravenous methohexital sodium (Brevital) has been used in desensitization therapy. Antianxiety agents may have some application in tense patients, although these drugs can interfere with the sexual response. The side effects of antidepressants, in particular the SSRIs and tricyclic drugs, have been used to prolong the sexual response in patients with premature ejaculation. This approach is particularly useful in patients who are refractory to behavioral techniques who may fall into the category of physiologically disposed premature ejaculators. Topical

anesthetic creams are also reported to be helpful in decreasing the intravaginal ejaculation latency time (IELT) in cases of premature ejaculation. Antidepressants are advocated in treatment of patients who are phobic of sex and in those with posttraumatic stress disorder following rape. Trazodone is an antidepressant that improves nocturnal erections. The risks of taking such medications must be carefully weighed against their possible benefits. Bromocriptine (Parlodel) is used in the treatment of hyperprolactinemia, which is frequently associated with hypogonadism. In such patients, it is necessary to rule out pituitary tumors. Bromocriptine, a dopamine agonist, may improve sexual function impaired by hyperprolactinemia.

A number of substances have popular standing as aphrodisiacs; for example, ginseng root and yohimbine (Yocon). Studies, however, have not con□rmed any aphrodisiac properties. Yohimbine, an α-receptor antagonist, may cause dilation of the penile artery; however, the American Urologic Association does not recommend its use to treat organic erectile dysfunction. Many recreational drugs, including cocaine, amphetamines, alcohol, and cannabis, are considered enhancers of sexual performance. Although they may provide the user with an initial bene□t because of their tranquilizing, disinhibiting, or mood-elevating e□ects, consistent or prolonged use of any of these substances impairs sexual functioning.

Dopaminergic agents have been reported to increase libido and improve sex function. Those drugs include L-dopa, a dopamine precursor, and bromocriptine, a dopamine agonist.

The antidepressant bupropion has dopaminergic e□ects and has increased sex drive in some patients. Selegiline, an MAOI, is selective for MAOB and is dopaminergic. It improves sexual functioning in older persons.

HORMONE THERAPY. Androgens increase the sex drive in women and in men with low testosterone concentrations. Women may experience virilizing effects, some of which are irreversible (e.g., deepening of the voice). In men, prolonged use of androgens produces hypertension and prostatic enlargement. Testosterone is most effective when given parenterally; however, effective oral and transdermal preparations are available.

Women who use estrogens for replacement therapy or for contraception may report decreased libido; in such cases, a combined preparation of estrogen and testosterone has been used e□ectively. Estrogen itself prevents thinning of the vaginal mucous membrane and

facilitates lubrication. Several forms of locally delivered estrogen—vaginal rings, vaginal creams, and vaginal tablets—provide alternate
administration routes to treat women with arousal problems or genital atrophy. Because tablets, creams, and rings do not signi□cantly
increase circulating estrogen levels, these devices may be considered for patients with breast cancer with arousal problems.

ANTIANDROGENS AND ANTIESTROGENS. Estrogens and progesterone are antiandrogens that have been used to treat compulsive sexual behavior in
men, usually in sex offenders. Clomiphene (Clomid) and tamoxifen (Nolvadex) are both antiestrogens, and both stimulate gonadotropinreleasing
hormone (GnRH) secretion and increase testosterone concentrations, thereby increasing libido. Women being treated for breast
cancer with tamoxifen report an increased libido. However, tamoxifen may cause uterine cancer.

MECHANICAL TREATMENT APPROACHES. In male patients with arteriosclerosis (especially of the distal aorta, known as Leriche's syndrome), the
erection may be lost during active pelvic thrusting. The need for increased blood in the gluteal muscles and others served by the ilial or
hypogastric arteries takes blood away (steals) from the pudendal artery and, thus, interferes with penile blood flow. Relief may be obtained
by decreasing pelvic thrusting, which is also aided by the woman's superior coital position.

VACUUM PUMP. Vacuum pumps are mechanical devices that patients without vascular disease can use to obtain erections. The blood drawn
into the penis following the creation of the vacuum is kept there by a ring placed around the base of the penis. This device has no adverse
effects, but it is cumbersome, and partners must be willing to accept its use. Some women complain that the penis is redder and cooler than
when erection is produced by natural circumstances, and they find the process and the result objectionable.

A similar device, called EROS, has been developed to create clitoral erections in women. EROS is a small suction cup that □ts over the
clitoral region and draws blood into the clitoris. Studies have reported its success in treating female sexual arousal disorder. Vibrators used
to stimulate the clitoral area have been successful in treating anorgasmic women.

Surgical Treatment

MALE PROSTHESES. Surgical treatment is infrequently advocated, but penile prosthetic devices are available for men with inadequate erectile
responses who are resistant to other treatment methods or who have medically caused deficiencies. The two main types of prostheses are (1)

a semi-rigid rod prosthesis that produces a permanent erection that can be positioned close to the body for concealment and (2) an inflatable type that is implanted with its own reservoir and pump for inflation and deflation. The latter type is designed to mimic normal physiological functioning.

VASCULAR SURGERY. When vascular insufficiency is present due to atherosclerosis or other blockage, bypass surgery of penile arteries has been attempted in selected cases with some success.

Outcome

Demonstrating the e□ectiveness of traditional outpatient psychotherapy is just as di□cult when therapy is oriented to sexual problems as it is in general. The more severe the psychopathology associated with a problem of long duration, the more adverse the outcome is likely to be. The results of di□erent treatment methods have varied considerably since Masters and Johnson □rst reported positive results for their treatment approach in 1970. Masters and Johnson studied the failure rates of their patients (de□ned as the failure to initiate reversal of the basic symptom of the presenting dysfunction). They compared initial failure rates with 5-year follow-up □ndings for the same couples. Although some have criticized their de□nition of the percentage of presumed successes, other studies have con□rmed the e□ectiveness of their approach.

The more di□cult treatment cases involve couples with severe marital discord. Desire disorders are particularly di□cult to treat. They require longer, more intensive therapy than some other disorders, and their outcomes vary greatly.

When behavioral approaches are used, empirical criteria that predict outcome are more easily isolated. Using these criteria, for instance, couples who regularly practice assigned exercises appear to have a much greater likelihood of success than do more resistant couples or those whose interaction involves sadomasochistic or depressive features or mechanisms of blame and projection. Attitude □exibility is also a positive prognostic factor. Overall, younger couples tend to complete sex therapy more often than older couples. Couples whose interactional di□culties center on their sex problems, such as inhibition, frustration, or fear of performance failure, are also likely to respond well to therapy.

Although most therapists prefer to treat a couple for sexual dysfunction, treatment of individual persons has also been successful. In general, methods that have proved e□ective singly or in combination include training

17.3 Paraphilic Disorders

Paraphilias or perversions are sexual stimuli or acts that are deviations from normal sexual behaviors, but are necessary for some persons to experience arousal and orgasm. According to the *Diagnostic and Statistical Manual of Mental Disorders, fth edition* (DSM-5), the term paraphilic disorder is reserved for those cases in which a sexually deviant fantasy or impulse has been expressed behaviorally. Individuals with paraphilic interests can experience sexual pleasure, but they are inhibited from responding to stimuli that are normally considered erotic. The paraphiliac person's sexuality is mainly restricted to speci c deviant stimuli or acts. Persons that occasionally experiment with paraphilic behavior (e.g., infrequent episode of bondage or dressing in costumes), but are capable of responding to more typical erotic stimuli, are not seen ashaving paraphilic disorders.

Paraphilic disorders can range from nearly normal behavior to behavior that is destructive or hurtful only to a person's self or to a person's self and partner, and nally to behavior that is deemed destructive or threatening to the community at large. DSM-5 lists pedophilia, frotteurism, voyeurism, exhibitionism, sexual sadism, sexual masochism, fetishism, and transvestism with explicit diagnostic criteria because of their threat to others and/or because they are relatively common paraphilias. There are many other paraphilias that may be diagnosed. A paraphilia is clinically signi cant if the person has acted on these fantasies or if these fantasies cause marked distress or interpersonal di culty or job-related di culty. However, when the fantasy has not been acted upon, the term paraphilic disorder should not be applied. In the paraphilias listed earlier,with the exception of pedophilia, the speci ers, "in a controlled environment" (where the fantasy cannot easily be acted upon due to circumstances, such as being in an institution) and "in full remission" (when the patient has not acted on the fantasies for 5 years and there has been no impairment in interpersonal or occupational functioning in an uncontrolled environment for 5 years) are added.

A special fantasy with its unconscious and conscious components is the pathognomonic element of the paraphilia, with sexual arousal and orgasm being associated phenomena that *reinforce the fantasy or impulse.* The influence of these fantasies and their behavioral manifestations often extend beyond the sexual sphere to pervade people's lives.

The major functions of human sexual behavior are to assist in bonding, to create mutual pleasure in cooperation with a partner, to

express and enhance love between two persons, and to procreate. Paraphilic disorders entail divergent behaviors in that those acts involve aggression, victimization, and extreme one-sidedness. The behaviors exclude or harm others and disrupt the potential for bonding between persons. Moreover, paraphilic sexual scripts often serve other vital psychic functions. They may assuage anxiety, bind aggression, or stabilize identity.

EPIDEMIOLOGY

Paraphilias are practiced by only a small percentage of the population, but the insistent, repetitive nature of the disorders results in a high frequency of such acts. Thus, a large proportion of the population has been victimized by persons with paraphilic disorders. It has been suggested that the prevalence of paraphilias is signi□cantly higher than the number of cases diagnosed in general clinical facilities, based on the large commercial market in paraphilic pornography and paraphernalia. Is not known how many of the consumers of this material act on paraphilic fantasies or cannot respond to typical erotic stimuli.

Among legally identi□ed cases of paraphilic disorders, pedophilia is most common. Of all children, 10 to 20 percent have been molested by age 18. Because a child is the object, the act is taken more seriously, and greater e□ort is spent tracking down the culprit than in other paraphilic disorders. Persons with exhibitionism who publicly display themselves to young children are also commonly apprehended. Those with voyeurism may be apprehended, but their risk is not great. Of adult females, 20 percent have been the targets of persons with exhibitionism and voyeurism. Sexual masochism and sexual sadism are underrepresented in any prevalence estimates. Sexual sadism usually comes to attention only in sensational cases of rape, brutality, and lust murder. The excretory paraphilic disorders are scarcely reported, because activity usually takes place between consenting adults or between prostitute and client. Persons with fetishism rarely become entangled in the legal system. Those with transvestism may be arrested occasionally for disturbing the peace or on other misdemeanor charges if they are obviously men dressed in women's clothes, but arrest is more common among those with gender identity disorders.

Frequency of Paraphilic Acts Committed by Patients with Paraphilia Seeking Outpatient Treatment

As usually de□ned, the paraphilias seem to be largely male conditions. Fetishism almost always occurs in men. More than 50 percent of all paraphilias have their onset before age 18. Patients with paraphilia frequently have three to □ve paraphilias, either concurrently or at di□erent times in their lives. This pattern of occurrence is especially the case with exhibitionism, fetishism, sexual masochism, sexual sadism,

transvestic fetishism, voyeurism, and zoophilia . The occurrence of paraphilic behavior peaks between ages 15 and 25 and gradually declines. DSM-5 suggests the paraphilia designation be reserved for those ages 18 and older to avoid pathologizing normal sexual curiosity and occasional experimentation in adolescence. In men older than 50, criminal paraphilic acts are rare. Those that occur are practiced in isolation or with a cooperative partner.

ETIOLOGY

Psychosocial Factors

In the classic psychoanalytic model, persons with a paraphilia have failed to complete the normal developmental process toward sexual adjustment, but the model has been modified by new psychoanalytic approaches. What distinguishes one paraphilia from another is the method chosen by a person (usually male) to cope with the anxiety caused by the threat of castration by the father and separation from the mother. However bizarre its manifestation, the resulting behavior provides an outlet for the sexual and aggressive drives that would otherwise have been channeled into normal sexual behavior.

Failure to resolve the oedipal crisis by identifying with the father-aggressor (for boys) or mother-aggressor (for girls) results either in improper identification with the opposite-sex parent or in an improper choice of object for libido cathexis. Classic psychoanalytic theory holds that transsexualism and transvestic fetishism are disorders because each involves identification with the opposite-sex parent instead of the same-sex parent; for instance, a man dressing in women's clothes is believed to identify with his mother. Exhibitionism and voyeurism may be attempts to calm anxiety about castration because the reaction of the victim or the arousal of the voyeur reassures the paraphilic person that the penis is intact. Fetishism is an attempt to avoid anxiety by displacing libidinal impulses to inappropriate objects. A person with a shoe fetish unconsciously denies that women have lost their penises through castration by attaching libido to a phallic object, the shoe, which symbolizes the female penis. Persons with pedophilia and sexual sadism have a need to dominate and control their victims to compensate for their feelings of powerlessness during the oedipal crisis. Some theorists believe that choosing a child as a love object is a narcissistic act. Persons with sexual masochism overcome their fear of injury and their sense of powerlessness by showing that they are impervious to harm. Another theory proposes that the masochist directs the aggression inherent in all paraphilias toward herself or himself.

Although recent developments in psychoanalysis place more emphasis on treating defense mechanisms than on oedipal traumas,

psychoanalytic therapy for patients with a paraphilia remains consistent with Sigmund Freud's theory.

Other theories attribute the development of a paraphilia to early experiences that condition or socialize children into committing a paraphilic act. The first shared sexual experience can be important in that regard. Molestation as a child can predispose a person to accept continued abuse as an adult or, conversely, to become an abuser of others. Also, early experiences of abuse that are not specifically sexual, such as spanking, enemas, or verbal humiliation, can be sexualized by a child and can form the basis for a paraphilia. Such experiences can result in the development of an *eroticized child.*

A 34-year-old man presented for treatment with a chief complaint of erectile disorder. He was frequently unable to obtain an erection sufficient for coitus with his wife. The problem disappeared whenever she was willing to act out his bondage fantasy and tie him up with ropes, a scenario he intensely desired. He explained that he felt free to be sexual when he was tied up because it reassured him that he could move vigorously and not hurt the woman. In addition, he gave a history of being tied up "in fun" when he was a child by a babysitter who would then tickle him until he begged her to stop.

The onset of paraphilic acts can result from persons' modeling their behavior on the behavior of others who have carried out paraphilic acts, mimicking sexual behavior depicted in the media, or recalling emotionally laden events from the past, such as their own molestation.

Learning theory indicates that because the fantasizing of paraphilic interests begins at an early age and because personal fantasies and thoughts are not shared with others (who could block or discourage them), the use and misuse of paraphilic fantasies and urges continue uninhibited until late in life. Only then do persons begin to realize that such paraphilic interests and urges are inconsistent with societal norms. By that time, however, the repetitive use of such fantasies has become ingrained, and the sexual thoughts and behaviors have become associated with, or conditioned to, paraphilic fantasies.

Biological Factors

Several studies have identified abnormal organic findings in persons with paraphilias. None has used random samples of such persons; instead, they have extensively investigated patients with paraphilia who were referred to large medical centers. Among these patients, those with positive organic findings included 74 percent with abnormal hormone levels, 27 percent with hard or soft neurological signs, 24 percent with chromosomal abnormalities, 9 percent with seizures, 9 percent with dyslexia, 4 percent with abnormal

electroencephalography (EEG) studies, 4 percent with major mental disorders, and 4 percent with mental handicaps. The question is whether these abnormalities are causally related to paraphilic interests or are incidental findings that bear no relevance to the development of paraphilia.

Psychophysiological tests have been developed to measure penile volumetric size in response to paraphilic and nonparaphilic stimuli. The procedures may be of use in diagnosis and treatment, but are of questionable diagnostic validity because some men are able to suppress their erectile responses.

DIAGNOSIS AND CLINICAL FEATURES

In DSM-5, the criteria for paraphilic disorder requires the patient to have experienced intense and recurrent arousal from their deviant fantasy for at least 6 months and to have acted on the paraphilic impulse. The presence of a paraphilic fantasy, however, may still distress a patient even if there has been no behavioral elaboration. The fantasy distressing the patient contains unusual sexual material that is relatively □xed and shows only minor variations. Arousal and orgasm depend on the mental elaboration, if not the behavioral playing out of the fantasy. Sexual activity is ritualized or stereotyped and makes use of degraded, reduced, or dehumanized objects.

Exhibitionism

Exhibitionism is the recurrent urge to expose the genitals to a stranger or to an unsuspecting person. Sexual excitement occurs in anticipation of the exposure, and orgasm is brought about by masturbation during or after the event. In almost 100 percent of cases, those with exhibitionism are men exposing themselves to women. The dynamic of men with exhibitionism is to assert their masculinity by showing their penises and by watching the victims' reactions—fright, surprise, and disgust. In this paraphilic disorder, men unconsciously feel castrated and impotent. Wives of men with exhibitionism often substitute for the mothers to whom the men were excessively attached during childhood, or conversely, by whom they were rejected. In other related paraphilias, the central themes involve derivatives of looking or showing.

A substance-abusing professional was □nally able to attain sobriety at age 33 years. With this accomplishment, he met a woman and got married, began to work steadily for the □rst time in his life, and was able to impregnate his new wife. His preferred sexual activity had been masturbation in semi-public places. The patient had a strong sense that his mother had always thought him to be inadequate, did not like to spend time with him, and constantly made negative comparisons between him and his "all-boy" younger brother. He

recalled several times when his father had tried to explain his mother's antipathy: "It is just one of those things son: your mother does not seem to like you." Without substance abuse, he gave up his exhibitionism, but he quickly developed sexual incapacity with his wife and became "addicted" to phone sex. (Courtesy of Stephen B. Levine, M.D.)

Specifiers added to exhibitionistic disorder by DSM-5 differentiate arousal from exposing genitals to prepubertal children, to physically mature individuals, or to both prepubertal children and physically mature individuals.

Fetishism

In fetishism the sexual focus is on objects (e.g., shoes, gloves, pantyhose, and stockings) that are intimately associated with the human body, or on nongenital body parts. The latter focus is sometimes called partialism and is discussed later. DSM-5 applies the diagnosis fetishistic disorder to partialism and attaches the following specifiers to fetishistic disorder: body part(s); non-living parts; other. The particular fetish used is linked to someone closely involved with a patient during childhood and has a quality associated with this loved, needed, or even traumatizing person. Usually, the disorder begins by adolescence, although the fetish may have been established in childhood. Once established, the disorder tends to be chronic.

Sexual activity may be directed toward the fetish itself (e.g., masturbation with or into a shoe), or the fetish may be incorporated into sexual intercourse (e.g., the demand that high-heeled shoes be worn). The disorder is almost exclusively found in men. According to Freud, the fetish serves as a symbol of the phallus to persons with unconscious castration fears. Learning theorists believe that the object was associated with sexual stimulation at an early age.

A 50-year-old man entered treatment with a chief complaint of erectile disorder experienced primarily with his wife. He was suffering from a moderate depression that related to both his marital issues and business problems. He had no erectile problems with women he picked up in bars or knew and arranged to meet in bars. Bars were his chosen venue in part because smoking had been prohibited in other public areas in his city and a woman's act of smoking a cigarette was necessary to his sexual arousal. His family history included an alcoholic mother and an emotionally abusive father who was a chain smoker. On family car trips the father would smoke, with all the car windows up. If the patient complained of feeling nauseous the father would tell him to "shut up." He recalled being very attracted to a Sunday school teacher who smoked when he was 6 years old. He first smoked when he was 13, sneaking and hiding behind his house. His first cigarette was one he stole from a pack on his mother's night table.

Frotteurism

Frotteurism is usually characterized by a man's rubbing his penis against the buttocks or other body parts of a fully clothed woman to achieve orgasm. At other times, he may use his hands to rub an unsuspecting victim. The acts usually occur in crowded places, particularly in subways and buses. Those with frotteurism are extremely passive and isolated, and frottage is often their only source of sexual gratification. The expression of aggression in this paraphilia is readily apparent.

Pedophilia

Pedophilia involves recurrent intense sexual urges toward, or arousal by, children 13 years of age or younger, over a period of at least 6 months. Persons with pedophilia are at least 16 years of age and at least 5 years older than the victims. When a perpetrator is a late adolescent involved in an ongoing sexual relationship with a 12- or 13-year-old, the diagnosis is not warranted.

Most child molestations involve genital fondling or oral sex. Vaginal or anal penetration of children occurs infrequently, except in cases of incest. Although most child victims coming to public attention are girls, this □nding appears to be a product of the referral process.

O□enders report that when they touch a child, most (60 percent) of the victims are boys. This □gure is in sharp contrast to the □gure for nontouching victimization of children, such as window peeping and exhibitionism; 99 percent of all such cases are perpetrated against girls.

DSM-5 adds the following speci□ers to a diagnosis of pedophilic disorder: sexually attracted to males; sexually attracted to females; or sexually attracted to both. Of persons with pedophilia, 95 percent are heterosexual, and 50 percent have consumed alcohol to excess at the time of the incident. In addition to their pedophilia, a signi□cant number of the perpetrators are concomitantly or have previously been involved in exhibitionism, voyeurism, or rape.

Incest is related to pedophilia by the frequent selection of an immature child as a sex object, the subtle or overt element of coercion, and occasionally the preferential nature of the adult–child liaison.

A 62-year-old married janitor had worked as a fourth-grade schoolteacher for 26 years before he transferred schooldistricts, and finally several years later mysteriously lost his second job. He was referred for help after his family discovered that he had repeatedly fondled the genitals of his 4- and 6-year-old granddaughters. A father of □ve who had not had sex with his wife for 30 years after strenuously objecting to her cigarette smoking, he was generous, helpful, and cooperative with his children and grandchildren. Intellectually slow, he preferred comic books and had a charming manner of playing with young children "like he was one himself." By his estimate he had

touched the buttocks and genitals of at least 300 girl students, thinking only of how they did not know what he was doing because he was being a□ectionate and they were too young to realize what was happening. He loved the anticipation and excitement of this behavior.

His teaching career ended when parents complained to a principal. The principal discovered that the new teacher had been transferred, not □red from his longstanding teaching job for the same reason. The patient had tried to touch his 12-year-old daughter who angrily warned him to stay away from her, but he had also managed to touch her friends and his best friend's daughters as they neared puberty.

(Courtesy of Stephen B. Levine, M.D.)

Sexual Masochism

Masochism takes its name from the activities of Leopold von Sacher-Masoch, a 19th century Austrian novelist whose characters derived sexual pleasure from being abused and dominated by women. According to the DSM-5, persons with sexual masochism have a recurrent preoccupation with sexual urges and fantasies involving the act of being humiliated, beaten, bound, or otherwise made to su□er. A speci□er added to this disorder diagnosis is: with asphyxiophilia; also called autoerotic asphyxiation, this is the practice of achieving or heightening sexual arousal with restriction of breathing. Sexual masochistic practices are more common among men than among women. Freud believed masochism resulted from destructive fantasies turned against the self. In some cases, persons can allow themselves to experience sexual feelings only when punishment for the feelings follows. Persons with sexual masochism may have had childhood experiences that convinced them that pain is a prerequisite for sexual pleasure. About 30 percent of those with sexual masochism also have sadistic fantasies. Moral masochism involves a need to suffer, but is not accompanied by sexual fantasies.

A 27-year-old woman presented for an interview with the director of a course to which she had applied and which she was eager to take. She appeared at the interview in the company of a man whom she introduced to the director, saying, "This is my lover." When asked about this unusual behavior during the interview, the applicant stated that her companion had ordered her to bring him and make that introduction. She further explained that she was part of a group that utilized sadomasochistic techniques in their sexual play.

Sexual Sadism

DSM-5 de□nes sexual sadism as the recurrent and intense sexual arousal from the physical and psychological su□ering of another person. A person must have experienced these feelings for at least 6 months, and must have acted on sadistic fantasies to receive a diagnosis of sexual

sadism disorder. Persons who deny behavioral elaboration of their paraphilic fantasies and who say they su□er no distress, or interpersonal or social difficulties, as a consequence of their paraphilias are designated as having an ascertained sexual sadism interest.

The onset of the disorder is usually before the age of 18 years, and most persons with sexual sadism are male. According to psychoanalytic theory, sadism is a defense against fears of castration; persons with sexual sadism do to others what they fear will happen to them and derive pleasure from expressing their aggressive instincts. The disorder was named after the Marquis de Sade, an 18th century French author and military o□cer who was repeatedly imprisoned for his violent sexual acts against women. Sexual sadism is related to rape, although rape is more aptly considered an expression of power. Some sadistic rapists, however, kill their victims after having sex (so-called lust murders). In many cases, these persons have underlying schizophrenia. John Money believes that lust murderers su□er from dissociative disorder and perhaps have a history of head trauma. He lists □ve contributory causes of sexual sadism: hereditary predisposition, hormonal malfunctioning, pathological relationships, a history of sexual abuse, and the presence of other mental disorders.

Voyeurism

Voyeurism, also known as *scopophilia,* is the recurrent preoccupation with fantasies and acts that involve observing unsuspecting persons who are naked or engaged in grooming or sexual activity. Masturbation to orgasm usually accompanies or follows the event. The □rst voyeuristic act usually occurs during childhood, and the paraphilia is most common in men. When persons with voyeurism are apprehended, the charge is usually loitering.

Transvestism

Transvestism, formerly called transvestic fetishism, is described as fantasies and sexual urges to dress in opposite gender clothing as a means of arousal and as an adjunct to masturbation or coitus. The diagnosis is given when the transvestic fantasies have been acted upon for at least 6 months. DSM-5 requires speci□ers with a diagnosis of transvestic disorder: with fetishism is added if the patient is aroused by fabrics, materials, or garments; with autogynephilia is added if the patient is sexually aroused by thoughts or images of himself as a female.

Transvestism typically begins in childhood or early adolescence. As years pass, some men with transvestism want to dress and live permanently as women. Very rarely, women want to dress and live as men. These persons are classi□ed in DSM-5 as persons with transvestic disorder and gender dysphoria. Usually, a person wears more than one article of

opposite sex clothing; frequently, an entire wardrobe is involved. When a man with transvestism is cross-dressed, the appearance of femininity may be striking, although not usually
to the degree found in transsexualism. When not dressed in women's clothes, men with transvestism may be hypermasculine in appearance and occupation. Cross-dressing can be
graded from solitary, depressed, guilt-ridden dressing to ego-syntonic, social membership in a transvestite subculture.
The overt clinical syndrome of transvestism may begin in latency, but is more often seen around pubescence or in adolescence. Frank
dressing in opposite sex clothing usually does not begin until mobility and relative independence from parents are well established.

Other Specified Paraphilic Disorder

This classi□cation includes various paraphilias that cause personal distress and that have been acted upon for 6 months that do not meet the
criteria for any of the aforementioned categories. The same de□nition applies to Unspeci□ed Paraphilic Disorder, with the di□erence that
the clinician does not wish to specify the particular paraphilia for reasons that may include not having sufficient information.

TELEPHONE AND COMPUTER SCATOLOGIA. Telephone scatologia is characterized by obscene phone calling and involves an unsuspecting partner. Tension and arousal begin in anticipation of phoning; the recipient of the call listens while the telephoner (usually male) verbally exposes
his preoccupations or induces her to talk about her sexual activity. The conversation is accompanied by masturbation, which is often
completed after the contact is interrupted.
Persons also use interactive computer networks, sometimes compulsively, to send obscene messages by electronic mail and to transmit sexually explicit messages and video images.
Because of the anonymity of the users in chat rooms who use aliases, on-line or computer sex (cybersex) allows some persons to play the role of the opposite sex ("genderbending"),
which represents an alternative method of expressing transvestic or transsexual fantasies. A danger of on-line cybersex is that pedophiles often make contact with children or
adolescents who are lured into meeting them and are then molested. Many on-line contacts develop into o□-line liaisons. Although some persons report that the o□-line encounters
develop into meaningful relationships, most such meetings are □lled with disappointment and disillusionment, as the fantasized person fails to meet unconscious expectations of the
ideal partner. In other situations, when adults meet, rape or even homicide may occur.

NECROPHILIA. Necrophilia is an obsession with obtaining sexual gratification from cadavers. Most persons with this disorder find corpses in morgues, but some have been known to rob graves or even to murder to satisfy their sexual urges. In the few cases studied, those with necrophilia believed that they were inflicting the greatest conceivable humiliation on their lifeless victims. According to Richard von Krafft-Ebing, the diagnosis of psychosis is, under all circumstances, justified.

PARTIALISM. Persons with the disorder of partialism concentrate their sexual activity on one part of the body to the exclusion of all others. Mouth–genital contact—such as cunnilingus (oral contact with a woman's external genitals), fellatio (oral contact with the penis), and anilingus (oral contact with the anus)—is normally associated with foreplay; Freud recognized the mucosal surfaces of the body as erotogenic and capable of producing pleasurable sensation. But when a person uses these activities as the sole source of sexual gratification and cannot have or refuses to have coitus, a paraphilia exists. It is also known as *oralism.*

ZOOPHILIA. In zoophilia, animals—which may be trained to participate—are preferentially incorporated into arousal fantasies or sexual activities, including intercourse, masturbation, and oral–genital contact. Zoophilia as an organized paraphilia is rare. For many persons, animals are the major source of relatedness, so it is not surprising that a broad variety of domestic animals are used sensually or sexually. Sexual relations with animals may occasionally be an outgrowth of availability or convenience, especially in parts of the world where rigid convention precludes premarital sexuality and in situations of enforced isolation. Because masturbation is also available in such situations, however, a predilection for animal contact is probably present in opportunistic zoophilia.

COPROPHILIA AND KLISMAPHILIA. Coprophilia is sexual pleasure associated with the desire to defecate on a partner, to be defecated on, or to eat feces (coprophagia). A variant is the compulsive utterance of obscene words (coprolalia). These paraphilias are associated with fixation at the anal stage of psychosexual development. Similarly, klismaphilia, the use of enemas as part of sexual stimulation, is related to anal fixation.

UROPHILIA. Urophilia, a form of urethral eroticism, is interest in sexual pleasure associated with the desire to urinate on a partner or to be urinated on. In both men and women, the disorder may be associated with masturbatory techniques involving the insertion of foreign objects into the urethra for sexual stimulation.

MASTURBATION. Masturbation is a normal activity that is common in all stages of life from infancy to old age, but this viewpoint was not always accepted. Freud believed that neurasthenia was caused by excessive masturbation. In the early 1900s, masturbatory insanity was a common diagnosis in hospitals for the criminally insane in the United States. Masturbation can be defined as a person's achieving sexual pleasure—which usually results in orgasm—by himself or herself (autoeroticism). Alfred Kinsey found it to be more prevalent in males than in females, but this difference may no longer exist. The frequency of masturbation varies from three to four times a week in adolescence to one to two times a week in adulthood. It is common among married persons; Kinsey reported that it occurred on the average of once a month among married couples.

The techniques of masturbation vary in both sexes and among persons. The most common technique is direct stimulation of the clitoris or penis with the hand or the □ngers.

Indirect stimulation can also be used, such as rubbing against a pillow or squeezing the thighs. Kinsey found that 2 percent of women are capable of achieving orgasm through fantasy alone. Men and women have been known to insert objects in the urethra to achieve orgasm. The hand vibrator is now used as a masturbatory device by both sexes.

Masturbation is abnormal when it is the only type of sexual activity performed in adulthood if a partner is or might be available, when its frequency indicates a compulsion or sexual dysfunction, or when it is consistently preferred to sex with a partner (Fig. 17.3-1).

FIGURE 17.3-1

A man who masturbated compulsively with a large electrically powered vibrator by inserting the head of the instrument into his anus was unable to retrieve it when it was inserted too far into the anal canal. (Courtesy of Stephen Baker, M.D.)

HYPOXYPHILIA. Hypoxyphilia is the desire to achieve an altered state of consciousness secondary to hypoxia while experiencing orgasm. Persons may use a drug (e.g., a volatile nitrite or nitrous oxide) to produce hypoxia. Autoerotic asphyxiation is also associated with hypoxic states, but it should be classified as a form of sexual masochism.

DIFFERENTIAL DIAGNOSIS

Clinicians must di□erentiate a paraphilia from an experimental act that is not recurrent or compulsive and that is done for its novelty.

Paraphilic activity most likely begins during adolescence. Some paraphilias (especially the bizarre types) are associated with other mental disorders, such as schizophrenia. Brain diseases can also release perverse impulses.

COURSE AND PROGNOSIS

The difficulty in controlling or curing paraphilic disorders rests in the fact that it is hard for people to give up sexual pleasure with no assurance that new routes to sexual gratification will be secured. A poor prognosis for paraphilic disorder is associated with an early age of onset, a high frequency of acts, no guilt or shame about the act, and substance abuse. The course and the prognosis are better when patients have a history of coitus in addition to the paraphilia, and when they are self-referred rather than referred by a legal agency.

TREATMENT

Five types of psychiatric interventions are used to treat persons with paraphilic disorder and paraphilic interests: external control, reduction of sexual drives, treatment of comorbid conditions (e.g., depression or anxiety), cognitive-behavioral therapy, and dynamic psychotherapy.

Prison is an external control mechanism for sexual crimes that usually does not contain a treatment element. When victimization occurs in a family or work setting, the external control comes from informing supervisors, peers, or other adult family members of the problem and advising them about eliminating opportunities for the perpetrator to act on urges.

Drug therapy, including antipsychotic or antidepressant medication, is indicated for the treatment of schizophrenia or depressive disorders if the paraphilia is associated with these disorders. Antiandrogens, such as cyproterone acetate in Europe and medroxyprogesterone acetate (Depo-Provera) in the United States, may reduce the drive to behave sexually by decreasing serum testosterone levels to subnormal concentrations. Serotonergic agents, such as fluoxetine (Prozac), have been used with limited success in some patients with paraphilia.

Cognitive-behavioral therapy is used to disrupt learned paraphilic patterns and modify behavior to make it socially acceptable. The interventions include social skills training, sex education, cognitive restructuring (confronting and destroying the rationalizations used to support victimization of others), and development of victim empathy. Imaginal desensitization, relaxation technique, and learning what triggers the paraphilic impulse so that such stimuli can be avoided are also taught. In modified aversive behavior rehearsal, perpetrators are videotaped acting out their paraphilia with a mannequin. Then the patient with paraphilic disorder is confronted by a therapist and a group of other offenders who ask questions about feelings, thoughts, motives associated with the act and repeatedly try to correct cognitive distortions and point out lack of victim empathy to the patient.

Insight-oriented psychotherapy is a long-standing treatment approach. Patients have the opportunity to understand their dynamics and the

events that caused the paraphilia to develop. In particular, they become aware of the daily events that cause them to act on their impulses (e.g., a real or fantasized rejection). Treatment helps them deal more effectively with life stresses and enhances their capacity to relate to a life partner. In addition, psychotherapy allows patients to regain self-esteem, which in turn allows them to approach a partner in a more normal sexual manner. Sex therapy is an appropriate adjunct to the treatment of patients with specific sexual dysfunctions when they attempt nondeviant sexual activities.

Good prognostic indicators include the presence of only one paraphilia, normal intelligence, the absence of substance abuse, the absence of nonsexual antisocial personality traits, and the presence of a successful adult attachment. Paraphilic disorders, however, remain significant treatment challenges even under these circumstances.

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCE

VALUE ADDED COURSE STUDENT DETAILS

SEXUAL MEDICINE, PARAPHILIA, GENDER IDENTITY ISSUES AND THEIR MANAGEMENT FOR 3rd YEAR STUDENTS

S.No	Register No	Students List	Department	Signature
1	U16MB361	RAJASHREE .M	Psychiatry	
2	U16MB362	RAJAT TYAGI	Psychiatry	
3	U16MB363	RAJEEV RANJAN SINGH	Psychiatry	
4	U16MB364	RAMAPRIYA .M	Psychiatry	
5	U16MB365	RIYAS AHAMED .M	Psychiatry	
6	U16MB366	RUCHI YADAV	Psychiatry	
7	U16MB367	RUPESH RANJAN	Psychiatry	
8	U16MB368	SAI PAVAN KUMAR .B	Psychiatry	
9	U16MB369	SAJUTI DEY	Psychiatry	
10	U16MB370	SAKTHIMALAR .R	Psychiatry	
11	U16MB371	SANDHYA	Psychiatry	
12	U16MB372	SARA .R	Psychiatry	

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13	U16MB373	SARASWATI .N	Psychiatry	
14	U16MB374	SATHYA VIJAYENDRAN P.U	Psychiatry	
15	U16MB375	SHAIKH IMRAN SHAIKH NAJIR	Psychiatry	

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SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Candidate Name		Assessor Name	
Date of Assessment		Assessor Position	

Sexual Medicine, Paraphilia, Gender Identity issues and their management

MULTIPLE CHOICE QUESTIONS

Course Code: PSYC10

I. ANSWER ALL THE QUESTIONS

1) Sexual dysfunction is one category of disorders of sexuality and sexual functioning. The term sexual dysfunction refers to:

a) Problems with the normal sexual response cycle

b) Sexual urges or fantasies involving unusual sources of gratification problems

c) An individual is dissatisfied with their own biological sex and have a strong desire to be a member of the opposite sex.

d) Problems with sexual fantasies

Check your answer

2) In disorders of sexuality and sexual functioning, the term paraphilias refers to:

a) Problems with the normal sexual response cycle

b) Sexual urges or fantasies involving unusual sources of gratification problems

c) An individual is dissatisfied with their own biological sex and have a strong desire to be a member of the opposite sex.

d) Problems with sexual fantasies

Check your answer

3) In disorders of sexuality and sexual functioning, the term gender identity disorder refers to:

a) Problems with the normal sexual response cycle

b) Sexual urges or fantasies involving unusual sources of gratification problems

c) Problems with sexual fantasies

d) An individual is dissatisfied with their own biological sex and have a strong desire to be a member of the opposite sex

Check your answer

4) Sexual aversion disorder is associated with which of the following?

a) Anxiety

b) Disgust

c) Fear

d) All of the above

Check your answer

5) Female Sexual Arousal Disorder is defined primarily in terms of a deficiency in a physical or physiological response, and as a result may be caused by a range of physical or physiological factors, including:

a) Hormone imbalances

b) Diabetes

c) Medications being taken for other disorders

d) All of the above

Check your answer

6) Which of the following is characteristic of Male Erectile Disorder?

a) A failure to attain an erection from the outset of sexual activity,

b) First experiencing an erection but then losing tumescence prior to penetration

c) Losing tumescence during penetration but prior to orgasm

d) All of the above

Check your answer

7) The term performance anxiety refers to:

a) Fear of failing to achieve a sustained erection

b) Fear of having sex in a public place

c) Fear of criticism from the sexual partner

d) Fear of not achieving orgasm

Check your answer

8) Which of the following is the term for the experience of persistent or recurrent delay in or absence of orgasm following normal sexual excitement which causes the individual marked distress or interpersonal difficulty?

a) Dysfunctional Orgasmic Disorder

b) Aclimactic Disorder

c) Female Orgasmic Disorder

d) Female Climactic Disorder

Check your answer

9) Genital pains that can occur before, during or after sexual intercourse, and can occur in both males and females are known as:

a) Dyspareunia

b) Dysmenhorea

c) Dyskinesia

d) Dyspraxia

Check your answer

10) The involuntary contraction of the perineal muscles surrounding the outer third of the vagina when vaginal penetration is attempted is termed:

a) Perinealitis

b) Perivaginitis

c) Vaginitis

d) Vaginismus

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Candidate Name	RAJT TYAGI	Assessor Name	Dr. ARUN
Date of Assessment	11-11-2019	Assessor Position	ASSOCIATE PROFESSOR

UNIVERSITY REG NO:- U16MB362

9/10

Sexual Medicine, Paraphilias, Gender Identity issues and their managament

MULTIPLE CHOICE QUESTIONS

Course Code: PSYC10

I. ANSWER ALL THE QUESTIONS

1) Sexual dysfunction is one category of disorders of sexuality and sexual functioning. The term sexual dysfunction refers to:

- a) Problems with the normal sexual response cycle
- b) Sexual urges or fantasies involving unusual sources of gratification problems
- c) An individual is dissatisfied with their own biological sex and have a strong desire to be a member of the opposite sex.
- d) Problems with sexual fantasies

Check your answer

2) In disorders of sexuality and sexual functioning, the term paraphilias refers to:

- a) Problems with the normal sexual response cycle
- b) Sexual urges or fantasies involving unusual sources of gratification problems
- c) An individual is dissatisfied with their own biological sex and have a strong desire to be a member of the opposite sex.
- d) Problems with sexual fantasies

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Check your answer

3) In disorders of sexuality and sexual functioning, the term gender identity disorder refers to:

- a) Problems with the normal sexual response cycle
- b) Sexual urges or fantasies involving unusual sources of gratification problems
- c) Problems with sexual fantasies
- d) An individual is dissatisfied with their own biological sex and have a strong desire to be a member of the opposite sex

Check your answer

4) Sexual aversion disorder is associated with which of the following?

- a) Anxiety
- b) Disgust
- c) Fear
- d) All of the above

Check your answer

5) Female Sexual Arousal Disorder is defined primarily in terms of a deficiency in a physical or physiological response, and as a result may be caused by a range of physical or physiological factors, including:

- a) Hormone imbalances

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

c) Medications being taken for other disorders

d) All of the above

Check your answer

6) Which of the following is characteristic of Male Erectile Disorder?

a) A failure to attain an erection from the outset of sexual activity,

b) First experiencing an erection but then losing tumescence prior to penetration

c) Losing tumescence during penetration but prior to orgasm

d) All of the above

Check your answer

7) The term performance anxiety refers to:

a) Fear of failing to achieve a sustained erection

b) Fear of having sex in a public place

c) Fear of criticism from the sexual partner

d) Fear of not achieving orgasm

Check your answer

8) Which of the following is the term for the experience of persistent or recurrent delay in or absence of orgasm following normal sexual excitement which causes the individual marked distress or interpersonal difficulty?

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

- b) Aclimactic Disorder
- c) Female Orgasmic Disorder
- d) Female Climactic Disorder

Check your answer

9) Genital pains that can occur before, during or after sexual intercourse, and can occur in both males and females are known as:

- a) Dyspareunia
- b) Dysmenhorea
- c) Dyskinesia
- d) Dyspraxia

Check your answer

10) The involuntary contraction of the perineal muscles surrounding the outer third of the vagina when vaginal penetration is attempted is termed:

- a) Perinealitis
- b) Perivaginitis
- c) Vaginitis
- d) Vaginismus

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Candidate Name	RAJASHREE. M	Assessor Name	DR. ARUN
Date of Assessment	11.11.2019	Assessor Position	ASSOCIATE PROFESSOR

UNIVERSITY REG NO:- U16MB861

7/10

Sexual Medicine, Paraphilias, Gender Identity issues and their managament

MULTIPLE CHOICE QUESTIONS

Course Code: PSYC10

I. ANSWER ALL THE QUESTIONS

1) Sexual dysfunction is one category of disorders of sexuality and sexual functioning. The term sexual dysfunction refers to:

- a) Problems with the normal sexual response cycle
- b) Sexual urges or fantasies involving unusual sources of gratification problems
- c) An individual is dissatisfied with their own biological sex and have a strong desire to be a member of the opposite sex.
- d) Problems with sexual fantasies

Check your answer

2) In disorders of sexuality and sexual functioning, the term paraphilias refers to:

- a) Problems with the normal sexual response cycle
- b) Sexual urges or fantasies involving unusual sources of gratification problems
- c) An individual is dissatisfied with their own biological sex and have a strong desire to be a member of the opposite sex.

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Check your answer

3) In disorders of sexuality and sexual functioning, the term gender identity disorder refers to:

- a) Problems with the normal sexual response cycle
- b) Sexual urges or fantasies involving unusual sources of gratification problems
- c) Problems with sexual fantasies
- d) An individual is dissatisfied with their own biological sex and have a strong desire to be a member of the opposite sex

Check your answer

4) Sexual aversion disorder is associated with which of the following?

- a) Anxiety
- b) Disgust
- c) Fear
- d) All of the above

Check your answer

5) Female Sexual Arousal Disorder is defined primarily in terms of a deficiency in a physical or physiological response, and as a result may be caused by a range of physical or physiological factors, including:

- a) Hormone imbalances
- b) Diabetes



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SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

c) Medications being taken for other disorders

d) All of the above

Check your answer

6) Which of the following is characteristic of Male Erectile Disorder?

a) A failure to attain an erection from the outset of sexual activity,

b) First experiencing an erection but then losing tumescence prior to penetration

c) Losing tumescence during penetration but prior to orgasm

d) All of the above

Check your answer

7) The term performance anxiety refers to:

a) Fear of failing to achieve a sustained erection

b) Fear of having sex in a public place

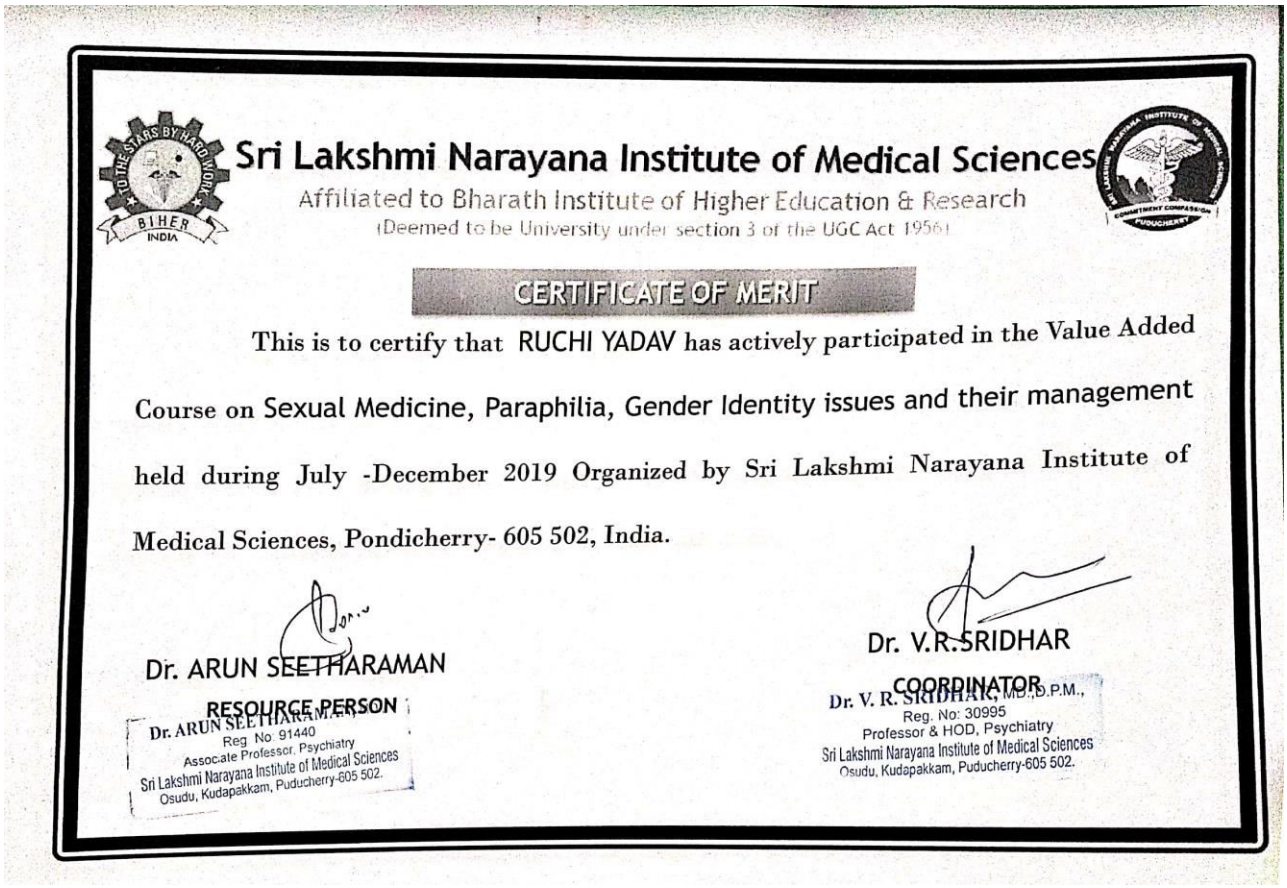
c) Fear of criticism from the sexual partner

d) Fear of not achieving orgasm

Check your answer

8) Which of the following is the term for the experience of persistent or recurrent delay in or absence of orgasm following normal sexual excitement which causes the individual marked distress or interpersonal difficulty?

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH



Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that RUCHI YADAV has actively participated in the Value Added Course on Sexual Medicine, Paraphilia, Gender Identity issues and their management held during July -December 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. ARUN SEETHARAMAN

RESOURCE PERSON

Dr. ARUN SEETHARAMAN
Reg. No: 91440
Associate Professor, Psychiatry
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

Dr. V.R.SRIDHAR

COORDINATOR

Dr. V. R. SRIDHAR, M.D., D.P.M.,
Reg. No: 30995
Professor & HOD, Psychiatry
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH



Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that RIYAS AHAMED .M has actively participated in the Value Added Course on Sexual Medicine, Paraphilia, Gender Identity issues and their management held during July -December 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. ARUN SEETHARAMAN
RESOURCE PERSON
Dr. ARUN SEETHARAMAN, MD.,
Reg. No: 91440
Associate Professor, Psychiatry
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

Dr. V.R.SRIDHAR
COORDINATOR
Dr. V. R. SRIDHAR, MD.,D.P.M.,
Reg. No: 30995
Professor & HOD, Psychiatry
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Student Feedback Form

Course Name: **SEXUAL MEDICINE**
Subject Code: **PSYC10**

Name of Student: _____ Roll No.: _____

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear					
2	Course contents met with your expectations					
3	Lecturer sequence was well planned					
4	Lectures were clear and easy to understand					
5	Teaching aids were effective					
6	Instructors encourage interaction and were helpful					
7	The level of the course					
8	Overall rating of the course	1	2	3	4	5

**** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory***

Suggestions if any:

Signature

Date:

BIHER

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Student Feedback Form

Course Name: **SEXUAL MEDICINE**

Subject Code: **PSYC10**

Name of Student: RAMAPRIYA · M Roll No.: U16MB364

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear					✓
2	Course contents met with your expectations				✓	
3	Lecturer sequence was well planned					✓
4	Lectures were clear and easy to understand				✓	
5	Teaching aids were effective					✓
6	Instructors encourage interaction and were helpful				✓	
7	The level of the course					✓
8	Overall rating of the course	1	2	✓ 3	4	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

Signature

Date: 3-12-2019

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Student Feedback Form

Course Name: **SEXUAL MEDICINE**

Subject Code: **PSYC10**

Name of Student: RAJEEV RANJAN SINGH Roll No.: U16MB363

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear			✓		
2	Course contents met with your expectations				✓	
3	Lecturer sequence was well planned					✓
4	Lectures were clear and easy to understand				✓	
5	Teaching aids were effective			✓		
6	Instructors encourage interaction and were helpful				✓	
7	The level of the course					✓
8	Overall rating of the course	1	2	3	4	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

Rajeev Singh
Signature

Date: 3·12·2019

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Date: 03-12-2019

From

Dr.V.R.Sridhar
Professor and Head,
Department of Psychiatry,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To

The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course:

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: **Sexual Medicine, Paraphilia, Gender Identity issues and their management**. We solicit your kind action to send certificates for the participants that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards,

Dr. V. R. SRIDHAR, MD.,D.P.M.,
Reg. No: 30995
Professor & HOD, Psychiatry
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

Encl: Certificates

Photographs

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

PSYC10-Sexual Medicine, Paraphilia, Gender Identity issues and their management. JULY TO DECEMBRE 2019



BIHER

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

Date: 07/06/2019

From
Dr. Aravind. C
Professor and Head,
Department of General Medicine
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research
Chennai

To
The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research
Chennai

Sub: Permission to conduct value-added course: DIABETES AND DIETARY PRACTICES

Respected Madam,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: DIABETES AND DIETARY PRACTICES on 05/07/2019. We solicit your kind permission for the same.

Kind Regards

Dr. Aravind. C

Dr. C. ARAVIND, MD., Reg.No:68432 Professor & HOD, General Medicine Sri Lakshmi Narayana Institute of Medical Sciences Osudu, Kudapakkam, Puducherry

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FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: Dr. Jayalakshmi

The HOD: Dr. Aravind. C

The Expert: Dr. Venkatasamy

The committee has discussed about the course and is approved.

Dean

Subject Expert

HOD

Dr. G. JAYALAKSHMI, BSC.,MBBS.,DTCD.,M.D., DEAN Sri Lakshmi Narayana Institute of Medical Sciences Osudu, Ageram Kudapakkam, Post, Villanur Commune Puducherry-605 502.

Dr. C. ARAVIND, MD., Reg.No:68432 Professor & HOD, General Medicine

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.

[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affiliated to Bharath University, Chennai - TN]

Circular

11/06/2019

Sub: Organising Value-added Course: DIABETES AND DIETARY PRACTICES reg

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research**, is organising a Value added course, titled, "DIABETES AND DIETARY PRACTICES" between July 2019 and December 2019. The course content is enclosed below.

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before 26/06/2019. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

Dr. G. JAYALAKSHMI, BSC.,MBBS.,DTCD.,M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Ageram Kudapakkam, Post,
Villanur Commune Puducherry-605 502.

Encl: Copy of Course content

COURSE PROPOSAL

Course Title: **DIABETES AND DIETARY PRACTICES**

Course Objective: To create an awareness among students of the 2nd year M.B.B.S about the role played by nutritional therapy in diabetes- both primary and secondary prevention

Course Outcome: An awareness regarding the importance of diet in diabetes- disease progression and treatment and the appropriate healthy diabetic diet were generated in the minds of all the participants

Course Audience: A batch of 25 students belonging to the 2nd year of M.B.B.S

Course Coordinator: Dr. C. Aravind

Course Faculties with Qualification and Designation:

1. **Dr. Venkatasamy**
   Professor
   Department of Medicine

2. **Dr. Muthukumarasamy**
   Professor
   Department of Medicine

Course Curriculum/Topics with schedule :

SlNo	Date	Topic	Time	Hours	Name od the Instructor
1.	05/07/2019	What is diabetes?	5 pm to 7 pm	2 hours	Dr. Venkatasamy
2.	12/07/2019	Epidemiology	4: 30 pm to 6: 30 pm	2 hours	Dr. Venkatasamy
3.	19/07/2019	Symptomatology	5 pm to 7 pm	2 hours	Dr. Muthukumarasamy
4.	02/08/2019	WHOM TO SCREEN?	5 pm to 7 pm	2 hours	Dr. Venkatasamy
5.	09/08/2019	Etiopathogenesis	5 pm to 7 pm	2 hours	Dr. Muthukumarasamy
6.	16/08/2019	Modifiable and	4: 30	2 hours	Dr.

		non- modifiable risk factors	pm to 6: 30 pm		Muthukumarasamy
7.	23/08/2019	Can certain diets predispose to developing DM?	5 pm to 7 pm	2 hours	Dr. Muthukumarasamy
8.	06/09/2019	Can natural foods, alternate medicine cure DM?	5 pm to 7 pm	2 hours	Dr. Venkatasamy
9.	13/09/2019	Rice based diet – and its implications	4 pm to 6 pm	2 hours	Dr. Muthukumarasamy
10.	20/09/2019	Medical nutrition therapy	4 pm to 6 pm	2 hours	Dr. Venkatasamy
11.	04/10/2019	Daily meal plan, diary and calender	4 pm to 6 pm	2 hours	Dr. Muthukumarasamy
12.	18/10/2019	Calorie distribution of foods	4 pm to 6 pm	2 hours	Dr. Venkatasamy
13.	25/10/2019	What fats should we forsake?	4 pm to 6 pm	2 hours	Dr. Muthukumarasamy
14.	01/11/2019	Proteins and Diabetes	4 pm to 6 pm	2 hours	Dr. Venkatasamy
15.	08/11/2019	Diet and slowing of disease progression	4 pm to 6 pm	2 hours	Dr. Venkatasamy
			Total Hours	30	Dr. Muthukumarasamy

REFERENCE BOOKS:

1. **HARRISON'S PRINCIPLES OF INTERNAL MEDICINE; 18th EDITION**
2. **WILLIAM'S TEXTBOOK OF ENDOCRINOLOGY**

VALUE ADDED COURSE

1. Name of the programme and code

   Diabetes and dietary practices; IM11

2. Duration & period

   30 hrs; between July 2019 – November 2019

3. Information Brochure and course content of value-added courses

   Enclosed as Annexure – I

4. List of students enrolled

   Enclosed as Annexure – II

5. Assessment procedures:

   Short notes – Enclosed as Annexure – III

6. Certificate model

   Enclosed as Annexure – IV

7. No. of times offered during the same year

   1; July 2019 – November 2019

8. Year of discontinuation

   2020

9. Summary report of each program year wise:

VALUE ADDED COURSE: July 2019 – November 2019					
Sl. No.	Course code	Course name	Resource persons	Target Students	Strength and year
1	IM11	Diabetics and dietary practices	Dr. Venkatasamy	2nd year MBBS	25 (July 2019 – November 2019)

10. Course feedback

    Enclosed as Annexure - V

RESOURCE PERSON- Dr.Venkatasamy

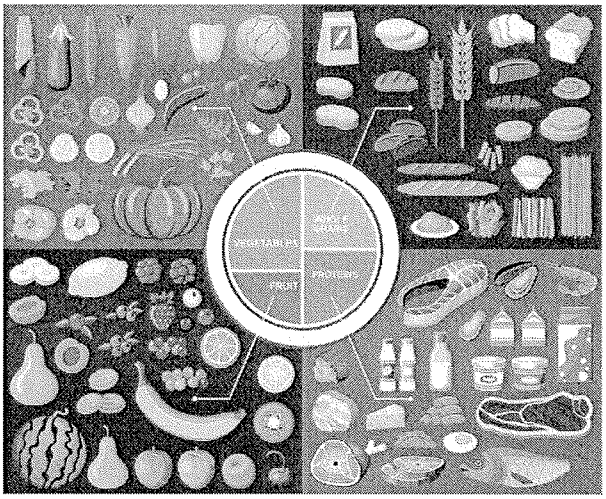
COORDINATOR – Dr. C. Aravind

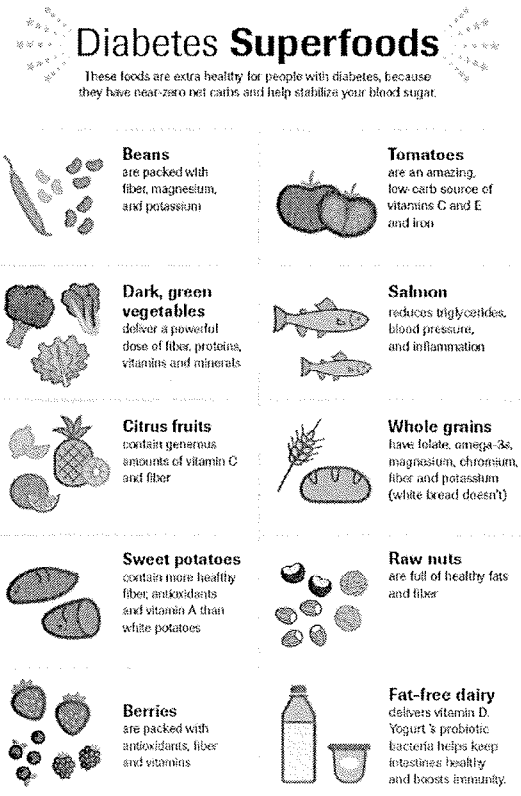
Professor & HOD, General Medicine
Sri Lakshmi Narayana Institute of Medical Sciences
Puducherry-605 502.

ANNEXURE - I

PARTICIPANT HANDBOOK

DIABETES AND DIETARY PRACTICES





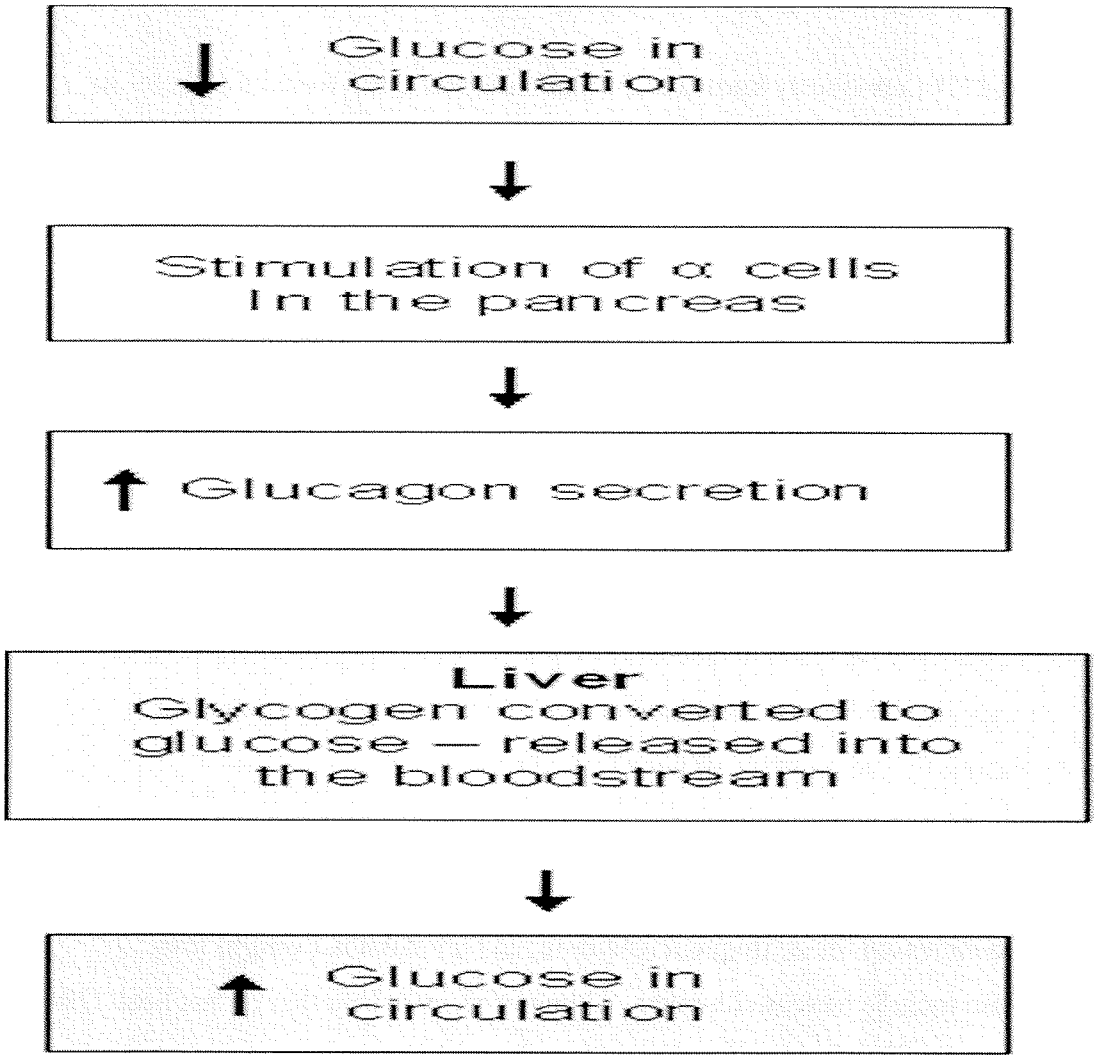
COURSE DETAILS

PARTICULARS	DESCRIPTION
Course title	DIABETES AND DIETARY PRACTICES
Course code	IM11
Objective	1. What is diabetes? 2. Epidemiology 3. Symptomatology 4. WHOM TO SCREEN? 5. Etiopathogenesis 6. Modifiable and non- modifiable risk factors 7. Can certain diets predispose to developing DM? 8. Can natural foods, alternate medicine cure DM? 9. Rice based diet – and its implications 10. Medical nutrition therapy 11. Daily meal plan, diary and calender 12. Calorie distribution of foods 13. What fats should we forsake? 14. Proteins and Diabetes 15. Diet and slowing of disease progression
Key competencies	On successful completion of the course, the students will have a better knowledge about the preferred diet in the primary and secondary prevention of diabetes
Target students	2nd year MBBS
Duration	30 hours; between July 2019 and November 2019
Assessment procedure	Short notes

DIABETES & DIETARY PRACTICES

GLUCOSE METABOLISM

Body cells require glucose (sugar) as a fuel for producing energy. After digestion, food changes to glucose. Glucose through blood reaches to cells. Insulin, a hormone, is a key which makes the body cells door to allow glucose to enter. In absence of enough insulin, glucose level in blood increases.



DIABETES MELLITUS

Diabetes mellitus (**DM**), commonly known as **diabetes**, is a group of metabolic disorders characterized by a high blood sugar level over a prolonged period of time. Symptoms often include frequent urination, increased thirst, and increased appetite. If left untreated, diabetes can cause many complications. Acute complications can include diabetic ketoacidosis, hyperosmolar hyperglycemic state, or death. Serious long-term complications include cardiovascular disease, stroke, chronic kidney disease, foot ulcers, damage to the nerves, damage to the eyes and cognitive impairment.

Diabetes is due to either the pancreas not producing enough insulin, or the cells of the body not responding properly to the insulin produced. There are three main types of diabetes mellitus

Type 1 diabetes (**T1D**), previously known as **juvenile diabetes**, is a form of diabetes in which very little or no insulin is produced by the islets of Langerhans in the pancreas. Insulin is a hormone required for the body to use blood sugar. Before treatment this results in high blood sugar levels in the body. The classic symptoms are frequent urination, increased thirst, increased hunger, and weight loss. Additional symptoms may include blurry vision, tiredness, and poor wound healing. Symptoms typically develop over a short period of time, often a matter of weeks.

The cause of type 1 diabetes is unknown, but it is believed to involve a combination of genetic and environmental factors. Risk factors include having a family member with the condition. The underlying mechanism involves an autoimmune destruction of the insulin producing beta cells in the pancreas. Diabetes is diagnosed by testing the level of sugar or glycated hemoglobin (HbA1C) in the blood. Type 1 diabetes can be distinguished from type 2 by testing for the presence of autoantibodies.

Type 2 diabetes (**T2D**), formerly known as **adult-onset diabetes**, is a form of diabetes that is characterized by high blood sugar, insulin resistance, and relative lack of insulin. Common symptoms include increased thirst, frequent urination, and unexplained weight loss. Symptoms may also include increased hunger, feeling tired, and sores that do not heal. Often symptoms come on slowly. Long-term complications from high blood sugar include heart disease, strokes, diabetic retinopathy which can result in blindness, kidney failure, and poor blood flow in the limbs which may lead to amputations. The sudden onset of hyperosmolar hyperglycemic state may occur; however, ketoacidosis is uncommon.

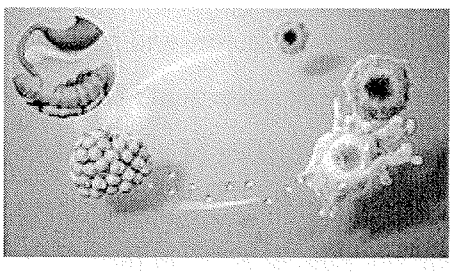
Type 2 diabetes primarily occurs as a result of obesity and lack of exercise.

ETIOLOGY

TYPE 1 DIABETES

Type 1 diabetes is characterized by loss of the insulin-producing beta cells of the pancreatic islets, leading to insulin deficiency. This type can be further classified as immune-mediated or idiopathic. The majority of type 1 diabetes is of the immune-mediated nature, in which a T cell-mediated autoimmune attack leads to the loss of beta cells and thus insulin. It causes approximately 10% of diabetes mellitus cases in North America and Europe. Most affected people are otherwise healthy and of a healthy weight when onset occurs. Sensitivity and responsiveness to insulin are usually normal, especially in the early stages. Although it has been called "juvenile diabetes" due to the frequent onset in children, the majority of individuals living with type 1 diabetes are now adults.

"Brittle" diabetes, also known as unstable diabetes or labile diabetes, is a term that was traditionally used to describe the dramatic and recurrent swings in glucose levels, often occurring for no apparent reason in insulin-dependent diabetes. This term, however, has no biologic basis and should not be used. Still, type 1 diabetes can be accompanied by irregular and unpredictable high blood sugar levels, and the potential for diabetic ketoacidosis or serious low blood sugar levels. Other complications include an impaired counterregulatory response to low blood sugar, infection, gastroparesis (which leads to erratic absorption of dietary carbohydrates), and endocrinopathies (e.g., Addison's disease). These phenomena are believed to occur no more frequently than in 1% to 2% of persons with type 1 diabetes.



Type 1 diabetes is partly inherited, with multiple genes, including certain HLA genotypes, known to influence the risk of diabetes. In genetically susceptible people, the onset of diabetes can be triggered by one or more environmental factors, such as a viral infection or diet. Several viruses have been implicated, but to date there is no stringent evidence to support this hypothesis in humans. Among dietary factors, data suggest that gliadin (a protein present in gluten) may play a role in the development of type 1 diabetes, but the mechanism is not fully understood.

Type 1 diabetes can occur at any age, and a significant proportion is diagnosed during adulthood. Latent autoimmune diabetes of adults (LADA) is the diagnostic term applied when type 1 diabetes develops in adults; it has a slower onset than the same condition in children. Given this difference, some use the unofficial term "type 1.5 diabetes" for this condition. Adults with LADA are frequently initially misdiagnosed as having type 2 diabetes, based on age rather than cause.

TYPE 2 DIABETES

Type 2 diabetes is characterized by insulin resistance, which may be combined with relatively reduced insulin secretion. The defective responsiveness of body tissues to insulin is believed to involve the insulin receptor. However, the specific defects are not known. Diabetes mellitus cases due to a known defect are classified separately. Type 2 diabetes is the most common type of diabetes mellitus. Many people with type 2 diabetes have evidence of prediabetes (impaired fasting glucose and/or impaired glucose tolerance) before meeting the criteria for type 2 diabetes. The progression of prediabetes to overt type 2 diabetes can be slowed or reversed by lifestyle changes or medications that improve insulin sensitivity or reduce the liver's glucose production.

Type 2 diabetes is primarily due to lifestyle factors and genetics. A number of lifestyle factors are known to be important to the development of type 2 diabetes, including obesity (defined by a body mass index of greater than 30), lack of physical activity, poor diet, stress, and urbanization. Excess body fat is associated with 30% of cases in people of Chinese and Japanese descent, 60–80% of cases in those of European and African descent, and 100% of Pima Indians and Pacific Islanders. Even those who are not obese may have a high waist–hip ratio.

Dietary factors such as sugar-sweetened drinks are associated with an increased risk. The type of fats in the diet is also important, with saturated fat and trans fats increasing the risk and polyunsaturated and monounsaturated fat decreasing the risk. Eating white rice excessively may increase the risk of diabetes, especially in Chinese and Japanese people. Lack of physical activity may increase the risk of diabetes in some people.

DO DIETARY HABITS PREDISPOSE TO DIABETES??

The role of diet in the etiology of T2DM was proposed by Indians as mentioned earlier, who observed that the disease was almost confined to rich people who consumed oil, flour, and sugar in excessive amounts. During the First and Second World Wars, declines in the diabetes mortality rates were documented due to food shortage and famines in the involved countries such as Germany and other European countries. In Berlin, diabetes mortality rate declined from 23.1/100,000 in 1914 to 10.9 in 1919. In contrast, there was no change in diabetes mortality rate in other countries with no shortage of food at the same time period such as Japan and North American countries. Whereas few studies have found strong association of T2DM with high intake of carbohydrates and fats. Many studies have reported a positive association between high intake of sugars and development of T2DM. In a study, Ludwig investigated more than 500 ethnically diverse schoolchildren for 19 months. It was found that for each additional serving of carbonated drinks consumed, frequency of obesity increased, after adjusting for different parameters such as dietary, demographic, anthropometric, and lifestyle.

A study was conducted which included the diabetic patients with differing degrees of glycemic control. There were no differences in the mean daily plasma glucose levels or diurnal glucose profiles. As with carbohydrates, the association between dietary fats and T2DM was also inconsistent.34 Many of prospective studies have found relations between fat intake and subsequent risk of developing T2DM. In a diabetes study, conducted at San Louis Valley, a more than thousand subjects without a prior diagnosis of diabetes were prospectively investigated for 4 years. In that study, the researchers found an association between fat intake, T2DM and impaired glucose tolerance Another study observed the relationship of the various diet components among two groups of women, including fat, fiber plus sucrose, and the risk of T2DM. After adjustment, no associations were found between intakes of fat, sucrose, carbohydrate or fiber and risk of diabetes in both groups.

Recently, evidence suggested a link between the intake of soft drinks with obesity and diabetes, resulting from large amounts of high fructose corn syrup used in the manufacturing of soft drinks, which raises blood glucose levels and BMI to the dangerous levels. It was also stated by Assy that diet soft drinks contain glycated chemicals that markedly augment insulin resistance. Food intake has been strongly linked with obesity, not only related to the volume of food but also in terms of the composition and quality of diet. High intake of red meat, sweets and fried foods, contribute to the increased the risk of insulin resistance and T2DM. In contrast, an inverse correlation was observed between intake of vegetables and T2DM. Consumption of fruits and vegetables may protect the development of T2DM, as they are rich in nutrients, fiber and antioxidants which are considered as protective barrier against the diseases. Recently, in Japanese women, a report revealed that elevated intake of white rice was associated with an increased risk of T2DM. This demands an urgent need for changing lifestyle among general population and further increase the awareness of healthy diet patterns in all groups.

DIAGNOSIS OF DIABETES

Diabetes mellitus is characterized by recurrent or persistent high blood sugar, and is diagnosed by demonstrating any one of the following:

- Fasting plasma glucose level $\geq$ 7.0 mmol/L (126 mg/dL)
- Plasma glucose $\geq$ 11.1 mmol/L (200 mg/dL) two hours after a 75 gram oral glucose load as in a glucose tolerance test (OGTT)
- Symptoms of high blood sugar and casual plasma glucose $\geq$ 11.1 mmol/L (200 mg/dL)
- Glycated hemoglobin (HbA_{1C}) $\geq$ 48 mmol/mol ($\geq$ 6.5 DCCT %).

A positive result, in the absence of unequivocal high blood sugar, should be confirmed by a repeat of any of the above methods on a different day. It is preferable to measure a fasting glucose level because of the ease of measurement and the considerable time commitment of formal glucose tolerance testing, which takes two hours to complete and offers no prognostic advantage over the fasting test. According to the current definition, two fasting glucose measurements above 7.0 mmol/L (126 mg/dL) is considered diagnostic for diabetes mellitus.

Per the WHO, people with fasting glucose levels from 6.1 to 6.9 mmol/L (110 to 125 mg/dL) are considered to have impaired fasting glucose. People with plasma glucose at or above

7.8 mmol/L (140 mg/dL), but not over 11.1 mmol/L (200 mg/dL), two hours after a 75 gram oral glucose load are considered to have impaired glucose tolerance. Of these two prediabetic states, the latter in particular is a major risk factor for progression to full-blown diabetes mellitus, as well as cardiovascular disease. The American Diabetes Association (ADA) since 2003 uses a slightly different range for impaired fasting glucose of 5.6 to 6.9 mmol/L (100 to 125 mg/dL).

TREATMENT PLAN: MNT

Diabetes management concentrates on keeping blood sugar levels as close to normal, without causing low blood sugar. This can usually be accomplished with dietary changes, exercise, weight loss, and use of appropriate medications (insulin, oral medications).

Learning about the disease and actively participating in the treatment is important, since complications are far less common and less severe in people who have well-managed blood sugar levels. Per the American College of Physicians, the goal of treatment is an HbA_{1C} level of 7-8%. Attention is also paid to other health problems that may accelerate the negative effects of diabetes. These include smoking, high blood pressure, metabolic syndrome obesity, and lack of regular exercise. Specialized footwear is widely used to reduce the risk of ulcers in at-risk diabetic feet although evidence for the efficacy of this remains equivocal.

Lifestyle

People with diabetes can benefit from education about the disease and treatment, dietary changes, and exercise, with the goal of keeping both short-term and long-term blood glucose levels within acceptable bounds. In addition, given the associated higher risks of cardiovascular disease, lifestyle modifications are recommended to control blood pressure.

Weight loss can prevent progression from prediabetes to diabetes type 2, decrease the risk of cardiovascular disease, or result in a partial remission in people with diabetes. No single dietary pattern is best for all people with diabetes. Healthy dietary patterns, such as the Mediterranean diet, low-carbohydrate diet, or DASH diet, are often recommended, although evidence does not support one over the others. According to the ADA, "reducing overall carbohydrate intake for individuals with diabetes has demonstrated the most evidence for improving glycemia", and for individuals with type 2 diabetes who cannot meet the glycemic targets or where reducing anti-glycemic medications is a priority, low or very-low

carbohydrate diets are a viable approach. For overweight people with type 2 diabetes, any diet that achieves weight loss is effective. Implementing a plant-based diet may help manage or prevent type-2 diabetes by lowering glycated hemoglobin levels. In addition, improvement in health may reduce the need for or number of medications needed by people who adopt a plant-based diet.

Medications

Glucose control

Most medications used to treat diabetes act by lowering blood sugar levels through different mechanisms. There is broad consensus that when people with diabetes maintain tight glucose control – keeping the glucose levels in their blood within normal ranges – they experience fewer complications, such as kidney problems or eye problems There is however debate as to whether this is appropriate and cost effective for people later in life in whom the risk of hypoglycemia may be more significant.

There are a number of different classes of anti-diabetic medications. Type 1 diabetes requires treatment with insulin, ideally using a "basal bolus" regimen that most closely matches normal insulin release: long-acting insulin for the basal rate and short-acting insulin with meals. Type 2 diabetes is generally taken with medication that is taken by mouth (e.g. metformin) although some eventually require injectable treatment with insulin or GLP-1 agonists.

Metformin is generally recommended as a first-line treatment for type 2 diabetes, as there is good evidence that it decreases mortality. It works by decreasing the liver's production of glucose. Several other groups of drugs, mostly given by mouth, may also decrease blood sugar in type 2 diabetes. These include agents that increase insulin release (sulfonylureas), agents that decrease absorption of sugar from the intestines (acarbose), agents that inhibit the enzyme dipeptidyl peptidase-4 (DPP-4) that inactivates incretins such as GLP-1 and GIP (sitagliptin), agents that make the body more sensitive to insulin (thiazolidinedione) and agents that increase the excretion of glucose in the urine (SGLT2 inhibitors). When insulin is used in type 2 diabetes, a long-acting formulation is usually added initially, while continuing oral medications.[8] Doses of insulin are then increased until glucose targets are reached.[8][107]

Blood pressure lowering

Cardiovascular disease is a serious complication associated with diabetes, and many international guidelines recommend blood pressure treatment targets that are lower than

140/90 mmHg for people with diabetes. However, there is only limited evidence regarding what the lower targets should be. A 2016 systematic review found potential harm to treating to targets lower than 140 mmHg, and a subsequent systematic review in 2019 found no evidence of additional benefit from blood pressure lowering to between 130 - 140mmHg, although there was an increased risk of adverse events.

2015 American Diabetes Association recommendations are that people with diabetes and albuminuria should receive an inhibitor of the renin-angiotensin system to reduce the risks of progression to end-stage renal disease, cardiovascular events, and death. There is some evidence that angiotensin converting enzyme inhibitors (ACEIs) are superior to other inhibitors of the renin-angiotensin system such as angiotensin receptor blockers (ARBs), or aliskiren in preventing cardiovascular disease. Although a more recent review found similar effects of ACEIs and ARBs on major cardiovascular and renal outcomes. There is no evidence that combining ACEIs and ARBs provides additional benefits.

Aspirin

The use of aspirin to prevent cardiovascular disease in diabetes is controversial. Aspirin is recommended by some in people at high risk of cardiovascular disease, however routine use of aspirin has not been found to improve outcomes in uncomplicated diabetes. 2015 American Diabetes Association recommendations for aspirin use (based on expert consensus or clinical experience) are that low-dose aspirin use is reasonable in adults with diabetes who are at intermediate risk of cardiovascular disease (10-year cardiovascular disease risk, 5–10%). National guidelines for England and Wales by the National Institute for Health and Care Excellence (NICE) recommend against the use of aspirin in people with type 1 or type 2 diabetes who do not have confirmed cardiovascular disease.

Surgery

Weight loss surgery in those with obesity and type 2 diabetes is often an effective measure. Many are able to maintain normal blood sugar levels with little or no medications following surgery and long-term mortality is decreased. There is, however, a short-term mortality risk of less than 1% from the surgery. The body mass index cutoffs for when surgery is appropriate are not yet clear. It is recommended that this option be considered in those who are unable to get both their weight and blood sugar under control.

A pancreas transplant is occasionally considered for people with type 1 diabetes who have severe complications of their disease, including end stage kidney disease requiring kidney transplantation.

Support

In countries using a general practitioner system, such as the United Kingdom, care may take place mainly outside hospitals, with hospital-based specialist care used only in case of complications, difficult blood sugar control, or research projects. In other circumstances, general practitioners and specialists share care in a team approach. Home telehealth support can be an effective management technique

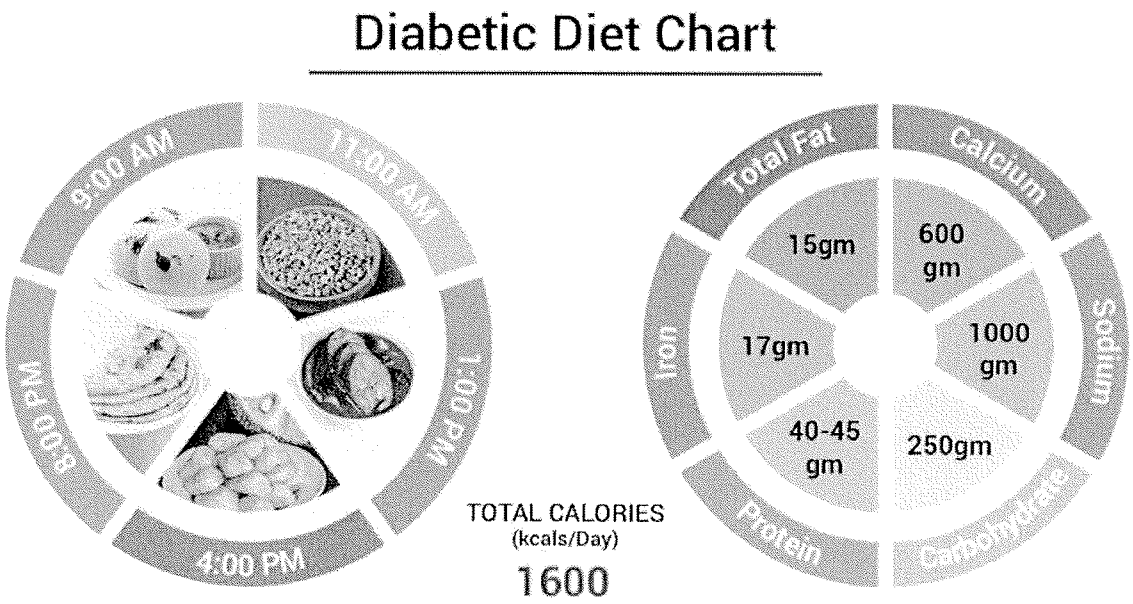
DIETARY APPROACHES TO A PATIENT WITH DIABTES

Diabetic's dietary practices are mainly influenced by cultural backgrounds. Concerning each of the dimensions of dietary practices, there were significant positive relationships between knowledge regarding diabetic diet and dietary practices. Knowledge was a salient factor related to dietary behaviors control. Moreover, patients' knowledge on a recommended diet indicates their understanding of dietary guidelines which influenced their food selection and eating patterns.

The association between dietary knowledge and dietary practices among T2DM patients in the previous studies were inconsistent. Another study revealed that there was no relationship between dietary knowledge and compliance of dietary practices.58 On the other hand, the same study found that a high dietary knowledge score was associated with following dietary recommendations and knowledgeable patients performed self-management activities in a better way. Dietary knowledge significantly influences dietary practices. In Indonesia, a study was conducted to measure dietary practices among diabetic patients, which elaborated that the Indonesian people, preferred to consume high-fat foods which lead to an increased risk of CVD.59 The trend of skipping breakfast has dramatically increased over the past 10 years in children, adolescents, and adults. There is increasing evidence that skipping breakfast is related with overweight and other health issues.

In addition, frequent eating or snacking may also increase the body weight and risk of metabolic diseases. Rimm demarcated western and prudent dietary patterns. The prudent

dietary pattern was characterized by increased consumption of fish, poultry, various vegetables and fruits whereas; the western dietary pattern was characterized by an increased consumption of processed and red meat, chips, dairy products, refined grains, and sweets and desserts. These patterns were previously associated with T2DM risk. The glycemic index is an indicator of the postprandial blood glucose response to food per gram of carbohydrate compared with a reference food such as white bread or glucose. Hence, the glycemic load represents both the quality and quantity of the carbohydrates consumed. Another study conducted in Lebanon demonstrated direct correlation of the refined grains and desserts and fast food patterns with T2DM, however, in the same study an inverse correlation was observed between the traditional food pattern and T2DM among Lebanese adults.



Annexure – II

LIST OF STUDENTS ENROLLED WITH SIGNATURES

Bharath Institute of Higher Education and Research

Sri Lakshmi Narayana Institute of Medical Sciences

Participant list with signatures

Value added course: **DIABETES AND DIETARY PRACTICES (dated 05/07/2019)**

Sl.No	Reg.No	Name of the candidate	Signature
1.	U17MB251	AANNIE SHERLINE RAJAM.L	
2.	U17MB252	AARTHISEKAR . D	
3.	U17MB253	AARYA R BABU	
4.	U17MB254	ABHIJITH.K	
5.	U17MB255	ABHISHEIK.J	
6.	U17MB256	ABHISHEK KUMAR VISHWAKARMA	
7.	U17MB257	ADITYA RAI	
8.	U17MB258	ADWIZA RAI	
9.	U17MB259	AFZAN.M	
10.	U17MB260	AGARWAL RIDHAM RAJESHBHAI	
11.	U17MB261	AISWARYA.S.NAIR	
12.	U17MB262	AKANKSHA CHOURASIA	
13.	U17MB263	AKASH KELOTH	
14.	U17MB264	ALLUVALA ABHILASH	
15.	U17MB265	AMIRTHA RAJENDRA SUVETHAN D	
16.	U17MB281	BHAVYA GUPTA	
17.	U17MB282	BRAHMA PRAKASH MISHRA	
18.	U17MB283	CHINMAY DODANI	
19.	U17MB284	CHRISTO VINCENT.V	
20.	U17MB285	CIBIYASHREE.G	
21.	U17MB286	DEBIA JERMIN	
22.	U17MB287	DEEPIKAA R.D	

23.	U17MB288	DHANUSS BHUVAN SRIDARAN	
24.	U17MB289	DHIREN.S	
25.	U17MB290	DHWANI SOLANKI	

Annexure - III

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

DIABETES AND DIETARY PRACTICES

SHORT NOTES

Course Code: IM11

WRITE SHORT NOTES ON THE FOLLOWING:

1. Diabetic diet
2. Medical nutrition therapy for diabetes
3. Metabolic syndrome and diabetes
4. Effect of diet on the disease progression among diabetics

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

Annexure III

DIABETES AND DIET

SHORT NOTES

Student Name:

ALLUVALA ABHILASH

Course Code: IM11

WRITE SHORT NOTES ON THE FOLLOWING:

1. Diabetic diet
2. Medical nutrition therapy for diabetes
3. Metabolic syndrome and diabetes
4. Effect of diet on the disease progression among diabetics

10

10

Needs improvement

1) Diabetic diet :- vegetables → nonstarchy includes broccoli, carrot, greens, peppers and tomatoes.

fruits - includes oranges, melon, berries, apples, ~~ban~~

protein.

dairy - non fat or low fat

2

2) medical nutrition therapy for diabetes :- ① Maintenance of as near normal BG levels as possible, by balancing food, medication and physical activity.

- Achievement of optimal serum lipid levels,
- provision of adequate calories for maintaining reasonable weight in adults, normal growth / development in children and adolescents.

3

3) Metabolic Syndrome :- visceral obesity, Low HDL-cholesterol, High triglycerides, Insulin resistance, Hypertension.

2 Diabetes : Lack of Insulin production, Insulin resistance genes and family History, DM, Age, obesity, poor diet, lack of Exercise.

4) • control Blood sugar level
• consumes dietary food,
• take tablet. metformin 500mg TDS.
• If not subsided, then insulin therapy is started, if severe

-1-

2.

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

Annexure III

DIABETES AND DIET

SHORT NOTES

Student Name:

AKASH KELOTH

Course Code: IM11

WRITE SHORT NOTES ON THE FOLLOWING:

1. Diabetic diet
2. Medical nutrition therapy for diabetes
3. Metabolic syndrome and diabetes
4. Effect of diet on the disease progression among diabetics

① Diabetic diet is a healthy diet that is normally rich in nutrients & low in fat & calories.

② MNT – Nutrition based treatment provided by a Registered dietitian nutritionist. It includes nutrition diagnosis as well as therapeutic & counselling to help manage diabetes.

③ Metabolic syndrome – cluster of condition that occurs together, increasing risk of heart disease, stroke, Type 2 diabetes. Condition – HTN, Hyperglycemia, Obesity, dyslipidemia

④ Improvement in elevated HbA1c level achieved through diet management; thus patient could be prevented from developing diabetic complication

ANNEXURE IV

Sri Lakshmi Narayana Institute of Medical Sciences

CERTIFICATE OF MERIT

This is to certify that ABHIJITH.K has actively participated in the Value Added Course on "Diabetes and Dietary Practices" conducted between July 2019-November 2019, organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. Venkatasamy
RESOURCE PERSON

Dr. C. Aravind
COORDINATOR

Dr. C. ARAVIND, MD.,
Reg. No:68432
Professor & HOD, General Medicine
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.



ANNEXURE - IV

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that AISWARYA.S.NAIR has actively participated in the Value Added Course on 'Diabetes and Dietary Practices' conducted between July 2019- November 2019, organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. Venkatasamy
RESOURCE PERSON

Dr. C. Aravind
COORDINATOR

Dr. C. ARAVIND, MD.,
Professor & HOD, General Medicine
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

ANNEXURE - V

Student Feedback Form

Course Name: **DIABETIES AND DIETARY PRACTICES**

Subject Code: **IM11**

Name of Student: Abhilash. J Roll No.: U17MB255

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear					✓
2	Course contents met with your expectations					✓
3	Lecturer sequence was well planned				✓	
4	Lectures were clear and easy to understand					✓
5	Teaching aids were effective				✓	
6	Instructors encourage interaction and were helpful				✓	
7	The level of the course					✓
8	Overall rating of the course	1	2	3	4	5

**** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory***

Suggestions if any:

Signature

Date: 08/11/19

ANNEXURE V

Student Feedback Form

Course Name: **DIABETIES AND DIETARY PRACTICES**

Subject Code: **IM11**

Name of Student: Afzan.M Roll No.: U1FMB259

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear					✓
2	Course contents met with your expectations				✓	
3	Lecturer sequence was well planned					✓
4	Lectures were clear and easy to understand					✓
5	Teaching aids were effective				✓	
6	Instructors encourage interaction and were helpful					✓
7	The level of the course				✓	
8	Overall rating of the course	1	2	3	4	5

**** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory***

Suggestions if any:

Signature

Date: 08/11/2019

Date: 11/11/2019

From
Dr. Aravind. C
Professor and Head
Department of Internal Medicine
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research
Chennai

To
The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: DIABETES AND DIETARY PRACTICES

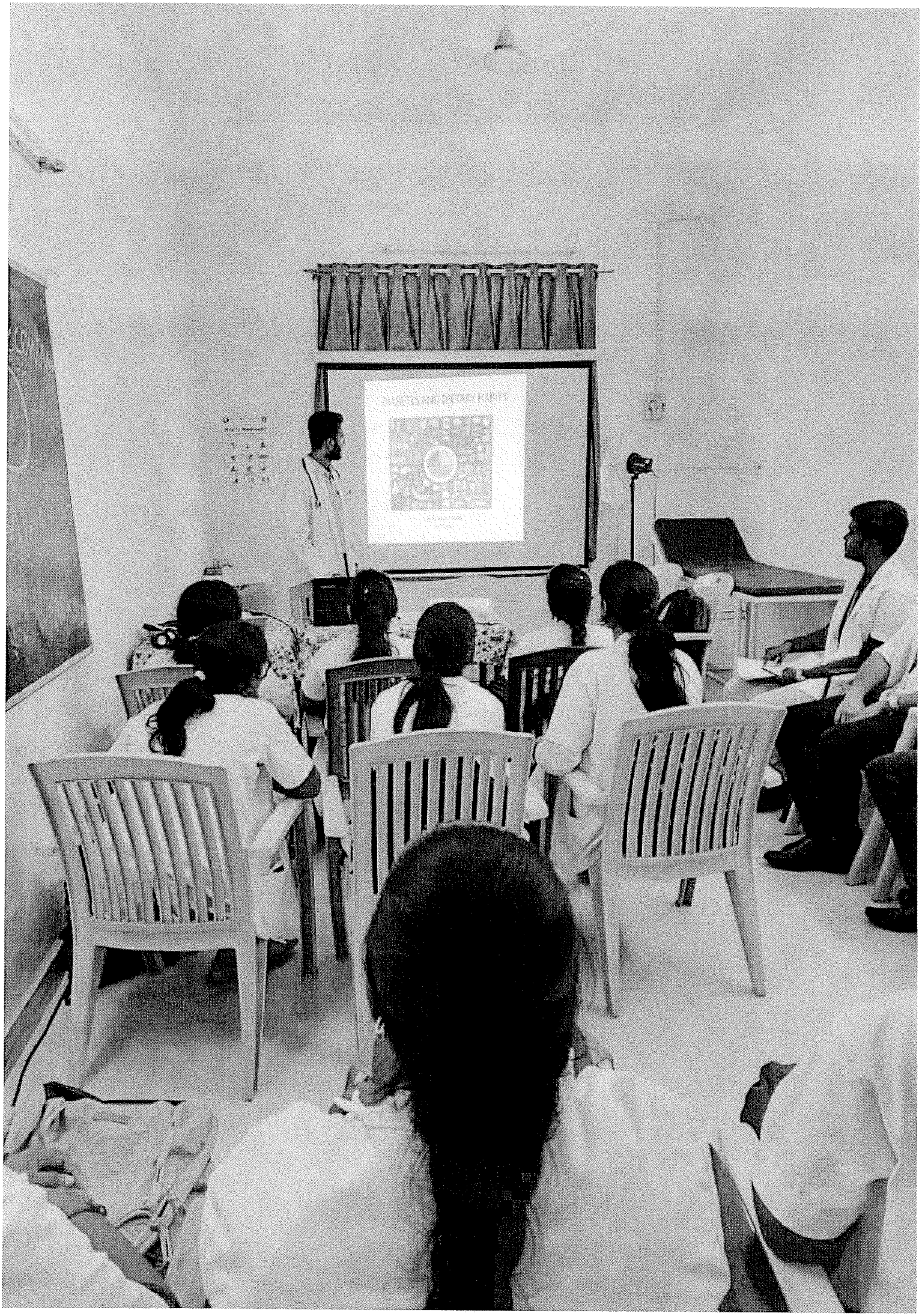
Respected Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: **"Diabetes and dietary practices"** on 08/11/2019. We solicit your kind action to send certificates for the participants. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards

Dr. Aravind, CND, MD.,
Reg.No:68432
Professor & HOD, General Medicine
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

Encl: Photographs



Sri Lakshmi Narayana Institute of Medical Sciences

Date 3/6/2019

From
Dr Asayas Bosco Chandra Kumar,
Professor and Head,
General Surgery,
Sri Lakshmi Narayana Institute Of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

To
The Dean,
Sri Lakshmi Narayana Institute Of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: RECENT ADVANCES IN RADIOTHERAPY AND CHEMOTHERAPY

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **RECENT ADVANCES IN RADIOTHERAPY AND CHEMOTHERAPY** , 30 Hours course on **JULY2019- DEC 2019**. We solicit your kind permission for the same.

Kind Regards

PROFESSOR & HOD
DEPARTMENT OF GENERAL SURGERY
Sri Lakshmi Narayana Institute of Medical Sciences
PONDICHERRY - 605 502

DR ASAYAS BOSCO CHANDRA KUMAR

HOD, GENERAL SURGERY

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: DR G. JAYALAKSHMI

The HOD: DR ASAYAS BOSCO CHANDRA KUMAR

The Expert: DR M. SENTHIL VELAN

The committee has discussed about the course and is approved.

Dr. M. SENTHILVELAN, MS.,
Reg. No: 53175
Professor General Surgery
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

Dr. G. JAYALAKSHMI, BSC., MBBS., DTCD., M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Agaram, Kudapakkam Post,
Villianur Commune, Puducherry - 605502.

PROFESSOR & HOD
DEPARTMENT OF GENERAL SURGERY
Sri Lakshmi Narayana Institute of Medical Sciences
PONDICHERRY - 605 502

Dean	Subject Expert	HOD
(Sign & Seal)	(Sign & Seal)	(Sign & Seal)

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affiliated to Bharath University, Chennai - TN]

Circular

07.06.2019

Sub: Organising Value-added Course: RECENT ADVANCES IN RADIOTHERAPY AND CHEMOTHERAPY

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research** is organizing a value added course on **"RECENT ADVANCES IN RADIOTHERAPY AND CHEMOTHERAPY "**.

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before 1ST July 2019. Applications received after the mentioned date shall not be entertained under any circumstances.

Dr. G. JAYALAKSHMI, BSC., MBBS., DTCD., M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Agaram, Kudapakkam Post,
Villianur Commune, Puducherry - 605502.

Dean

Course Proposal

Course Title: RECENT ADVANCES IN RADIOTHERAPY AND CHEMOTHERAPY

Course Objective:

1. Recent advances in radiotherapy
   a. Introduction
   b. Technological Advances in Radiotherapy:
   c .Dimensional Radiotherapy
   d. Intensity Modulated Radiotherapy
   e. Stereotactic Radiosurgery(SRS) and Radiotherapy(SRT)
   f. Stereotactic Body Radiotherapy(SBRT)
   g. Particle Beam therapy: (Electron, proton and neutron beam therapy)
   h. Advances In Radiotherapy Delivery System

2. Recent advances in Assessment of response to chemotherapy
   a. tumor response to chemotherapy
   b. molecular markers for prediction of response
   c. serum markers for monitoring response
   d. monitoring response by molecular imaging
   e .RECIST criteria

Course Outcome:

Course Audience: MBBS UNDERGRADUATES

Course Coordinator: DR ASAYAS BOSCO CHANDRA KUMAR

Course Faculties with Qualification and Designation:

1. **Dr Asayas Bosco Chandra Kumar , Prof and HOD General Surgery**
2. **Dr K Balagurunatha, Prof General Surgery**
3. **Dr M Senthil Velan , Prof General Surgery**

Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Time	Hours	Faculty
1.	20/7/2019	1.Recent advances in radiotherapy	4-6PM	2	**Dr M Senthil Velan**
2.	22/7/2019	a. Introduction	4-6PM	2	**Dr K Balagurunatha**
3.	24/7/2019	b. Technological Advances in Radiotherapy:	4-6PM	2	**Dr M Senthil Velan**
4.	25/7/2019	c. Dimensional Radiotherapy	4-6PM	2	**Dr Asayas Bosco**
5.	26/7/2019	d. Intensity Modulated Radiotherapy	4-6PM	2	**Dr M Senthil Velan**
6.	28/7/2019	e. Stereotactic Radiosurgery(SRS) and Radiotherapy(SRT)	4-6PM	2	**Dr K Balagurunatha**
7.	30/7/2019	f. Stereotactic Body Radiotherapy(SBRT)	4-6PM	2	**Dr M Senthil Velan**
8.	2/8/2019	g. Particle Beam therapy: (Electron, proton and neutron beam therapy)	4-6PM	2	**Dr Asayas Bosco**
9.	5/8/2019	h. Advances In Radiotherapy Delivery System	4-6PM	2	**Dr K Balagurunatha**
10.	8/8/2019	Recent advances in Assessment of response to chemotherapy	4-7PM	3	**Dr M Senthil Velan**
11.	11/8/2019	a. tumor response to chemotherapy	4-6PM	2	**Dr K Balagurunatha**
12.	13/8/2019	b. molecular markers for prediction of response	4-6PM	2	**Dr Asayas Bosco**
13	14/8/2019	c. serum markers for monitoring response	4-6PM	2	**Dr M Senthil Velan**
14	17/8/2019	d. monitoring response by molecular imaging	4-6PM	2	**Dr Asayas Bosco**
15	18/8/2019	e. RECIST criteria	4-5pm	1	**Dr M Senthil Velan**
			TOTAL HOURS	30	

REFERENCE BOOKS: (Minimum 2)

1. **Schwartz's Principles of Surgery, 11th Edition**
2. **Bailey And Love's Short Practice of Surgery 27th Ed**

VALUE ADDED COURSE

1. Name of the programme & Code

Recent Advances in Radiotherapy and chemotherapy & GS11

2. Duration & Period

30 hrs & JULY 2019- DEC 2019

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Multiple choice questions- *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

1 TIME JULY 2019- DEC 2019

8. Year of discontinuation: 2019

9. Summary report of each program year-wise

Value Added Course- JULY 2019- DEC 2019					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	GS11	Recent Advances in Radiotherapy and chemotherapy	Dr M SENTHIL VELAN	MBBS	20 (july 19-dec 19)

10. Course Feed Back

Enclosed as Annexure- V

Dr. M. SENTHILVELAN, MS.,
Reg. No 53175
Professor General Surgery
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

RESOURCE PERSON

DR M SENTHIL VELAN

(PROF GENERAL SURGERY)

PROFESSOR & HOD
DEPARTMENT OF GENERAL SURGERY
Sri Lakshmi Narayana Institute of Medical Sciences
PONDICHERRY - 605 502

CO-ORDINATOR

DR ASAYAS BOSCO CHANDRAKUMAR
(HOD GENERAL SURGERY)

RECENT ADVANCES IN RADIOTHERAPY AND CHEMOTHERAPY

PARTICIPANTS HAND BOOK

COURSE DETAILS

Particulars	Description
Course Title	Recent advances in radiotherapy and chemotherapy
Course Code	GS11
Objective	1. Recent advances in radiotherapy a. Introduction b. Technological Advances in Radiotherapy: c .Dimensional Radiotherapy d. Intensity Modulated Radiotherapy e. Stereotactic Radiosurgery(SRS) and Radiotherapy(SRT) f. Stereotactic Body Radiotherapy(SBRT) g. Particle Beam therapy: (Electron, proton and neutron beam therapy) h. Advances In Radiotherapy Delivery System

	2. Recent advances in Assessment of response to chemotherapy a. tumor response to chemotherapy b. molecular markers for prediction of response c. serum markers for monitoring response d. monitoring response by molecular imaging e .RECIST criteria
Further learning opportunities	-
Key Competencies	On successful completion of the course the students will have knowledge regarding recent advances about recent advances in radiotherapy and chemotherapy
Target Student	MBBS Students
Duration	30hrs JULY 2019- DEC 2019
Theory Session	10hrs
Practical Session	20hrs
Assessment Procedure	Multiple choice questions

INTRODUCTION

Radiotherapy plays an an important role in the multimodal management of cancer with approximately 50 % of all cancer patient receiving radiation therapy during their course of illness; it contributes towards 40% of curative treatment. Radiotherapy has evolved over the period of time moving from conventional 2 Dimensional technique where only rectangular or square field were used for treating cancer to conformal radiotherapy technique such as 3DCRT(3 Dimensional Radiotherapy), IMRT(Intensity Modulated Radiotherapy), IGRT(Image Guided Radiotherapy), Stereotactic Radiotherapy and Stereotactic Radiosurgery These technique allows more precision in Radiotherapy dose delivery to the tumor as well as reduces the radiation to the adjacent normal structures and critical strucures, thus reducing the acute and late radiation toxicities. The progress in Radiotherapy delivery technique continues to be boosted

by advances in imaging technique(from two Dimensional imaging to 4 Dimensional Imging allowing us real time tumor tracking), computerized treatment planning System, radiation treatment Machines as well as improved understanding of the radiobiology of radiotherapy.

Technological Advances in Radiotherapy:

3Dimensional Radiotherapy:

Three-dimensional conformal radiotherapy (3DCRT) is a complex process that begins with the creation of individualized, 3D digital data sets of patient tumors and normal adjacent anatomy. These data sets are then used to generate 3D computer images and to develop complex plans to deliver highly "conformed" (focused) radiation while sparing normal adjacent tissue. Because higher doses of radiation can be delivered to cancer cells while significantly reducing the amount of radiation received by surrounding healthy tissues, the technique should increase the rate of tumor control while decreasing side effects.

Intensity Modulated Radiotherapy

This is a technique of conformal radiotherapy optimizing the the delivery of irradiation to irregularly shaped volume whilst simultaneously avoiding critical organs. IMRT is made possible through : a) inverse Planning software and b) computer controlled intensity modulation of multiple radiation beam during radiation delivery. Thus the therapeutic ratio for tumors can be improved

Image Guided Radiotherapy(IGRT)

As the treatment margin becomes tighter, potential to miss tumor due to organ motion and patient setup variation become greater. When the critical organs are close to tumor a slight positional error may lead to inadvertent radiation to the normal organ

IGRT is a technique aimed at increasing the precision of radiotherapy by frequently imaging the target or normal tissue just before the treatment or by real time tracking during the treatment and thus enhancing the therapeutic ratio for the tumor and reducing the error arising from the internal organ motion or patient set up. Present era's linear accelerators have inbuilt KV/ MV Imaging, Cone Beam CT and US imaging system enabling the IGRT possible.

Stereotactic Radiosurgery(SRS) and **Radiotherapy(SRT)**

SRS and SRT are techniques to administer precisely directed, high dose irradiation that tightly conforms to an intracranial target to create a desired radiobiological response while minimizing radiation dose to surrounding normal tissue, thus reducing the risk of radiation toxicity

The term stereotactic refers to using precise three dimensional mapping technique to guide a procedure. Stereotactic radiosurgery (SRS) is used for stereotactically guided conformal irradiation of a defined target volume in single session. SRS can be delivered with Gamma Knife(where Gamma rays from multiple Co-60 sources are utilised for treating the tumor or functional brain disease) or X X ray knife(X rays produced in modified LINAC radiosurgery system, including Cyberknife, Novalis Tx are used for treating functional brain diseases or Brain tumors), and protons beam therapy.

Stereotactic Radiotherapy refers to stereotactically guided delivery of highly conformal radiation to adefined target volume in multiple fractionstypically using non invasive positioning technique

Stereotactic Body Radiotherapy(SBRT)

SBRT is the term applied by the American Society of Therapeutic Radiology and Oncology (ASTRO) for the management and delivery of image-guided high-dose radiation therapy with tumor-ablative intent within a course of treatment that does not exceed 5 fractions.

SBRT for early staged Lung cancer and SBRT for Hepatocellular carcinoma in surgically unfit patient has given promising result and randomized trials in surgically Fit patients are still awaited. SBRT spine has evolved as a much effective technique increasing the therapeutic ratio for tumor control and symptom relief.

Particle Beam therapy: (Electron, proton and neutron beam therapy)

Electron beam produced from linear accelerators are commonly used to treat superficial tumors as they do not penetrate deeply into the tissues. External beam radiotherapy is also carried out with heavy particles such as neutrons produced by neytrons generators or cyclotrons; protons produced from cyclotrons and synchrotrons; and heavy ions(helium, carbon, nitrogen, argon and neon) produced by synchrocyclotrons

Proton beams are newer form of particle beam irradiation used to treat deep seated cancer. It delivers very high dose to tumor and minimal dose to s normal structure in their path due to its characteristic absorption profile in tissues called Bragg's peak. Intensity modulated proton therapy(IMPT) allows modulation of the Bragg's peak of protons of different energies making it ideal for deep seated tumors at skull base, brain and spinal cord and also paediatric tumors

Advances In Radiotherapy Delivery System:

The First linear accelerator principle was invented by Rolf Wideroe in 1930 which was followed by development of first linear accelerator for therapy in 1949 by Newberry developed first linear in England. Then the first linearcompact linear accelerator was developed by Varian /Electa system in 1950s. The basic linear accelerators were of single photon energy and they had basic collimator rendering them fit for conventional radiotherapy only Linear accelerators have undergone various upgradation over the decades, resulting in present day linear accelerator with dual photon energy, multiple electron energies, enabled with multileaf collimators, KV and MV imaging and cone beam CT , exac trac, USG imaging system making IMRT , IGRT, SRS, SRT and SBRT possible.

Apart from the External beam Radiotherapy delivery system, Brachytherapy delivery system has also evolved over the period of time from manual loading to manual afterloading and then remote afterloading technique and thus reducing the radiation hazards to the radiation workers. In present era incorporation of USG, CT scan and MRI based brachytherapy treatment planning renders effective tumor control and reduces the radiation induced toxicities.

Summary

In present era, technological advances in radiotherapy conforms the radiation to the target lesion reducing the dose to the surrounding critical organs. As a dose escalation in radiotherapy becomes feasible enhancing the therapeutic ratio for the tumor. Concurrent chemordiotherapy has evolved as an alternative to surgery in many head and neck tumors, Bladder cancer, Limb salvage surgeries strengthening the principle of organ preservation.

Assessment of response to chemotherapy

History

Objective response of a tumour to cancer therapy were made in the early 1960s. In the mid- to late 1970s, the definitions of objective tumour response were widely disseminated and adopted when it became apparent that a common language would be necessary to report the results of cancer treatment in a consistent manner. The World Health Organization (WHO) published a handbook in 1979 which used common definitions and criteria of response used by various investigators1.

However because of some problems, modification of WHO criteria was made which later on led to origin of RECIST criteria.

Introduction

Tumour response is a fundamental concept in clinical oncology but perhaps the least understood. In fact, the need to classify tumours as responding or non-responding can be seen as a direct consequence of our currently limited understanding of tumour biology. In essence, tumour response simply describes the phenomenon whereby some patients benefit from a particular therapy whereas others, despite apparently identical clinical and histopathological characteristics, do not. Monitoring tumour response to therapy is therefore a crucial part of clinical oncology. The definitive proof of the effectiveness of a therapy is improvement in clinical symptoms and survivorship. Current response assessment is based primarily on changes in tumour size as measured by CT scan or other anatomic imaging modalities. Criteria for tumour response have been refined over more than 25 years but fundamental limitations remain. The aim of this article is to describe accurate methods for monitoring tumour response to therapy.

TUMOUR RESPONSE TO THERAPY

There are various methods by which tumour response can be assessed. These methods range from clinical to molecular markers for prediction of response depending upon tumour type.

Clinical examination. By Clinical examination we can find site, size and nature of lesion. These lesions will only be considered measurable when they are superficial (e.g., skin nodules and palpable lymph nodes). For the case of skin lesions, documentation by colour photograph and measurement by a ruler is recommended.

Chest x-ray. Lesions on chest x-ray are acceptable as measurable lesions when they are clearly defined and surrounded by aerated lung. However, CT scan is preferable.

CT scan and MRI. CT and MRI are the best currently available and most reproducible methods for measuring target lesions selected for response assessment. Conventional CT and MRI should be performed with contiguous cuts of 10 mm or less in slice thickness. Spiral CT should be performed by use of a 5-mm contiguous reconstruction algorithm; this specification applies to the tumours of the chest, abdomen, and pelvis, while head and neck tumours and those of the extremities usually require specific protocols.

Ultrasound

Ultrasound measures objective response evaluation..Ultrasound may be used as a possible alternative to clinical measurements for superficial palpable lymph nodes, subcutaneous lesions, and thyroid nodules. Ultrasound might also be useful to confirm the complete disappearance of superficial lesions usually assessed by clinical examination. It should not be used to measure tumour lesions that are clinically not easily accessible. Endoscopy and laparoscopy. The utilization of these techniques for objective tumour evaluation has not yet been fully or widely validated. Their uses in this specific context require sophisticated equipment and a high level of expertise that may be available only in some centres. Therefore, utilization of such techniques for objective tumour response should be restricted to validation purposes in specialized centres.

Tumour Markers

Tumour markers alone cannot be used to assess response. However, if markers are initially above the upper normal limit, they must return to normal levels for a patient to be considered in complete clinical response when all tumour lesions have disappeared.

Cytology and histology.

Cytological and histological techniques can be used to differentiate between partial response and complete response in rare cases (e.g., after treatment to differentiate between residual benign lesions and residual malignant lesions in tumour types such as germ cell tumours).

Molecular Markers for Prediction of Response

There are various molecular markers for prediction of response in various malignant disorders like HER 2 Over expression in Breast cancer, KRAS Mutation in colorectal cancer and Specific somatic mutations of the EGFR kinase domain which greatly increase the sensitivity of non–small cell lung cancer (NSCLC) cells to EGFR kinase inhibitors such as gefitinib and erlotinib. Therefore, EGFR kinase mutations may be a prognostic marker in NSCLC.

Serum Markers for Monitoring Response

In clinical practice , two approaches have been used to monitor tumour response to therapy. One is to measure markers specifically secreted by cancer cells into the blood; the other approach, which is much more common, uses changes in tumour size as a criterion for tumour response. The use of changes in serum markers as a measure of tumour response to therapy is appealing because it is non invasive, can be repeated frequently, and has a relatively low cost. Furthermore, it offers the opportunity to measure tumour response at multiple sites with a single parameter. In some of the malignant tumours, tumour markers (prostate-specific antigen in prostate cancer, CA125 in ovarian cancer, and thyroglobulin in thyroid cancer) are frequently used to monitor tumour response for patient management.

MONITORING RESPONSE BY MOLECULAR IMAGING

Because of these well-recognized limitations of current approaches for monitoring tumour response to therapy, there has been considerable interest in new functional or molecular imaging techniques. This interest has been further stimulated by a growing number of alternative treatment regimens. For many malignant diseases, several treatment regimens have become available, acting on different targets in the tumour tissue. For treatment of metastatic colon cancer, ten chemotherapy combinations are listed in the Physician Data Query database of the National Institutes of Health, which summarizes evidence-based treatment options for all malignant diseases. Among several pursued molecular imaging approaches for treatment monitoring, such as dynamic contrastenhanced MRI, diffusion-weighted MRI, MR spectroscopy, optical imaging, and contrast-enhanced ultrasound , PET

with the glucose analogue 18F-FDG are currently routinely used as molecular imaging for monitoring response in malignant tumours.

RESPONSE EVALUATION CRITERIA IN SOLID TUMORS(RECIST Criteria)

RECIST criteria explores the definitions, assumptions, and purposes of tumour response criteria. The guidelines that are offered may lead to more uniform reporting of outcomes in tumour response assessment2. The tumour response can be evaluated by following methods.

Assessment of overall tumour burden and measurable disease.

To assess objective response, it is necessary to estimate the overall tumour burden at baseline to which subsequent measurements will be compared. Only patients with measurable disease at baseline should be included in protocols where objective tumour response is the primary end point. Measurable disease is defined by the presence of at least one measurable lesion .

Baseline documentation of "target" and "non-target" lesions

All measurable lesions up to a maximum of five lesions per organ and ten lesions in total, representative of all involved organs, should be identified as target lesions and recorded and measured at baseline. Target lesions should be selected on the basis of their size (those with the longest diameter) and their suitability for accurate repeated measurements (either by imaging techniques or clinically). A sum of the longest diameter for all target lesions will be calculated and reported as the baseline sum of longest diameter.

Response Criteria

1. Evaluation of target lesions. Evaluation of target lesions can be done by defining the criteria used to determine objective tumour response for target lesion. Complete response is defined as the disappearance of all target lesions;

partial response—at least a 30% decrease in the sum of the longest diameter of target lesions, taking as reference the baseline sum of longest diameter; progressive disease—at least a 20% increase in the sum of the longest diameter of target lesions, taking as reference the smallest sum of longest diameter recorded since the treatment started or the appearance of one or more new lesions; stable disease—neither sufficient shrinkage to qualify for partial response nor sufficient increase to qualify for progressive disease, taking as reference the smallest sum of longest diameter since the treatment started.

2. Evaluation of non-target lesions. The evaluation of tumour response for non-target lesions include: complete response—the disappearance of all non target lesions and normalization of tumour marker level; incomplete response/stable disease—the persistence of one or more non-target lesion(s) and/or the maintenance of tumour marker level above the normal limits; and progressive disease—the appearance of one or more new lesions and/or unequivocal progression of existing non-target lesions.

Evaluation of best overall response. The best overall response is the best response recorded from the start of treatment until disease progression/recurrence (taking as reference for progressive disease the smallest measurements recorded since the treatment started). In general, the patient's best response assignment will depend on the achievement of both measurement and confirmation criteria.

Frequency of tumour re-evaluation. Frequency of tumour re-evaluation while on treatment should be protocol specific and adapted to the type and schedule of treatment. However, in the context of phase II studies where the beneficial effect of therapy is not known, follow-up of every other cycle (i.e., 6–8 weeks) seems a reasonable norm.

Confirmation. The main goal of confirmation of objective response is to avoid overestimating the response rate observed. This aspect of response evaluation is particularly important in nonrandomized trials where response is the primary end point. In this setting, to be assigned a status of partial response or complete response, changes in tumour measurements must be confirmed by repeat assessments that should be performed no less than 4 weeks after the criteria for response are first met. In the case of stable disease, measurements must have met

the stable disease criteria at least once after study entry at a minimum interval (in general, not less than 6–8 weeks) .

Duration of overall response. The duration of overall response is measured from the time that measurement criteria are met for complete response or partial response (whichever status is recorded first) until the first date that recurrent or progressive disease is objectively documented (taking as reference for progressive disease the smallest measurements recorded since the treatment started). The duration of overall complete response is measured from the time measurement criteria are first met for complete response until the first date that recurrent disease is objectively documented.

Duration of stable disease. Stable disease is measured from the start of the treatment until the criteria for disease progression is met (taking as reference the smallest measurements recorded since the treatment started). The clinical relevance of the duration of stable disease varies for different tumour types and grades. Therefore, it is highly recommended that the protocol should specify the minimal time interval required between two measurements for determination of stable disease. This time interval should take into account the expected clinical benefit that such a status may bring to the population under study 3.

Conclusion: This article has described a standard approach to solid tumour measurement and definitions for objective assessment of patients suffering from cancer. It is expected that these criteria will be useful in all solid tumours where objective response is the primary study endpoint, and where assessment of stable disease, tumour progression or time to progression analyses are undertaken. The article has provided definitions and criteria for assessment of tumour response. It has also provided guidelines and recommendations regarding standard reporting of the results that utilise tumour response as an endpoint.

Annexure- II

VALUE ADDED COURSE

RECENT ADVANCES IN RADIOTHERAPY AND CHEMOTHERAPY GS11

List of Students Enrolled JULY 2019- DEC 2019

MBBS Students			
Sl. No	**Name of the Student**	**Roll No**	**Signature**
1	KAJAL MISHRA	U17MB311	
2	KAVIYA E V	U17MB312	
3	KAYANAT FARHEEN	U17MB313	
4	KEVIKONO BIO	U17MB314	
5	KEVIN RAHUL S	U17MB315	
6	KURRI BHARGAV REDDY	U17MB316	
7	LALITHA PRIYA G	U17MB317	
8	MAGESHWAR G V	U17MB318	
9	MALLI SOHAN	U17MB319	
10	MANVITHA GOTTUMUKKALA	U17MB320	
11	MEDEMPUDI REETHIKA JYOTHI	U17MB321	
12	MINGAM RUMI	U17MB322	
13	MOHAMED HAARISH C	U17MB323	
14	MOHAMMED SAJITH	U17MB324	
15	MOHAN S	U17MB325	
16	MOINAK PAL	U17MB326	
17	MONISHA C	U17MB327	
18	MONISHA B	U17MB328	
19	MUKESH KANNAN K	U17MB329	
20	MUNAINA K V	U17MB330	

Kaviya EV U17MB312

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - IV

RECENT ADVANCES IN RADIOTHERAPY AND CHEMOTHERAPY

MULTIPLE CHOICE QUESTIONS

I. ANSWER ALL THE QUESTIONS **Course Code: GS11**

1. RECIST criteria

   a. response evaluation criteria in solid tumors

   b. response and cinical evaluation in tumors

   c. both a and b

   d. none

2. Complete response

   a) disappearance of all target lesions

   b) at least a 30% decrease in the sum of the longest diameter of target lesions

   c) both a and b

   d.none of the above

3. partial response

   a) disappearance of all target lesions

   b) at least a 30% decrease in the sum of the longest diameter of target lesions

   c) both a and b

   d.none of the above

4. progressive disease

   a) disappearance of all target lesions

   b) at least a 30% decrease in the sum of the longest diameter of target lesions

c. at least a 20% increase in the sum of the longest diameter of target lesions, taking as reference the smallest sum of longest diameter recorded since the treatment started

d. all of the above

5 stable disease—

a. at least a 30% decrease in the sum of the longest diameter of target lesions

b neither sufficient shrinkage to qualify for partial response nor sufficient increase to qualify for progressive disease

c. Both A & B are Correct

d. None of the above

6. . SRS can be delivered with

a.Gamma Knife

b. X ray knife

c. protons beam therapy.

d. all of the above

7. IMRT

a. Intensity modulated radiotheapy

b. intensity medited radiotheapy

c. Both A & B are Correct

d. None of the above

6/7

ASSESSOR NAME :

SIGNATURE :

DATE : 18/8/2019

Dr. M. SENTHILVELAN, MS.,
Reg. No: 53175
Professor General Surgery
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

KAJAL MISHRA
U17MB311

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - IV

RECENT ADVANCES IN RADIOTHERAPY AND CHEMOTHERAPY

MULTIPLE CHOICE QUESTIONS

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   b. response and cinical evaluation in tumors

   (c) both a and b

   d. none

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   (a) disappearance of all target lesions

   b) at least a 30% decrease in the sum of the longest diameter of target lesions

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SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

(c.) at least a 20% increase in the sum of the longest diameter of target lesions, taking as reference the smallest sum of longest diameter recorded since the treatment started

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6. . SRS can be delivered with

a.Gamma Knife

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c. protons beam therapy.

(d.) all of the above

7. IMRT

(a.) Intensity modulated radiotheapy

b. intensity medited radiotheapy

c. Both A & B are Correct

d. None of the above

ASSESSOR NAME :

SIGNATURE :

DATE : 18/8/2017

Dr. M. SENTHILVELAN, MS.,
Reg No 53175
Professor General Surgery
Sri Lakshmi Narayana Institute of Medical Science

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that MOHAN S has actively participated in the Value Added Course on RECENT ADVANCES IN RADIOTHERAPY AND CHEMOTHERAPY held during JULY 2019 – DEC 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

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Professor General Surgery
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

Dr. M Senthil Velan

Resource Person

PROFESSOR & HOD
DEPARTMENT OF GENERAL SURGERY
Sri Lakshmi Narayana Institute of Medical Sciences
PONDICHERRY - 605 502

Dr.Asayas Bosco Chandra Kumar

Coordinator

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that KAJAL MISHRA has actively participated in the Value Added Course on RECENT ADVANCES IN RADIOTHERAPY AND CHEMOTHERAPY held during JULY 2019 – DEC 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

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Dr. M Senthil Velan

RESOURCE PERSON

PROFESSOR & HOD
DEPARTMENT OF GENERAL SURGERY
Sri Lakshmi Narayana Institute of Medical Sciences
PONDICHERRY - 605 502
Dr.Asayas Bosco
Chandra Kumar

COORDINATOR

Student Feedback Form

Course Name: **RECENT ADVANCES IN RADIOTHERAPY AND CHEMOTHERAPY**

Subject Code: **GS11**

Name of Student: Monisha C Roll No.: U17MB327

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear					✓
2	Course contents met with your expectations				✓	
3	Lecturer sequence was well planned			✓		
4	Lectures were clear and easy to understand			✓		
5	Teaching aids were effective					✓
6	Instructors encourage interaction and were helpful					✓
7	The level of the course				✓	
8	Overall rating of the course	1	2	3	✓4	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

Date: 18/8/2019

Monisha
Signature

Student Feedback Form

Course Name: RECENT ADVANCES IN RADIOTHERAPY AND CHEMOTHERAPY

Subject Code: GS11

Name of Student: Kavya E V Roll No.: U17MB312

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear				✓	
2	Course contents met with your expectations					✓
3	Lecturer sequence was well planned				✓	
4	Lectures were clear and easy to understand					✓
5	Teaching aids were effective				✓	
6	Instructors encourage interaction and were helpful					✓
7	The level of the course				✓	
8	Overall rating of the course	1	2	3	4	✓5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

Date: 18/8/2019

Signature

Date 24/12/2019

From
Dr Asayas Bosco Chandra Kumar
Professor and Head,
General Surgery,
Sri Lakshmi Narayana Institute Of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To
The Dean,
Sri Lakshmi Narayana Institute Of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

.

Sub: Completion of value-added course: Recent Advances In Radiotherapy And Chemotherapy

Dear Sir,

With reference to the subject mentioned above, the department has conducted thevalue-added course titled **RECENT ADVANCES IN RADIOTHERAPY AND CHEMOTHERAPY** for 20students on JULY 2019 – DEC 2019. We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards

PROFESSOR & HOD
DEPARTMENT OF GENERAL SURGERY
Sri Lakshmi Narayana Institute of Medical Sciences
PONDICHERRY - 605 502

Dr. ASAYAS BOSCO CHANDRA KUMAR

HOD General Surgery

Encl: Certificates

Photographs


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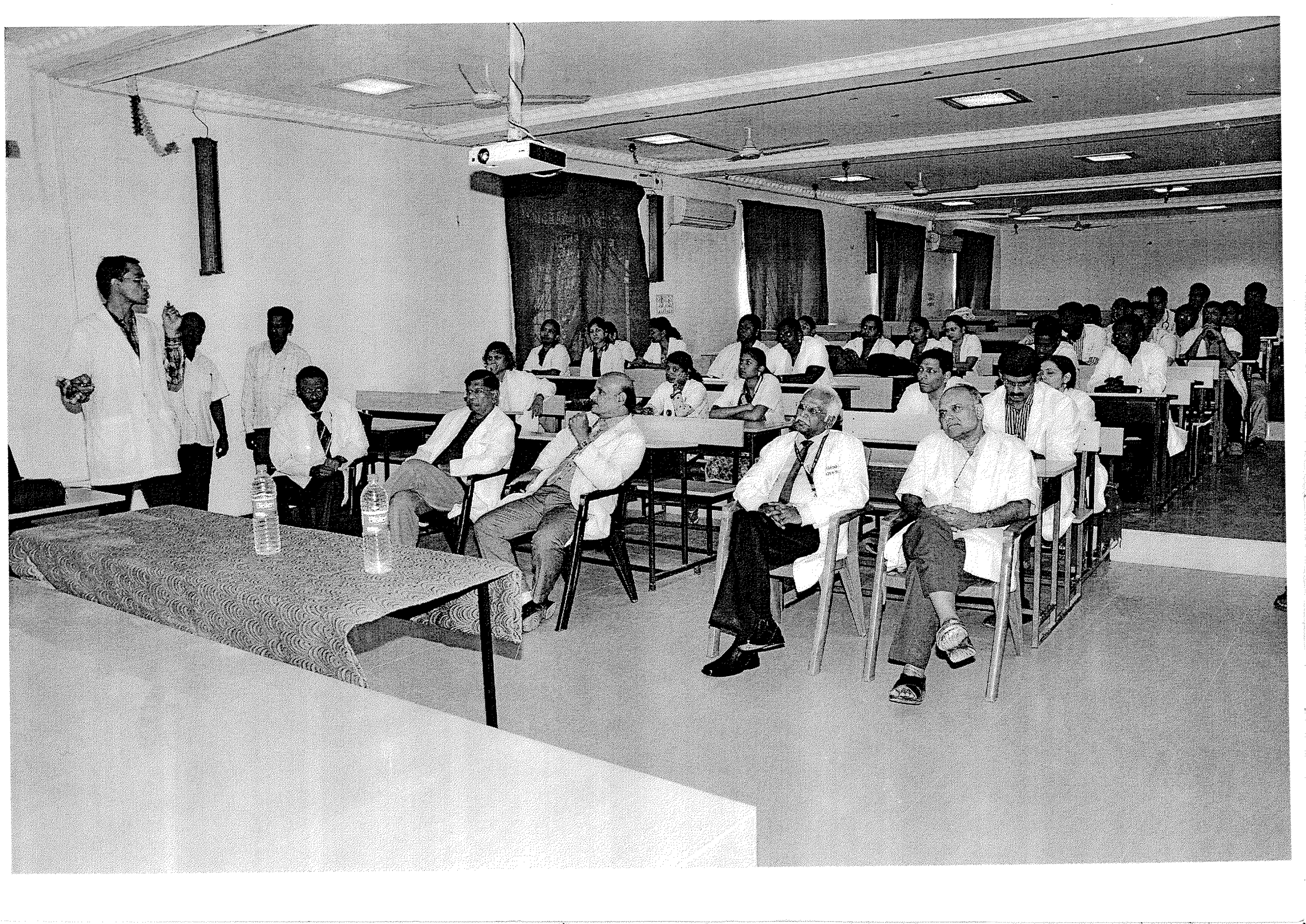

Sri Lakshmi Narayana Institute of Medical Sciences

Date: 26.02.19

From
Dr.Abarna .V
Department of Microbiology,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

To
The Dean,
Sri Lakshmi Narayana Institute of Medical College
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: Soft skill development & Human value development &Teaching and Presentation Skills

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled Soft skill development & Human value development from March to May 2019 and Teaching and presentation skills for undergraduates on July to August 2019. We solicit your kind permission for the same.

Kind Regards

Dr.Abarna.V

Department of Microbiology

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: Dr.Jayalakshmi

The HOD: Dr.Abarna.V

The Expert: Dr.Jayapradha.S

The committee has discussed about the course and is approved.

Dean	Subject Expert	HOD
(Sign & Seal)	(Sign & Seal)	(Sign & Seal)

Dr. G. JAYALAKSHMI, BSC.,MBBS.,DTCD.,M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Ageram Kudapakkam, Post,
Villianur Commune Puducherry-605 502.

DEPT OF MICROBIOLOGY
SRI LAKSHMI NARAYANA INSTITUTE OF
MEDICAL SCIENCES-PONDICHERRY 605 502

DEPT OF MICROBIOLOGY
SRI LAKSHMI NARAYANA INSTITUTE OF
MEDICAL SCIENCES-PONDICHERRY 605 502

Circular

20.06.2019

Sub: Organising Value-added Course: Certificate Course in Teaching and presentation skills reg

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research**, is organising ". The course content **"Certificate Course In Teaching and presentation skills" July 2019 to August 2019** is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before June 30th 2019. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

Dr. G. JAYALAKSHMI, BSC.,MBBS.,DTCD.,M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Ageram Kudapakkam, Post,
Villanur Commune Puducherry-605 502.

Encl: Copy of Course content

Course Proposal

Course Title: Certificate Course in Teaching and presentation skills

Course Objective:

1. Introduce the students to different fields of communication
2. To learn basic principles of presentation
3. To learn the basic skills in teaching

Course Outcome: Certificate Course In Teaching and presentation skills
Course Audience: Medical undergraduates
Course Coordinator: Dr.Abarna.V
Course Faculties with Qualification and Designation:
1. Dr.S.Jayapradha MD, Assistant professor
2.Mrs.Swathi.S Msc, Tutor

Course Curriculum/Topics with schedule (Min of 30hours)

SlNo	Date	Topic	Time	Hours	Lecture taken by
1.	3.7.2019	Teaching skills goals and objectives	4-7p.m	3	Dr.Jayapradha.S
2.	10.7.2019	Techniques in teaching	4-7p.m	3	Mrs.Swathi.S
3.	17.7.2019	Use a Variety of Teaching Methods and Strategies	4-7p.m	3	Mrs.Swathi.S
4.	24.7.2019	Creation of Effective Presentations	4-7p.m	3	Dr.Jayapradha.S
5.	31.7.2019	Use of Audiovisuals	4-7p.m	3	Mrs.Swathi.S
6.	7.8.2019	Teach Outdoors	4-7p.m	3	Dr.Jayapradha.S
7.	14.8.2019	Create Effective Presentations	4-7p.m	3	Dr.Abarna.V
8.	21.8.2019	Doing the Activity or Program	4-7p.m	3	Dr.Jayapradha.S
9.	28.8.2019	Use a Variety of Teaching Methods and Strategies	4-7pm	3	Dr.Abarna.V
10.	28.8.2019	Organisation skill- 1& Organisation skill- 2	4-7p.m	3	Mrs.Swathi.S
			Total Hours	30	

References:

1. Speak with no fear-Mike Acker
2. Persuasive presentations- Nancy Duarte

VALUE ADDED COURSE

1. Name of the programme & Code

Teaching and Presentation Skills

2. Duration & Period

34 hrs, Every , July 2019-August 2019

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Multiple choice questions- *Enclosed as Annexure- III*

6.Course Feed Back

Enclosed as Annexure- IV

7. No. of times offered during the same year:

30 hrs Every , March 2019– June 2019

8. Year of discontinuation: 2019

9. Summary report of each program year-wise

Value Added Courses (July – August 2019)					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	MIC10	**Teaching and Presentation Skills**	Dr. S.Jayapradha	**2nd yr** MBBS	20(July to August 2019)

10. Certificate model

Enclosed as Annexure- V

RESOURCE PERSON **COORDINATOR**

ANNEXURE I

TEACHING AND PRESENTATION SKILLS

PARTICIPANT HAND BOOK

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SLIMS

COURSE DETAILS

Particulars	Description
Course Title	**Certificate Course In Teaching and presentation skills**
Course Code	MIC10
Objective	1. Teaching skills goals and objectives 2. Techniques in teaching 3. Use a Variety of Teaching Methods and Strategies 4. Creation of Effective Presentations 5. Use of Audiovisuals 6. Teach Outdoors 7. Create Effective Presentations 8. Doing the Activity or Program 9. Effective questioning strategies 10. Organisation skill
Further learning opportunities	**Teaching and presentation skills**
Key Competencies	On successful completion of the course the students will have skill in handling a teaching session
Target Student	2nd yr MBBS Students
Duration	30 hrs Every July2019 – August 2019
Theory Session	15hrs
Practical Session	15hrs
Assessment Procedure	Questionnaire

Date	Time	Topic	Resource person
3.7.2019	4-7p.m	Teaching skills goals and objectives	Dr.Jayapradha.S
10.7.2019	4-7p.m	Techniques in teaching	Mrs.Swathi.S
17.7.2019	4-7p.m	Use a Variety of Teaching Methods and Strategies	Mrs.Swathi.S
24.7.2019	4-7p.m	Creation of Effective Presentations	Dr.Jayapradha.S
31.7.2019	4-7p.m	Use of Audiovisuals	Mrs.Swathi.S
7.8.2019	4-7p.m	Teach Outdoors	Dr.Jayapradha.S
14.8.2019	4-7p.m	Create Effective Presentations	Dr.Abarna.V
21.8.2019	4-7p.m	Doing the Activity or Program	Dr.Jayapradha.S
28.8.2019	4-7pm	Effective questioning strategies	Dr.Abarna.V
28.8.2019	4-7p.m	Organisation skill- 1& Organisation skill- 2	Mrs.Swathi.S

1. Teaching skills goals and objectives



Once you have a good understanding of your topic and your audience, you can begin to write your goals and objectives. This first step in planning a presentation is perhaps the *most important.* We cannot emphasize enough how important it is to have well written goals and objectives—if you do not know what you want to shoot at, you may completely miss your target.

When you begin, the first and most important question to ask is:

Why am I making this presentation?

rather than

What am I going to say?

Goals describe in broad, general terms what you hope to accomplish.

Objectives explain specifically what participants should **know**, be able **to do,** and **be like** as a result of the presentation.

For short presentations

- You need 1 major goal that summarizes your overall purpose.
- You need 2-4 specific objectives that identify what will be accomplished.

For long programs

- You need 1-2 major goals to help frame the overall program.
- You need 2-5 more specific objectives that identify what will be accomplished.
- If the program has multiple parts, it can be helpful to identify 1-3 specific objectives for each session.

Four Types of Objectives: Knowledge, Skills, Attitudes and Behavior

When planning a presentation, you need to identify what you want your audience to know (knowledge), do (skills and behavior), and be like (attitudes) as a result of your session.

- Knowledge: Refers to facts and terms, concepts, generalizations and theories. *Example Action verbs:*

2. Techniques in teaching

The **five techniques** in mind when developing or polishing your outreach skills.

Variety of Teaching Methods and Strategies

Create Effective Presentations

Use Audiovisuals

Teach Outdoors

Evaluate Yourself and Others

3. Use Of Variety of Teaching Methods and Strategies

We each learn differently based on our learning style, multiple intelligences and past knowledge and experience. We learn best when we experience a teaching approach that matches our unique learning profile. For this reason, educators need to use a variety of teaching strategies to assure that they are meeting the needs of their learners (audiences).

4. Creation of Effective Presentations

A presentation is a spoken communication made in a prepared and formal way. You can give a presentation to one person or hundreds of people or thousands. The skills required can be learned and are very much the same regardless of the size of the group. Water management professionals are often called upon to give a wide variety of presentations. You may be asked to:

- Give a progress report to your supervisor.

- Demonstrate to a group of contractors how to install a BMP.
- Speak to a civic group on how to reduce NPS pollution.
- Show your commissioners how county money is used to leverage more money.
- Pique the interest of local farmers in renting your no-till drill.
- Conduct a workshop for 40 educators.
- Persuade legislators to support an increase in cost-share monies.
- Explain a new procedure to employees.
- Teach a group of scouts how to do water quality monitoring.
- Deliver a keynote speech at an annual meeting.
- Give a dedication speech for your new outdoor education area.

With such diversity, a broad range of skills is needed. Developing great speaking abilities is not unlike learning a new sport. Every sport has basic skills that you have to master individually as well as combined together in a game. Basketball players, for example, have to learn to dribble and pass the ball, shoot foul shots and lay-ups, grab rebounds and defend the opponent. While they may excel in some skills, a certain level of expertise is needed in all areas to have an overall successful game. In addition, ballplayers need to integrate their skills with others to work as a whole, i.e., as a team.

Learning to become an effective speaker is similar. In the beginning it can be just as frustrating as learning to properly dribble or throw a basketball. However, after learning a few basic skills, and, most importantly, practicing them, things usually improve. But to really learn to present well takes constant

practice and mastery of the basic skills and the ability to weave them together as a whole, i.e., into a presentation.

5. Use Of Audiovisuals

Audiovisuals include any teaching tool used to focus attention, emphasize, clarify and reinforce key points. Visuals, in particular, are important presentation tools because humans are visual creatures – we process visual information (pictures, graphs, etc.) 60,000 times faster than text and retain it up to five times longer.

Well-planned and well-executed audiovisuals can do many things for the audience:

- Capture attention and focus attention
- Reinforce (but not repeat verbatim) the verbal message
- Clarify information
- Accelerate learning
- Increase retention

and for the presenter:

- Help organize the presentation
- Increase presenter credibility
- Help manage time and help maintain control
- Help keep presenter/audience on the same track

6. Teaching Outdoors

Water resource professionals provide outreach activities and programs for both youth and adults in outdoor settings. These include, for example, pond clinics,

field days, water festivals, teacher workshops, camp programs, land lab activities as well as Earth Day, Arbor Day and other special events. Outdoor experiences serve as a powerful vehicle for first-hand learning and a means for helping youth and adult learners make connections that are personal and relevant. Whether learning best practices for pond management and soil erosion or the effects of water quality on organisms found in a stream, learners can become more engaged and successful through the use of hands-on experiences in the outdoors.

While the principles of good education serve equally well inside and outside, several strategies for outdoor learning can make these experiences more rewarding for both the learner and the leader. The following guidelines can help you as you explore the outdoors with learners young and old.

7. Create Effective Presentations

Every presentation has three key elements that need to be in harmony for a presentation to be effective:

- The speaker (yourself)
- The listeners (your audience)
- The content (your prepared speech, your material)

If doing a presentation is your own idea, you pretty much have control over the selected topic and the audience you want to target. If you are asked to present, you need to ask as many questions as needed until you feel that you know who the audience will be (e.g., number expected, attendance is required or voluntary, their level of knowledge about the topic, what setting will they be in). Then ask what main ideas you should emphasize about the topic.

- List, Identify Select, Give example, Describe, Name, Tell, Outline, Explain, State, Summarize, Distinguish

- Skills: Refers to a wide range of cognitive (mental), physical and emotional skills including science processes, critical thinking, problem solving, decision making, communication, research, mathematical, psychomotor and interpersonal relations. *Example Action verbs:*
    - Compare, Observe, Apply, Solve, Contrast, Draw, Show, Operate, Infer, Practice, Construct, Prepare, Analyze, Illustrate, Modify, Demonstrate, Categorize, Manipulate, Predict, Model
- Attitudes: Refers to feelings, beliefs, dispositions, opinions, and values. E*xample Action verbs:*
    - Express, Clarify, Support, Interpret, Evaluate, Appraise, Conclude, Criticize, Judge, Debate, Justify, Feel
- Behavior: Refers to applying knowledge and skills, solving a problem, acting based upon a decision. *Example Action Verbs (usually reflects a specific action):*
    - Reduce, Dispose, Teach, Install, Exercise, Present

8. Preparing the Activity or Program

- If inexperienced, choose a topic or curriculum area that is your greatest strength to use as the basis for designing outdoor activities.
- Use an activity with a high percentage of success for learners. A variety of answers, diverse opinions, and different perspectives will generate a positive attitude.
- Select investigations that are short and focused when working with groups that are inexperienced in learning outdoors.

- If using an unfamiliar location, visit the area and visualize how to do the activity and where specific parts of the experience will occur.
- When possible, design the experience to include a variety of group sizes (e.g., whole group, small group, pairs, individuals).
- Use procedures and structures that learners are familiar with (e.g., recording data, grouping, using equipment, enhancing skills, reporting information).
- Enlist the help of community volunteers, parents, and teachers and/or use older students to work with younger students. In general a 1:10 adult to child ration is recommended. For water quality monitoring, or similar activities, a 1:5 ratio is recommended.
- Be familiar with the collection laws in the area. Your state's Department of Natural Resources can provide this information.
- Plan adequate time including going to and from the outdoor site (even if just outside of the meeting room or school building).
- Think through every aspect of the experience and take basic precautions to assure the safety and well being of learners. Bring a first aid kit, including a bee sting kit. Have a plan for handling emergencies (e.g., carry a cell phone, have a car available).
- Have parents sign a permission slip (see examples).
- Understand that some learners, especially youth, may not have had outdoor learning opportunities and may be uncomfortable. Some misbehavior may be due to this discomfort.
- Give learners advance notice before going outdoors so that they can dress appropriately for that day (e.g., comfortable and sturdy shoes, long pants, shirts with sleeves, rain gear, jackets, mittens, hats). Learning outdoors

throughout all seasons and weather helps deepen understanding of ecological and conservation concepts. So, rather than cancel, bring along some extra clothing for those who are unprepared.

- Discuss safety and potential hazards. Encourage the use of sunscreen, sun-safe hats, and insect repellent. Have a plan for providing plenty of water. When appropriate, wear safety goggles and/or rubber gloves, and only dispose of chemicals in plastic waste bottle (clearly labeled). Establish with the learners the objectives for learning outdoors.
- Before going outdoors, help young learners set appropriate guidelines for behavior (e.g., walk carefully, speak quietly, taste only plants offered by a leader). Behavior is a function of communication and expectation, not a function of the learning setting.
- Have young learners select a partner or small group with which they must stay.
- Have learners gather and bring all necessary equipment.
- Set physical boundaries, time limits, and a place to meet.
- Agree upon a signal to call the group back together (e.g., raising a hand, setting time limits, clapping several times, making a bird call) and, with young learners, practice it before going outside.

9. Create Effective Presentations

How to Present Your Content to Make the Most Sense

How you organize and structure your presentation greatly affects what your audience will gain. It is important to look at the following four key elements:

1. Choosing an Overall Organizational Pattern

Presenters save planning time by plugging their information and creative thoughts into an established format. Research also clearly shows that listeners remember better and more if they have a sense of the shape of the talk. The best presenters make their organization very clear. In fact, you cannot make it too obvious.

Based on your topic, audience, and goals and objectives, choose an appropriate pattern. Ask yourself what pattern will best help you get your message across.

2. Building a Strong Opening

The opening is the most important part of your presentation. It serves four key functions:

- Gain attention – Your introduction must get the audience's attention. If no one is paying attention, it doesn't matter what you say. What you want is positive attention and to hold their attention.
- Create rapport and establish your credibility – First impressions are everything and you want to make a good one.
- Sell your audience on the need to listen – The audience has that natural curiosity and interest at the beginning. Convince them that it will be worthwhile to listen to you attentively.
- Describe what you are going to say – The introduction needs to give the audience some idea of what you will present. In addition, to help them know how to process the information, you should let them know what organizational pattern you have used.

3. Building a Rich Body

Your strong opening sets the stage for the main body of your presentation and previews your organizational pattern. As this pattern unfolds, you need to

explain the key ideas that you are going to make in as much detail as necessary for your audience to understand your message. Knowing that this is where the retention curve dips, you want to try to counter this effect by using a variety of techniques. Keep in mind that these different strategies meet the needs of all the different types of learners in your audience.

4. Building a Powerful Closing

Your closing, like your opening, should be as powerful and as magical as you can make it because people remember their first impressions and last impressions most vividly—and this is your last chance to make a good impression.

Finally, introductions and conclusions put the head and tail on the body of your presentation. Without them, or with them not fully developed, you don't have a complete presentation and it will be evident to the audience. Neither takes much time, but they make all the differen

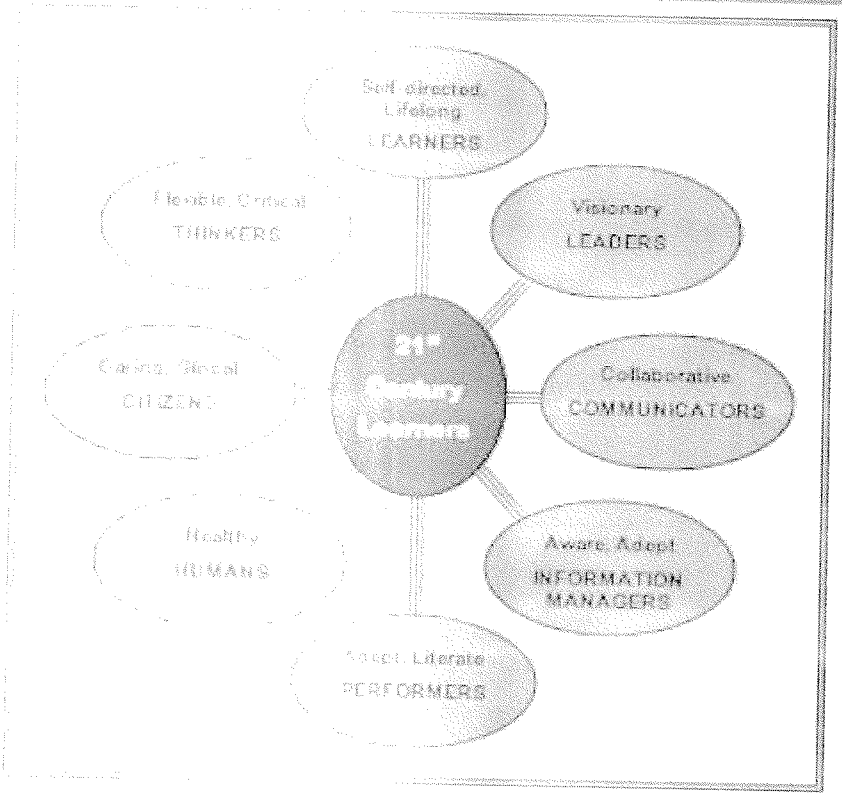
As a presenter, you can use effective questioning strategies to engage your audience, extend their understanding of your topic, and enhance your presentation by drawing on their expertise and perceptions.

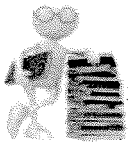
10.Organisation skill

- Ask open-ended questions
- Reword questions to eliminate yes/no responses (Is this a dragonfly? vs. What can you tell me about this insect?)
- Develop questions carefully, including "higher order" questions (What would happen if. . .? How does that compare to what we saw yesterday?)
- Ask only one question at a time

- Practice "Wait Time" by pausing 3-5 seconds after you ask a question and before you call on someone to respond
- Call on participants randomly
- Acknowledge all responses to show that each is valued
- Withhold criticism and praise of responses; acknowledge all input
- Rephrase rather than repeat questions that are not understood
- Encourage interaction by having participants answer questions in small groups
- In addition to asking good questions in an effective manner, presenters are challenged to master the techniques for eliciting and answering audience questions.

eaching skills





VALUE ADDED COURSE Annexure- II

Certificate course in Teaching and presentation skill-MIC10

July 2019 – August 2019
List of Students Enrolled

List of MBBS Students			
Sl. No	**Name of the Student**	**Roll No**	**Signature**
1	U18MB271	AYUSH JAISWAL	
2	U18MB272	BANDHAM SANKEERTHANA	
3	U18MB273	BORIS NAMBAM	
4	U18MB274	BUCHHAMMAGARI SOURABH REDDY	
5	U18MB275	CHARAN VARMA C.A	
6	U18MB276	CHARU SAI	
7	U18MB277	CHINKA SARAN SAI	
8	U18MB278	CUTPIECEWALA ALIASGAR MOHAMMED	
9	U18MB279	DATTATREYA BHATTACHARJEE	
10	U18MB280	DEBOPRIYA DEY	
11	U18MB281	DEVARAPALLI SAI TEJASWINI	
12	U18MB282	DHANUSHA S	
13	U18MB283	DHARANEESHWARAN .S	
14	U18MB284	DHISHVANTH DHEEPAK A.N	
15	U18MB285	DHYAN DAVID S.V	
16	U18MB286	DISHA SHEORAN	
17	U18MB287	DODIYA RAJANSINH KAMALSINH	
18	U18MB288	DONNIE OLIVIA H	
19	U18MB289	EASWAR B	
20	U18MB290	ELDHO BABU	

RESOURCE PERSON **COORDINATOR**

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - III

Teaching and presentation skills

Dattatreya Bhattacharja

Course Code: MIC10

I. ANSWER THE QUESTIONS:

1. What are the various methods of teaching?

- SLD
- SGD

2. How do you create an effective presentation?

- To create an effective presentation which includes teaching skills.

3. What are the use of audio visuals?

- audible
- knowledge gain

4. What are the three key elements of an effective presentation?

- To do teaching
- Perfection
- creation.

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - III

Teaching and presentation skills

Eldho Babu

Course Code: MIC10

I. ANSWER THE QUESTIONS:

1. What are the various methods of teaching?

- lecture
- SGD
- SLO.

2. How do you create an effective presentation?

- Effective presentation is based on the teaching skills.

3. What are the use of audio visuals?

- Knowledge gain.

4. What are the three key elements of an effective presentation?

- Creation
- preparation.

Annexure IV

Student Feedback Form

Course Name: **Teaching and presentation skills**
Subject Code: **MIC10**

Name of Student: Dattatreya Bhattacharjee Roll No.: U18MB279

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear			✓		
2	Course contents met with your expectations				✓	
3	Lecturer sequence was well planned				✓	
4	Lectures were clear and easy to understand			✓		
5	Teaching aids were effective				✓	
6	Instructors encourage interaction and were helpful			✓		
7	The level of the course			✓	✓	
8	Overall rating of the course	1	2	3	4	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

Date: 28/8/2019

Signature

Annexure IV

Student Feedback Form

Course Name: **Teaching and presentation skills**
Subject Code: **MIC10**

Name of Student: Eldho Babu Roll No.: U18MB290

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear				✓	
2	Course contents met with your expectations				✓	
3	Lecturer sequence was well planned			✓		
4	Lectures were clear and easy to understand			✓	✓	
5	Teaching aids were effective				✓	
6	Instructors encourage interaction and were helpful			✓	✓	
7	The level of the course			✓	✓	
8	Overall rating of the course	1	2	3	4	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

Date: 26-8-2019

Signature Eldho.

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that Dattatreya Bhattacharjee has actively participated in the Value Added Course on **Teaching And Presenation skills** held during July 2019 to August 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. S.Jayapradha
RESOURCE PERSON

Dr. Abarna.V
COORDINATOR

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that Eldho Babu has actively participated in the Value Added Course on **Teaching And Presenation skills** held during July 2019 to August 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. S.Jayapradha
RESOURCE PERSON

Dr. Abarna.V
COORDINATOR

Date : 29.08.19

From
Dr.S Jayapradha
The Department of Microbiology,
Sri Lakshmi NarayanaInstitute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To
The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course : : Certificate Course In Teaching and presentation skills

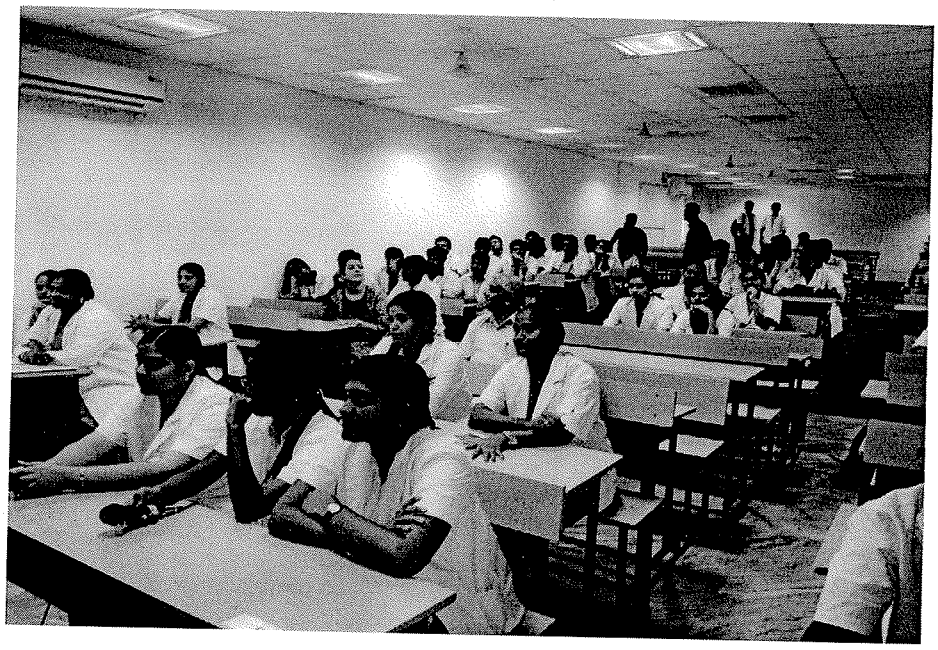
Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: **Certificate Course In Teaching and presentation skills** on July 2019 to August 2019 for 20 students. We solicit your kind action to send certificates for the participants that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards,
Dr.S.Jayapradha

Encl: Certificates

Photographs



Sri Lakshmi Narayana Institute of Medical Sciences

Date: 25.06.2019

From
Dr.Abarna.V
Department of Microbiology,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

To
The Dean,
Sri Lakshmi Narayana Institute of Medical College
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: Certificate course in Stress management among medical students & Lab automation in clinical microbiology

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled **Certificate course in Stress management among medical students** July 2019 to October 2019 **& Lab automation in clinical microbiology from** November 2019 to March 2020 for undergraduates. We solicit your kind permission for the same.

Kind Regards

Dr.Abarna.V

Department of Microbiology

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: Dr.G.Jayalakshmi

The HOD: Dr.Abarna.V

The Expert: Mrs.Swathi.S

The committee has discussed about the course and is approved.

Dean	Subject Expert	HOD
(Sign & Seal)	(Sign & Seal)	(Sign & Seal)

Dr. G. JAYALAKSHMI, BSC.,MBBS.,DTCD.,M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Ageram Kudapakkam, Post,
Villianur Commune Puducherry-605 502.

DEPT OF MICROBIOLOGY
SRI LAKSHMI NARAYANA INSTITUTE OF
MEDICAL SCIENCES-PONDICHERRY 605 502

DEPT OF MICROBIOLOGY
SRI LAKSHMI NARAYANA INSTITUTE OF
MEDICAL SCIENCES-PONDICHERRY 605 502

Circular

01.07.2019

Sub: Organising Value-added Course: Certificate course in Stress management among medical students reg

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research**, is organising". The course content **"Certificate course in Stress management among medical students"** from July2019 to October 2019 and form is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before June 30th 2019. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

Dr. G. JAYALAKSHMI, BSC.,MBBS.,DTCD.,M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Ageram Kudapakkam, Post,
Commune Puducherry-605 502.

Encl: Copy of Course content.

Course Proposal

Course Title: Certificate course in Stress management among medical students

Course Objective:

1. Introduce the students to different fields of communication
2. To learn basic principles of presentation
3. To learn the basic skills in teaching

Course Outcome: Certificate course in Stress management among medical students Course Audience: Medical undergraduates

Course Coordinator: Dr.abrana.V

Course Faculties with Qualification and Designation:

1. **Mrs.Swathi.S MSc, Tutor**
2. **Dr.Jayapradha.S MD, Assistant professor**

Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Time	Hours	Lecture taken by
1.	3.7.2019	Definition of stress	4-6p.m	2	Mrs.Swathi.S
2.	10.7.2019	Causes of Stress	4-6p.m	2	Dr.Jayapradha.S
3.	17.7.2019	Symptoms of Distress 1	4-6p.m	2	Mrs.Swathi.S
4.	24.7.2019	Role play	4-6p.m	2	Dr.Jayapradha.S
5.	31.7.2019	Behavioural changes due to stress	4-6p.m	2	Dr.Abarna.V
6.	7.8.2019	Managing Stress 1	4-6p.m	2	Dr.Jayapradha.S
7.	14.8.2019	Managing Stress 2	4-6p.m	2	Mrs.Swathi.S
8.	21.8.2019	Introduction to Stress Management	4-6p.m	2	Mrs.Swathi.S
9.	28.8.2019	Suicide	4-6p.m	2	Mrs.Swathi.S
10.	4.9.2019	Depression	4-6p.m	2	Dr.Abarna.V
11.	11.9.2019	Suicide	4-6p.m	2	Dr.Jayapradha.S
12.	18.9.2019	Yoga session	4-6p.m	2	Dr.Abarna.V
13.	25.9.2019	Group activity-1	4-6p.m	2	Mrs.Swathi.S
14.	3.10.2019	Group activity 2	4-6p.m	2	Dr.Jayapradha.S
15.	9.10.2019	Group activity3	4-6p.m	2	Mrs.Swathi.S
			Total Hours	30	

References:

1.Techniques on how to deal with stress management- Fielding Gray

2.Declutter your mind- Lizzy Francis

VALUE ADDED COURSE

1. Name of the programme & Code

Stress management among medical students MIC11

2. Duration & Period

30 hrs, July 2019 to October - 2019

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Multiple choice questions- *Enclosed as Annexure- III*

6. Course Feed Back

Enclosed as Annexure- IV

7. No. of times offered during the same year: July 2019 to Oct - 2019

8. Year of discontinuation: 2019

9. Summary report of each program year-wise

Value Added Course- July 2019 to Oct - 2019					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	MIC11	Stress management among medical students	Mrs.Swathi.S Dr.Jayapradha.S	2nd yr MBBS	July 2019 to Oct - 2019

10. Certificate model

Enclosed as Annexure- V

RESOURCE PERSON **COORDINATOR**

Stress Management among Medical Students

PARTICIPANT HAND BOOK

BIHER

SLIMS

ANNEXUREI

COURSE DETAILS

Particulars	Description
Course Title	Certificate course in Stress management among medical students
Course Code	MIC11
Objective	**1. Definition of stress** **2. Causes of Stress** **3. Symptoms of Distress** **4. Behavioural changes due to stress** **5. Managing Stress** **6. Introduction to Stress Management** **7. Depression** **8. Suicide** **9. Critical thinking** **10. Methods of avoiding stress**
Further learning opportunities	Stress management among medical students
Key Competencies	On successful completion of the course the students will have an idea of effective handling of stress
Target Student	MBBS Students
Duration	30hrs Every July 2019– Oct2019
Year of discontinuation	2019
Theory Session	30 hrs
Practical Session	30 hrs
Assessment Procedure	Questionnaire

Date	Time	Topic	Resource person
3.7.2019	4-6pm	Definition of stress	Mrs.Swathi.S
10.7.2019	4-6pm	Causes of Stress	Dr.Jayapradha.S
17.7.2019	4-6pm	Symptoms of Distress 1	Mrs.Swathi.S
24.7.2019	4-6pm	Role play	Dr.Jayapradha.S
31.7.2019	4-6pm	Behavioural changes due to stress	Dr.Jayalakshmi.G
7.8.2019	4-6pm	Managing Stress 1	Dr.Jayapradha.S
14.8.2019	4-6pm	Managing Stress 2	Mrs.Swathi.S
21.8.2019	4-6pm	Introduction to Stress Management	Mrs.Swathi.S
28.8.2019	4-6pm	Suicide	Mrs.Swathi.S
4.9.2019	4-6pm	Depression	Dr.Jayalakshmi.G
11.9.2019	4-6pm	Suicide	Dr.Jayapradha.S
18.9.2019	4-6pm	Yoga session	Dr.Jayalakshmi.G
25.9.2019	4-6pm	Group activity	Mrs.Swathi.S
3.10.2019	4-6p.m	Group activity 2	Dr.Jayapradha.S
9.10.2019	4-6p.m	Group activity3	Mrs.Swathi.S

1. Definition of stress

Stress is the way human beings react both physically and mentally to changes, events, and situations in their lives. People experience stress in different ways and for different reasons. The reaction is based on your perception of an event or situation. If you view a situation negatively, you will likely feel *distressed*—overwhelmed, oppressed, or out of control. Distress is the more familiar form of stress. The other form, *eustress*, results from a "positive" view of an event or situation, which is why it is also called "good stress."

Eustress helps you rise to a challenge and can be an antidote to boredom because it engages focused energy. That energy can easily turn to *distress*, however, if something causes you to view the situation as unmanageable or out of control. Many people regard public speaking or airplane flights as very stressful—causing physical reactions such as an increased heart rate and a loss of appetite—while others look forward to the event. It's often a question of perception: A positive stressor for one person can be a negative stressor for another.

2. Causes of Stress

The most frequent reasons for "stressing out" fall into three main categories:

1. The unsettling effects of change

2. The feeling that an outside force is challenging or threatening you

3. The feeling that you have lost personal control.

Life events such as marriage, changing jobs, divorce, or the death of a relative or friend are the most common causes of stress. Although life-threatening events are less common, they can be the most physiologically and

psychologically acute. They are usually associated with public service career fields in which people experience intense stress levels because of imminent danger and a high degree of uncertainty—police officer, fire and rescue worker, emergency relief worker, and the military. You may not plan to enter a high-stress career, but as a college student, you may find that the demands of college life can create stressful situations.

Mental Health (NIMH) notes some of the more common stressors for college students:

• Increased academic demands

• Being on your own in a new environment

• Changes in family relations

• Financial responsibilities

• Changes in your social life

• Exposure to new people, ideas, and temptations

• Awareness of your sexual identity and orientation

• Preparing for life after graduation.

3. Symptoms of Distress

Symptoms of stress fall into three general, but interrelated, categories—physical, mental,and emotional. Review this list carefully. If you find yourself frequently experiencing these symptoms, you are likely feeling distressed:

• Headaches

• Fatigue

• Gastrointestinal problems

• Hypertension (high blood pressure)

• Heart problems, such as palpitations

• Inability to focus/lack of concentration

• Sleep disturbances, whether it's sleeping too much or an inability to sleep

• Sweating palms/shaking hands

• Anxiety

• Sexual problems.

Even when you don't realize it, stress can cause or contribute to serious physical

disorders. It increases hormones such as adrenaline and corticosterone, which affect your

metabolism, immune reactions, and other stress responses. That can lead to increases in

your heart rate, respiration, blood pressure, and physical demands on your internal organs.

4. **Behavioral changes due to stress**

are also expressions of stress. They can include:

• Irritability

• Disruptive eating patterns (overeating or under eating)

• Harsh treatment of others

• Increased smoking or alcohol consumptionIsolation

• Compulsive shopping.

A sustained high level of stress is no laughing matter. It can affect every area of your life—

productivity in the workplace and classroom, increased health risks, and relationships, to name just a few.

5. Managing Stress

As noted in the Introduction, you can learn to manage stress. The first step is understanding yourself better—how you react in different situations, what causes you stress, and how you behave when you feel stressed. Once you've done that, take the following steps:

Set priorities. Use the time-management tips you learned in Section 1.Make a To-Do list. Decide what is really important to get done today, and what can wait. This helps you to know that you are working on your most immediate priorities, and you don't have the stress of trying to remember what you should be doing.

Practice facing stressful moments. Think about the event or situation you expect to

face and rehearse your reactions. Find ways to practice dealing with the challenge. If

you know that speaking in front of a group frightens you, practice doing it, perhaps

6. Introduction to Stress Management

Stress management is key to academic success.

with a trusted friend or fellow student. If the pressure of taking tests causes you to freeze up, buy some practice tests at the school bookstore or online and work with them when there are no time pressures.

Examine your expectations. Try to set realistic goals. It's good to push yourself to achieve, but make sure your expectations are realistic.Watch out for perfectionism. Be satisfied with doing the best you can.Nobody's perfect—not you, not your fellow Cadet, nobody. Allow people the liberty to make mistakes, and remember that mistakes can be a good teacher.

Live a healthy lifestyle.Get plenty of exercise. Eat healthy foods. Allow time for rest and relaxation. Find a relaxation technique that works for you—prayer, yoga,meditation, or breathing exercises. Look for the humor in life, and enjoy yourself.

*Learn to accept change as a part of life.*Nothing stays the same. Develop a support system

of friends and relatives you can talk to when needed. Believe in yourself and your potential. Remember that many people from disadvantaged backgrounds have gone on to enjoy great success in life. At the same time, avoid those activities that promise release from stress while actually adding to it. Drinking alcohol (despite what all those TV commercials imply), drinking

caffeine, smoking, using narcotics (including marijuana), and overeating all add to the

body's stress in addition to their other harmful effects.

Here are some other strategies for dealing with stress:

• Schedule time for vacation, breaks in your routine, hobbies, and fun activities.

• Try to arrange for uninterrupted time to accomplish tasks that need your

concentration.Arrange some leisure time during which you can do things that you really enjoy.

• Avoid scheduling too many appointments, meetings, and classes back-to-back.

Allow breaks to catch your breath. Take a few slow, deep breaths whenever you feel stressed. Breathe from the abdomen and, as you exhale, silently say to yourself,

"I feel calm."

• Become an expert at managing your time. Read books, view videos, and attend seminars on time management. Once you cut down on time wasters, you'll find more time to recharge yourself.

• Learn to say "no." Setting limits can minimize stress. Spend time on *your* main

responsibilities and priorities rather than allowing other people's priorities or needs

to dictate how you spend your time.

• Exercise regularly to reduce muscle tension and promote a sense of well-being.

• Tap into your support network. Family, friends, and social groups can help when

dealing with stressful events.

7. Depression

Unfortunately, a person's inability to deal with stress can often lead to clinical **depression**.

People with depression have similar symptoms to stress, except the symptoms are not

temporary—they can last for weeks at a time. Because of the sustained symptoms, the effect

on the body, mood, and behavior is often more serious than with temporary stress.

Depression can have severe effects on your eating habits, your relationships, your ability

to work and study, and how you think and feel. The illness is not unique to a particular

group of people or area of the country.Millions of adult Americans, including many college

students, suffer from clinical depression.

It's important to understand that clinical depression is a real, not an "imaginary" illness.

It's not a passing mood or a sign of personal weakness. It demands treatment—and 80

percent of those treated begin to feel better in just a few weeks.

According to NIMH, the following symptoms are signs of major depression:

• Sadness, anxiety, or "empty" feelings

• Decreased energy, fatigue, being "slowed down"

• Loss of interest or pleasure in usual activities

• Sleep disturbances (insomnia, oversleeping, or waking much earlier than usual)

• Appetite and weight changes (either loss or gain)

• Feelings of hopelessness, guilt, and worthlessness

• Thoughts of death or suicide, or suicide attempts

• Difficulty concentrating, making decisions, or remembering

• Irritability or excessive crying

• Chronic aches and pains not explained by another physical condition.

It's normal to have some signs of depression some of the time. But the NIMH says

that if someone has five or more symptoms for two weeks or longer, or suffers noticeable

changes in normal functioning, that person should go to a mental health professional

for evaluation. Depressed people often may not be thinking clearly and may therefore

not seek help on their own. They frequently require encouragement from others—they

"need help to get help."

Mental health professionals say depression among college students is a serious problem.

A recent UCLA survey of college freshmen indicates that today's students are feeling more

overwhelmed and stressed than students did 15 years ago. The National Mental Health

Association reports that more than 30 percent of college freshmen report feeling overwhelmed a great deal of the time.

If you think you might be depressed, you should talk with a qualified health-care or

mental-health professional. The resident adviser in your dorm, the student health center,

your family health-care provider, or a clergy member can help steer you to treatment

resources. Several effective treatments for depression are available, and—depending on the

severity of the symptoms—can provide relief in just a few weeks. But individuals respond

differently to treatment. If you don't start feeling better after a few weeks, talk to your

treatment provider about other treatments, or seek a second opinion.

8. Suicide

As noted above, severe depression often manifests itself in thoughts about death or suicide,

or in suicide attempts. Many people are understandably uncomfortable talking about suicide, but doing so can save lives. The NIMH reports that in 2000, suicide was the 11th leading cause of death for all Americans and the third leading cause of death for those aged 15 to 24.While women are three times as

likely to attempt suicide as men, men are four times as likely as women to succeed. There are many common myths about suicide:

• *If someone wants to die, nobody can stop that person.* False. Most people thinking about suicide don't want to die: They want help.

• *If I ask someone about suicide, I'll give that person the idea.* False. That you cared enough to ask may offer comfort to the person.

• *Suicide comes "out of the blue."* False. Usually, the person exhibits several warning signs.

You should always take suicidal thoughts, impulses, or behavior seriously. If you are thinking or talking about hurting or killing yourself, or know someone who is, *seek help immediately.* The NIMH recommends you turn to your student health center; a family physician; a professor, coach, or adviser; a member of the clergy; a local suicide or emergency hotline (one number is 1-800-SUICIDE); or a hospital emergency room. If you have to,

call 911. Some of the warning signs of suicide include:

• Talking about suicide

• Statements about hopelessness, helplessness, or worthlessness

• Preoccupation with death

• Becoming suddenly happier or calmer

• Losing interest in things one cares about

• Setting one's affairs in order for no apparent reason—such as giving away prized

possessions or making final arrangements regarding finances and property.

9. Critical Thinking

What are some of the stressors you currently face? Develop an action plan to improve your stress management skills by either eliminating a cause of stress or reducing its effects on you. Incorporate at least three techniques described in this

section of your textbook.

If you would like to do further research on stress, more information is available at these websites:

1. US Army HOOAH 4 Health:

www.hooah4health.com/mind/combatstress/default.htm

2. If you enter "stress management" into web search engines such as Google, you will

Stress can have consequences far beyond temporary feelings of pressure. While

10. Methods of avoiding stress

you can't avoid stress,

- you can learn to manage it and develop skills to cope with

the events or situations you find stressful.

- By learning to cope with stress, and by

recognizing the symptoms of depression and the warning signs of suicide,

- you'llbe better prepared to help not only yourself, but also friends, fellow students, andthe Soldiers you will someday lead.

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Annexure- II

VALUE ADDED COURSE

Stress management among medical students MIC11

List of Students Enrolled July 2019–Oct 2019

List of MBBS Student			
Sl. No	**Name of the Student**	**Roll No**	**Signature**
1	PALAYULLAVALAPPIL VARUN	U16MB347	
2	AANNIESHERLINERAJAML	U17MB251	
3	ABHISHEKKUMARVISHWAKARMA	U17MB256	
4	AKASH KELOTH	U17MB263	
5	ALLUVALA ABHILASH	U17MB264	
6	ANJU RAMESH K.V	U17MB270	
7	ANUSUYA.N	U17MB272	
8	APOORVA MALL	U17MB273	
9	ASHISH RANJAN	U17MB274	
10	ASWIN KUMAR.G	U17MB275	
11	ATHUL SUBHASH	U17MB277	
12	CHRISTO VINCENT.V	U17MB284	
13	DEBIA JERMIN	U17MB286	
14	DHANUSSBHUVANSRIDARAN	U17MB288	
15	DHIREEN.S	U17MB289	
16	DIVYA PRIYA.K	U17MB292	
17	DIVYANSHI SINGH	U17MB293	
18	ELAKIYA BALA	U17MB294	
19	HARSH BHARTI	U17MB304	
20	KAILAPRASHANTHKUMAR	U17MB310	
21	MALLISOHAN	U17MB319	
22	MOHAMMED SAJITH	U17MB324	
23	MOHAN.S	U17MB325	
24	NEHAKUMARI	U17MB334	
25	NISHANTBHUSHAN	U17MB340	

RESOURCE PERSON

COORDINATOR

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - III

Stress management among medical students

Course Code: MIC11

Learning Assessment

Elakkiya

1. Define stress and list some of the symptoms?

Stress is considered as the emotion which hinders daily activities.
Symptoms are. sweating, lack of sleep.

2. Explain what causes stress and list some of the ways to deal with it.?

Causes of stress can be physical, mental and social.
We can deal. by distracting ourself. by involving in other activities like sports, travelling etc.

3. What is the difference between stress and depression?

stress is short term.
Depression is long term accumulation of stress.

4. List some warning signs of suicide?

Signs of suicide are lack of involvement in daily activities, thinking over.

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - III

Stress management among medical students

Course Code: MIC11

Learning Assessment

Mohan.S

1. Define stress and list some of the symptoms?

System of stress are overeating, lack of sleep.

2. Explain what causes stress and list some of the ways to deal with it.?

Distraction by travelling, Sports, having pets.

3. What is the difference between stress and depression?

Stress is due to some minimal siliation but depression is due to long term accumulation of stress.

4. List some warning signs of suicide?

Signs of suicide are hallucination, repeated urge to suicide.

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that ELAKKIYA has actively participated in the Value Added Course on **Stress Management Among Medical Students** held during July 2019 – Oct 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Mrs .S. Swathi
RESOURCE PERSON

Dr. Abarna.V
COORDINATOR

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that MOHAN.S has actively participated in the Value Added Course on **Stress Management Among Medical Students** held during July 2019 – Oct 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Mrs .S. Swathi
RESOURCE PERSON

Dr. Abarna.V
COORDINATOR

Date: 10.10.19

From
Mrs.Swathi.S
The Department of Microbiology,
Sri Lakshmi NarayanaInstitute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To
The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course Certificate course in Stress management among medical students reg

Dear Sir,

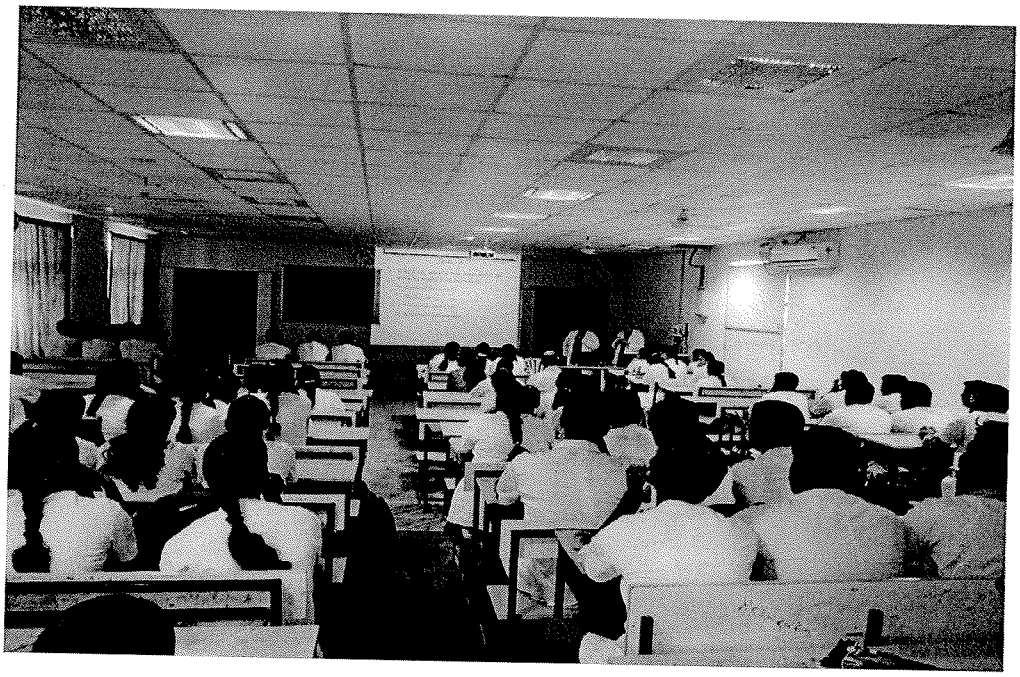
With reference to the subject mentioned above, the department has conducted the value-added course titled**: Certificate course in Stress management among medical students Course** on Oct 2019 for 20 students. We solicit your kind action to send certificates for the participants that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards,
Mrs.Swathi.S

The Department of Microbiology,

Encl: Certificates

Photographs



Sri Lakshmi Narayana Institute of Medical Sciences

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Date:02.06.2019

From

Dr. V. Raghavendran
Professor and Head,
Department of Pediatrics,
Sri Lakshmi Narayana Institute of Medical Sciences,
Bharath Institute of Higher Education and Research,
Chennai.

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To

The Dean,
Sri Lakshmi Narayana Institute of Medical College
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: Pediatric Renal Replacement Therapy

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: Pediatric Renal Replacement Therapy for final year MBBS students from July to August 2019. We solicit your kind permission for the same.

Kind Regards

Dr. V. Raghavendran

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: **Dr. Jayalakshmi**

The HOD: **Dr. V. Raghavendran**

The Expert: **Dr. Abhijeet Shrivastava**

The committee has discussed about the course and is approved.

Dr. G. JAYALAKSHMI, BSC., MBBS., DTCD., M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Agaram, Kudapakkam Post,
Villianur Commune, Puducherry - 605502.

ASSISTANT PROFESSOR
DEPARTMENT OF PAEDIATRICS
SRI LAKSHMI NARAYANA INSTITUTE OF
MEDICAL SCIENCES

PAEDIATRICS HEAD
DEPT. OF PAEDIATRICS
SRI LAKSHMI NARAYANA INSTITUTE OF
MEDICAL SCIENCES
OSUDU, PUDUCHERRY

Dean	Subject Expert	
(Sign & Seal)	(Sign & Seal)	(Sign & Seal)

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affiliated to Bharath University, Chennai - TN]

Circular

08.06.2019

Sub: Organising Value-added Course: Pediatric Renal Replacement Therapy. reg

With reference to the abovementioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research** is organizing **"Pediatric Renal Replacement Therapy"**. The course will be conducted from July to August 2019.

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before 20th June 2019. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

Dr. G. JAYALAKSHMI, BSC., MBBS., DTCD., M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Agaram, Kudapakkam Post,
Villianur Commune, Puducherry-605502.

Encl: Copy of Course content

Course Proposal

Course Title: **Pediatric Renal Replacement Therapy**

Course Objective:

1. To enhance the knowledge regarding indications of renal replacement therapy in children.
2. To enhance knowledge regarding the various modalities of RRT in children
3. To assess the impact of the course by conducting post course assessment of the target students and by getting their feedback.

Course Outcome: Improvement in knowledge about various modalities of RRT in children

Course Audience: Final year MBBS students of academic year 2019-2020

Course Coordinator: Dr. V. Raghavendran

Course Faculties with Qualification and Designation:

1. Dr. V. Raghavendran, Professor & HOD

2. Dr. Abhijeet Shrivastava, Assistant Professor

3. Dr. Satyamanasa Gayatri Vinay S

Course Curriculum/Topics with schedule (Min of 30 hours)

Sl No	Date	Topic	Faculty	Time	Hrs
1.	02.07.2019	Definition of RRT, indications of RRT in children	Dr. V. Raghavendran	4-5 p.m	1
2.	04.07.2019	Principles of RRT – Diffusion, convection and ultrafiltration	Dr. Abhijeet Shrivastava	2-3 p.m	1
3.	05.07.2019	Principles of RRT – clearance of small, middle and large molecules	Dr. Satyamanasa Gayatri Vinay S	4-6 p.m	2
4.	06.07.2019	Peritoneal dialysis – principles and procedure	Dr. V. Raghavendran	4-6 p.m	2
5.	07.07.2019	Peritoneal dialysis – PD fluid, PD catheters	Dr. Abhijeet Shrivastava	4-6 p.m	2
6.	09.07.2019	Peritoneal dialysis – pros, cons, evidence and complications	Dr. Satyamanasa Gayatri Vinay S	4-5 p.m	2
7.	10.07.2019	HD, SLED – vascular access and HD catheters	Dr. V. Raghavendran	4-5 p.m	1
8.	11.07.2019	HD, SLED – principles, components of dialysate, procedure and complications	Dr. Abhijeet Shrivastava	4-6 p.m	2
9.	12.07.2019	CRRT – principles, circuit and filters, complications, pros and	Dr. Satyamanasa	4-6 p.m	2

		cons, evidence	Gayatri Vinay S		
10	13.07.2019	Dialysis in fluid overload	Dr. V. Raghavendran	4-5 p.m	1
11	14.07.2019	Water treatment	Dr. Abhijeet Shrivastava	4-5 p.m	1
12	16.07.2019	Anticoagulation	Dr. Satyamanasa Gayatri Vinay S	4-6 p.m	2
13	17.07.2019	Pre course and Post Course evaluation, Feedback analysis from Likert scale	Dr. V. Raghavendran	2-4 p.m	2
		Practical Class			
13.	18.07.2019	Case discussions	Dr. Abhijeet Shrivastava	3-4 pm	1
14.	19.07.2019	Practical demonstration with PD catheters, PD fluids, procedure on mannequin	Dr. Satyamanasa Gayatri Vinay S	2-4 pm	2
15.	20.07.2019	Practical demonstration – vascular access on mannequin, HD machine with filters and circuits, CRRT machine with filter and circuit	Dr. V. Raghavendran	2-4 pm	2
16.	21.07.2019	Case discussions	Dr. Satyamanasa Gayatri Vinay S	3-4 pm	1
17.	23.07.2019	Assessment and giving feedback in weaker areas	Dr. Abhijeet Shrivastava	2-6 pm	4
		Total			30 hrs

VALUE ADDED COURSE FOR PEDIATRIC RENAL REPLACEMENT THERAPY

1. Name of the programme & Code

Pediatric Renal Replacement Therapy and PECO10

2. Duration & Period

30 hrs (July – August 2019)

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Multiple choice questions- *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

Once (July - August 2019)

8. Year of discontinuation: 2020

9. Summary report of each program year-wise

Value Added Course (July – August 2019)					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	PECO10	Pediatric Renal Replacement Therapy	Dr Abhijeet Shrivastava	Final year MBBS	20 (July – August 2019)

10. Course Feed Back

Enclosed as Annexure- V

ASSISTANT PROFESSOR
DEPARTMENT OF PAEDIATRICS
SRI LAKSHMI NARAYANA INSTITUTE OF
MEDICAL SCIENCES

RESOURCE PERSON
Dr Abhijeet Shrivastava

PAEDIATRICS HEAD
DEPT. OF PAEDIATRICS
SRI LAKSHMI NARAYANA INSTITUTE OF
MEDICAL SCIENCES
OSUDU, PUDUCHERRY

COORDINATOR
Dr V. Raghavendran

Annexure I

PEDIATRIC RENAL REPLACEMENT THERAPY



BIHER

PARTICIPANT HAND BOOK

SLIMS

COURSE DETAILS

Particulars	Description
Course Title	Pediatric Renal Replacement therapy
Course Code	PECO10
Objective	1. What is Renal Replacement Therapy 2. Indications of Renal Replacement Therapy 3. Modalities of Renal Replacement therapy and when to select which modality 4. Principles involved in renal replacement therapy 5. Continuous vs Intermittent therapy 6. Peritoneal Dialysis 7. Intermittent Hemodialysis 8. Continuous Renal Replacement Therapy 9. Complications
Further learning opportunities	Visit to a dialysis centre
Key Competencies	On successful completion of the course, the students will have the basic knowledge about who will need RRT, what modality to use and what can be the complications
Target Student	Final year MBBS Students
Duration	30 hrs (July - August 2019)
Theory Session	20 hrs
Practical Session	10 hrs
Assessment Procedure	Multiple choice questions

What is Renal Replacement Therapy?

It is a therapy that helps replace the function of the kidneys during acute or chronic derangements in renal function. It is typically done for removal of excess water, acid, electrolytes and toxins. It can also be done for some extra-renal pathologies where there is excessive production of endogenous toxins (inborn errors of metabolism, acute liver failure) or there is accumulation of exogenous toxins.

Indications of RRT

1. Acute kidney injury or chronic kidney disease with –
    a. Fluid overload more than 10% and pulmonary edema not responding to medical management like fluid restriction and diuretic therapy,
    b. Refractory dyseletrolytemias,
    c. Hypertensive emergencies,
    d. Refractory metabolic acidosis

e. Uremic manifestations like uremic encephalopathy, uremic pericarditis, uremic gastritis.

f. End stage renal disease with GFR less than 15 ml/min/1.73m2 is an indication for initiation of RRT.

2. Decompensation in Inborn errors of metabolism not responding to medical management

3. Hepatic encephalopathy as a bridge therapy to liver transplant

4. Poisonings.

Modalities of RRT

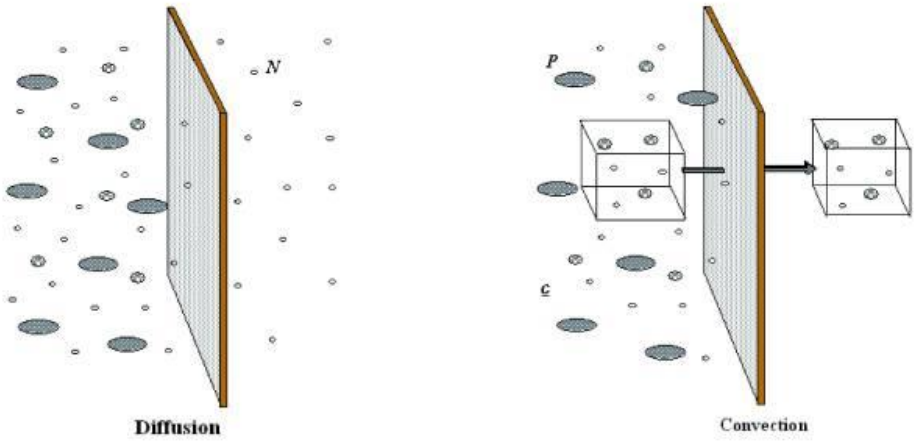
The selection of RRT modality, either peritoneal or blood based, depends on patient's characteristics such as age, severity of illness, comorbid illness, and indications for RRT like ion removal, middle molecule clearance, and fluid removal; location which could be inpatient, intensive care unit (ICU), or

outpatient; and available resources like financial resources, equipment, and trained personnel . In most developing countries and regions of the world, peritoneal dialysis remains the predominant method of RRT especially in children due to its relative ease and lower cost when compared to hemodialysis. Renal transplantation is the ultimate modality of RRT for end stage renal disease, as it replaces native renal function completely and gives near normal quality of life, but nonavailability of organ donors limits its widespread use and child has to remain on immunosuppressive medications lifelong that increases the predisposition to infections.

Principles of RRT

Renal replacement consists of blood purification by semi-permeable membranes (walls of the hollow fibres of dialysis filters during blood based modalities or the peritoneal membrane in peritoneal dialysis). During blood based modalities, blood flows into hollow fibers composed of porous biocompatible

synthetic material. A wide range of substances (water, urea, low, middle and high molecular weight solutes) can be transported across such membranes, from the blood to the effluent side of the hollow fibers, by the mechanism of diffusion (solutes) and convection (water and solutes). Ultrafiltration is another mechanism involved that helps transport water across very small pores (aquaporins in peritoneal membrane, synthetic pores present in dialysis membranes during hemodialysis) down the hydrostatic pressure gradient. Together, these processes of diffusion, convention and ultrafiltration help in effective removal of water and dissolved solutes.



During diffusion solute flux occurs along its concentration gradient between the two sides of the semi-permeable membrane. It also depends on the temperature , diffusivity coefficient , membrane thickness and surface area.

Convective flux of solutes requires instead a pressure gradient between the two sides of the membrane that moves a fluid (plasma water) with its « crystalloid » content (a process called ultrafiltration, whose entity is also dependent on membrane permeability coefficient). Colloids and cells will not cross the semipermeable membrane, depending on the pores' size.

Continuous vs Intermittent RRT

Blood purification can be achieved in the ICU both by continuous and intermittent RRT. In theory, during continuous RRT (Peritoneal dialysis and CRRT), the treatment is kept running 24 hours a day, seven days a week. During intermittent RRT (Intermittent hemodialysis and SLED) renal support is delivered in intermittent sessions lasting (depending on center preferences, protocols, and the patient's clinical status) 3–6 hours, typically three times per week (or depending on specific needs). Currently, about 80% of critically ill patients are treated with continuous RRT. However, due to the absence of significant differences in outcome deriving from the application of continuous vs intermittent RRT, no specific recommendation is provided by the major critical care societies, and the choice is mainly left to institutional protocols and expertise. Apart from evidence in large clinical trials, more gentle RRT application is generally better tolerated in hemodynamically unstable, critically ill

patients with severe AKI. Furthermore, since the occurrence of intradialytic hypotension is proportional to the net ultrafiltration rate, it is possible to prescribe a lower net ultrafiltration rate when the treatment is applied over 24 hours as compared to a quick 3-hour session.

Peritoneal Dialysis

Peritoneal dialysis (PD) is the most widely available form of renal replacement therapy used in children. Almost all centers that care for acutely ill children are capable of incorporating this technique into practice. PD is especially important for developing countries with limited resources.

Pros - The benefits of peritoneal dialysis include ease and quickness of catheter insertion, inexpensive cost compared to other modalities, and general tolerance with regards to hemodynamic stability. Percutaneously placed intraperitoneal catheters or permanent Tenckhoff catheters are used even in neonates, and catheter placement is relatively simple compared to the vascular access required for intermittent hemodialysis (IHD) or continuous renal replacement

therapy (CRRT). Due to ease of tolerance, PD catheters have been prophylactically placed in neonates after cardiopulmonary bypass surgery felt to be at high risk for ischemic kidney injury . Of global importance, particularly for areas with little technologic ability, PD can be performed manually and does not require a cycling device. Peritoneal dialysis fluid, either lactate based (USA) or bicarbonate based (outside USA), is nearly universally available. A major advantage of PD is absence of a need for anticoagulation. Functionally, PD is ideally suited for patients that have moderate illness and are poor candidates for modalities which require anticoagulation or large vascular access.

Cons - Due to its relatively low clearance compared to IHD and CRRT, PD is ill suited for situations such as acute toxin ingestions, severe metabolic disturbances . In cases of tremendous fluid overload, the rate of fluid removal of PD may not be rapid enough to prevent subsequent injury and morbidity. Manual PD can be labor intensive for the bedside practitioner, especially if the cycle frequency is high. Also, PD cannot be used in children with congenital abdominal

malformations such as omphalocele, gastroschisis, and bladder exstrophy, or in patients with significant abdominal adhesions.

Evidence - Though rates of PD use have decreased in the PICU, it is still the most commonly used method of RRT in children in the world. The use of PD is favored in the neonates who often have difficult vascular access, low tolerance to volume shifts, and thermodynamic instability . In neonates with heart failure, PD provides a safe and adequate strategy for children and allows reasonable creatinine clearance rates. The use of peritoneal dialysis is documented in children following cardiopulmonary bypass; Sorof et al. report no deaths or adverse hemodynamic effects during PD in 20 consecutive children immediately after cardiopulmonary bypass (CPB). In a single center study, survivors after CPB had a shorter interval between the diagnosis of AKI and PD initiation than nonsurvivors (1.2+0.4 days versus 4.3+1.2 days). Numerous other reports demonstrate the safety and efficacy of PD after cardiopulmonary bypass including providing effective dialytic efficiency measurements ($Kt/V > 2.1$, where K is the clearance of urea, t is the time of dialysis, and V is a patient's total body water; goal for PD is >2.0/week) .

Opinion - PD is the most often used form of RRT in adults and children worldwide, owing to cost and ease of use. In skilled hands, PD is highly effective at removing solute and fluid and can be tailored to patient needs. Practitioners should be mindful of the potential for PD if vascular catheter placement is problematic. This modality does not require anticoagulation and is ideal for neonates, children with inadequate vascular access, and children who can tolerate slower fluid removal and electrolyte correction.

Intermittent Hemodialysis

Intermittent hemodialysis (IHD) use requires center selective criteria of technical expertise and trained personnel and patient selective criteria of hemodynamic stability and vascular access.

Pros - The use of IHD is ideal for acute presentations of renal dysfunction or electrolyte imbalance. Because it offers the highest dose of dialysis in the shortest time frame, IHD is perfectly suited for disease processes which cause acute disruptions in homeostasis such as drug ingestions, tumor lysis syndrome, and hyperammonemia. Additionally, it allows for isolated ultrafiltration and titration of

dialysis fluid solute concentration to correct metabolic disturbances such as hypernatremia. IHD is time limited, allowing for patient mobility, for example, to travel if needed for other diagnostic tests or procedures. In centers where continuous RRT is not available, some IHD machines permit slower and extended dialysis (SLED) which allows for gradual removal of solute and/or fluid .

Cons - The technical requirements of IHD represent a major challenge to its use. IHD use is limited by the trained personnel available at a given medical care center and by the technical support available if trouble arises. Secondly, IHD requires vascular access in a large vessel. Though performed, this is especially problematic in children for whom obtaining access is a chronic problem . Neonates may be unable to tolerate IHD simply because of inability to offer an appropriate cannula size to maintain adequate flow rates. Additionally, large IHD catheter placement can lead to vascular damage such as stenosis and thrombosis. Many nephrologists feel that for this reason, the subclavian veins should be avoided altogether. Future chronic dialysis access needs may be greatly impeded by placement of temporary IHD catheters . IHD use causes large volume

shifts and may be unfeasible in patients that are hemodynamically unstable and those, such as small infants, who do not tolerate the volume shifts that occur during dialysis. Disequilibrium syndrome, secondary to rapid osmolar shifts, may complicate hemodialysis leading to seizures and cerebral edema, but it can be offset with short dialytic runs or with small doses of mannitol. IHD requires anticoagulation, most commonly with heparin (although low-molecular-weight heparins and the alternative anticoagulants danaparoid, lepirudin, and citrate can be used in patients with heparin-induced thrombocytopenia). Finally, because it is time limited, IHD use does not lessen the fluid restrictions that are often placed on critically ill patients. Thus, using IHD requires diligent daily planning to balance UF with goal fluids, including boluses and blood products, and nutrition.

Evidence - Prior to the rise in popularity of continuous renal replacement therapy, intermittent hemodialysis was the modality of choice in patients requiring aggressive support for acute kidney injury. Other than for acute ingestions and electrolyte disturbances, the use of IHD has taken a backseat to CRRT in the intensive care

setting requiring solute and fluid control. The adult SHARF 4 trials (Stuivenberg Hospital Acute Renal Failure), however, found no differences in mortality or renal recovery in 316 adults with AKI between IHD and CRRT [25]. Similarly, a meta-analysis of 43 studies comparing IHD to CRRT in adults reports that CRRT does not offer an advantage with regard to survival or long term dialysis dependence. Pediatric data comparing IHD to other modalities in AKI is limited. In 2001, Bunchman et al. published data on 226 children receiving RRT. In this study, 81% of the 61 children receiving IHD survived compared to only 40% for hemofiltration; however, the former group received significantly less vasopressor support than the latter. Retrospectively, the survival of pediatric AKI for IHD (73–89%) has been higher than those for CRRT (34–58%).

Opinion - Intermittent hemodialysis is effective therapy for acute ingestions, toxins, and fluid overload. IHD carries risks for line placement, technical difficulty in small patients and neonates, and complications with rapid shifts in fluids and electrolytes. IHD is ideal for patients with acute electrolyte abnormalities and those that would

benefit from and can tolerate high doses of dialysis in a short time frame.

Continuous Renal Replacement Therapy

The use of continuous dialysis for AKI is widespread in PICUs. Arteriovenous hemofiltration was first described in the late 1970s and the 1980s, including in infants . CRRT became popular in pediatric AKI in part because venovenous filtration machines, which offset the need for patient perfusionpressure-driven ultrafiltrate, eased the problem of low driving pressures in pediatric patients. Additionally, advances in CRRT technology allowed gravimetric and volumetric control of hemofiltration to allow for accurate ultrafiltration flows. Still, while CRRT use expands, in both adults and pediatrics the risk-benefit ratio pits known risks to theoretical benefits. A major limitation to the standardization of CRRT use is the lack of prospective randomized data from controlled studies, evaluating the time of initiation, route of delivery, and efficacy. Retrospective data attempts to answer some of these questions.

Pros - The major advantage of CRRT is that it affords nearly continuous adjustment of ultrafiltration. This feature makes it well suited for patients with hemodynamic instability. CRRT (and IHD) allows for ultrafiltration to be independently regulated from solute removal. This confers great benefit for patients with sensitive electrolyte needs and fluid states. Finally, fluid delivery does not require restriction while CRRT is in use, affording increased freedom for nutrition. The preferred modalities of CRRT in children are likely affected by site-specific familiarity and local preference, and data are retrospective.

Cons - The primary drawback to CRRT use is its complexity. The level of technical expertise required is high and, as such, is not available at many centers worldwide. The need for vascular access can often complicate its use. Attaining adequate flow rates in neonates and small children can be difficult even despite recommended catheter size placement. As in IHD, CRRT in small patients is complicated by the fact that a large percentage (10–15%) of blood volume may be extracorporeal at any given time. This amount of volume shift can lead to a high amount of thermodynamic instability.

Bradykinin release syndrome (hypotension, mucosal congestion, and bronchospasm upon contact of patient blood with a hemofilter) is a problem with CRRT in infants using an AN-69 membrane circuit. Finally, anticoagulation may pose added complications to patients in septic shock and disseminated intravascular coagulation (DIC).

Evidence - CRRT offers minute to minute control of ultrafiltrate and affords practitioners the flexibility to use volume intense medications, blood products, and nutrition. CRRT offers better control of uremia compared to PD or IHD [35] and allows practitioners to control solute levels to targets, which is critical in cases such as children with increased intracranial pressure who require tight control of serum osmolarity [36]. However, no prospective study of CRRT exists in either the adult or the pediatric literature. Also, no controlled trial comparing the efficacy of PD to IHD to CRRT in pediatrics exists. A study comparing PD to CRRT demonstrated a significant survival difference with CRRT (85%) versus PD (43%), but critics have indicated that rigid tubing, manually exchanged fluid, and hyperglycemia in the PD group may have skewed the results [37, 38]. A recent multicenter adult study in Belgium indicated that, in 1303

patients, mortality was higher (58% versus 43%) for AKI patients in the RRT group than in conservative management group despite correction for severity of illness [39]. Unfortunately, clear evidence supporting or contraindicating the use of CRRT in pediatrics is lacking. Fortunately, through the ppCRRT, the study of pediatric RRT has progressed and more data emerges regarding the confounding variables associated with the risks and benefits of RRT. Some of these variables are discussed below.

Opinion - As center-specific technical expertise expands, the use of CRRT continues to also expand. Despite limited data indicating its superiority over PD or IHD, the ability to finely control fluid balance and electrolyte derangements makes CRRT an ideal option in the hemodynamically unstable patient. Additionally, the ability to provide optimal nutrition and deliver blood products and medicine while on CRRT (without worrying excessively about fluid shifts) is highly desirable. The tight control of such deliverables is paramount in the care of the critically ill pediatric patient and the primary reason why CRRT use expands. Institutional capability, technical familiarity, and

ability to obtain adequate vascular access are barriers to its use, but efficacy in unstable patients is an attractive quality in this modality.

Initiation of RRT

In the only randomized trial of early versus late initiation of RRT in critically ill patients , 106 ventilated, oliguric adults were randomized to either “high volume-early” (initiation 8 hours after stratification, 72–96 L hemofiltration in 24 hours), “low volume-early” (initiation 8 hours after stratification, 24–36 L hemofiltration in 24 hours), and “low volume-late” (initiation 36 hours after stratification, 24–36 L hemofiltration in 24 hours) of CRRT. Median duration of renal failure and 28-day survival were not significantly affected by timing of initiation. However, other data suggesting that early treatment is superior to late treatment is encouraging in patients who developed AKI following CPB. There is also evidence suggesting that early RRT affords critically ill patients with a therapeutic strategy that goes beyond organ support. In other words, RRT may a serve a more direct, therapeutic role in ameliorating renal injury and improving the chances of “renal recovery.” Renal recovery is variably defined in

the literature, though most definitions used include the criterion of freedom from chronic RRT . The pediatric data regarding timing of initiation is largely retrospective and put into the context of triggers such as fluid overload and presence of sepsis.

Fluid Overload and CRRT - A retrospective study of 21 children receiving RRT for AKI suggested that the degree of fluid overload (FO) at time of RRT initiation was significantly lower in survivors than in nonsurvivors (16.4% versus 34%). In a larger study of 113 children with multiple-organ dysfunction syndrome (MODS) started on CRRT, median % FO was significantly lower in survivors compared to nonsurvivors (7.8% versus 15.1%), and mortality related to FO was independent of severity of illness. Another study showed that, in 297 patients, % FO was again significantly lower in survivors versus nonsurvivors (12.5% versus 23.0%). In a prospective, uncontrolled, observational study DiCarlo initiated CRRT for ten children with ARDS after BMT regardless of presence of AKI and demonstrated an 80% survival rate. Of the available retrospective evidence, the mortality for children started on CRRT is 10– 57.1%. In select centers, the use

of PD after cardiopulmonary bypass during the immediate postoperative period is routine. The ppCRRT data suggests that a threshold may exist for initiation of CRRT based on FO to improve mortality, a threshold that appears to be independent of severity of illness. The threshold, 10–15% FO, however, has yet to be prospectively tested. Further, it has yet to be demonstrated International Journal of Nephrology 5 that children placed on CRRT for AKI have better outcomes than those without such therapy. Sepsis and CRRT - RRT for sepsis without AKI has been attempted in adults, with the thought that RRT could remove harmful circulating cytokines and inflammatory mediators, but trials have been underpowered and results regarding efficacy have been varied. While many inflammatory mediators can be removed using RRT, specifically CRRT, it is unknown how the amount removed compares to the serum concentration of such mediators and the significance of certain levels. No studies of RRT designed specifically to analyze its efficacy in pediatric sepsis, absent AKI, have been performed.

Access - While adequate venous access is paramount to effective IHD or CRRT, PD confers the advantage of not requiring large vessel access. Catheter placement in children increases risk for thrombosis and sclerosis, especially in the subclavian veins, and may be detrimental to obtaining future access. Data from the ppCRRT indicates that smaller catheters (5 and 7 French) and those placed in the femoral veins were associated with shorter circuit lives than larger catheters and those placed in the internal jugular veins [52]. Appropriate catheter sizes and placement are mutually dependent and can vary.

Anticoagulation - The absence of a need for anticoagulation is a major advantage for PD use. Heparin and citrate are the major anticoagulants used in IHD and CRRT; registry data reports equal circuit viability with both substances. While citrate allows the patient to be free of heparin-induced systemic anticoagulation, it may require several additional solutions to be run concurrently with the circuit: anticoagulant dextrose solution A (ACD-A) and a continuous calcium infusion (infused through separate central access) to prevent hypocalcemia which occurs when citrate binds ionized calcium.

Higher citrate clearances or lower citrate delivery methods must be used to prevent citrate lock, defined as elevated serum total calcium but low serum ionized calcium, which results from increased citrate buffering of free calcium from decreased citrate metabolism.

Dose - The high dose of dialysis delivered in relation to time is an advantage of IHD over PD and CRRT. Much of the data regarding dose of RRT is retrospective and focuses on CRRT. An initial study reported mortality lessened with larger doses (≥35 mL/kg/hr) than with smaller doses (20 mL/kg/hr) . However, a large recent study with meticulous documentation of actual doses received demonstrated no improvement in kidney function or mortality outcome in adults receiving high-intensity CRRT (35 mL/kg/hr) versus low-intensity CRRT (20 mL/kg/hr) or intermittent hemodialysis. The few outcomes studies performed in pediatrics investigating the effects of RRT dosage and modality are retrospective. The ppCRRT in 2007 demonstrated no difference in overall outcomes based on modality or dose of CRRT used.

Outcomes - Limited prospective data is available to compare morbidity and mortality between the three dialytic modes. In adults, a study performed in a developing country analyzed PD versus CRRT in infection-related AKI and found that CRRT was significantly superior to PD in all end-points tested (reduction of creatinine, resolution of acidosis). In children, the data is quite limited, retrospective, and often limited to specific disease processes, such as cardiopulmonary bypass. Data from the ppCRRT indicates 58% survival for all children placed on RRT, although high mortality rates (liver 69%, pulmonary 55%, and stem cell 55%) seen in select transplant populations and children under 10 kilograms influence the data significantly.

Complications of Pediatric RRT

1. Hemodynamic instability
2. Electrolyte disturbances
3. Temperature instability

4. Dialysis disequilibrium syndrome

5. Infections

6. Bleeding

7. Access related complications

LIST OF STUDENTS ENROLLED IN VALUE ADDED COURSE - PEDIATRIC RENAL REPLACEMENT THERAPY STUDENT

S.No	Register No	Students List	Signature
2019	U16MB251	AARTHI.A	
2019	U16MB252	ABILASHA.K	
2019	U16MB253	ABITHA RAJLIN J.S	
2019	U16MB254	ADAPALA PRIYANKA	
2019	U16MB255	ADHITHAYA RAJ .N	
2019	U16MB256	AJAY .N	
2019	U16MB257	AKSHYA .R	
2019	U16MB258	ALLARI KARTHIK ABHIROOP	
2019	U16MB259	AMAL ASHOK	
2019	U16MB260	AMIRTHAVARSHNI .R	
2019	U16MB261	ANANYA SHARMA	
2019	U16MB262	ANGALAKUDURU DEEPCHAND	
2019	U16MB263	ANJAN BANERJEE	
2019	U16MB264	ANWESHA CHATTERJEE	
2019	U16MB265	ARCHANA .A	
2019	U16MB266	ARCHITHA.A	
2019	U16MB267	ARIVUMATHI .R	
2019	U16MB268	ARJUN.S	
2019	U16MB269	ASHVANTH KUMAR .A	
2019	U16MB270	ASMITHA S.V	

ASSISTANT PROFESSOR
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PAEDIATRICS HEAD
DEPT. OF PAEDIATRICS
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
OSUDU, PUDUCHERRY

Resource Person — **Dr Abhijeet Shrivastava**

Course Coordinator — **Dr V. Raghavendran**

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure – III

PEDIATRIC RENAL REPLACEMENT THERAPY

MULTIPLE CHOICE QUESTIONS

Course Code: PECO10

Name: AJAY . N

Roll: U60MB256

I. ANSWER ALL THE QUESTIONS

1. Which of the following is not an indication for RRT

a. Refractory fluid overload

b. Serum Creatinine more than 3 mg/dl

c. Blood Urea more than 100 mg/dl with uremic encephalopathy

d. Refractory dyselectrolytemias

(1)

2. Which of the following is a modality for continuous therapy?

a. Peritoneal dialysis

b. Hemodialysis

c. SLED

d. Both B and C

(0)

-1-

3. A 2 month old male infant with acute kidney injury and hemodynamic instability is being treated in a resource limited setting. Which of the following will be the preferred modality for RRT in this child?

a. Peritoneal dialysis

b. Hemodialysis

c. SLED

d. CRRT

4. A 12 yr old male child with acute kidney injury and hemodynamic instability is being treated in a tertiary care setup with good infrastructure backup. Which of the following will be the preferred modality for RRT?

a. Peritoneal dialysis

b. Hemodialysis

c. SLED

d. CRRT

5. What is significant fluid overload?

a. 1 - 5 %

b. 5 - 9 %

c. 10 - 15%

-2-

d. None of the above

6. Which of the following is not a component of PD fluid?

a. Glucose

b. Lactate

c. Sodium

d. Urea

7. Which of the following are mechanisms involved in RRT?

a. Diffusion

b. Osmotic drag

c. Hemofiltration

d. All the above are correct

8. Which of the following increases the chances of peritonitis in a child on chronic PD ?

a. Exit site facing downwards

b. Exit site situated away from the diaper area

c. Non tunneled PD catheter insertion

-3-

d. Regular dressing of exit site following all aseptic precautions

9. Convection is the one-way movement of solutes through a semi-permeable membrane with a water flow. Select the answer that is true of convection in continuous renal replacement therapy (CRRT):

a. Substitution fluids should be clean

b. Molecular size of solutes do not affect clearance

c. Occurs during hemofiltration

d. Only efficient for removing large molecules

10. Ultrafiltration is the movement of fluid through a semi-permeable membrane along a pressure gradient. Select the answer(s) below that also represent ultrafiltration in continuous renal replacement therapy (CRRT):

a. Positive and negative pressures affect ultrafiltration

b. Positive pressure is generally on the blood side of the membrane

c. Negligible convective solute clearance happens

d. All of the above

11. Select the statement(s) that correctly identifies the importance of vascular access in continuous renal replacement therapy (CRRT)

-4-

a. Central venous catheters provide rapid and easy access permitting immediate use in critically ill patients

b. Vascular access is a basic prerequisite to any form of extracorporeal therapy

c. To have a good CRRT treatment it is essential to have a good access

✓ d. All of the above 1

12. Under certain conditions administering continuous anticoagulants may pose a risk to patients Select the answer(s) that include some of these conditions:

a. Active bleeding

b. Increased aPTT and INR

c. Liver failure and low platelet count

✓ d. All of the above 1

Signature of the student:

10
12

Signature of the assessor:

Date: 23.07.2019

-5-

Annexure – III

PEDIATRIC RENAL REPLACEMENT THERAPY

MULTIPLE CHOICE QUESTIONS

Course Code: PECO10

Name: ADAPALA TRIYANKA

Roll: U16M B254.

I. ANSWER ALL THE QUESTIONS

1. Which of the following is not an indication for RRT

a. Refractory fluid overload

b. Serum Creatinine more than 3 mg/dl

c. Blood Urea more than 100 mg/dl with uremic encephalopathy

d. Refractory dyselectrolytemias

2. Which of the following is a modality for continuous therapy?

a. Peritoneal dialysis

b. Hemodialysis

c. SLED

d. Both B and C

3. A 2 month old male infant with acute kidney injury and hemodynamic instability is being treated in a resource limited setting. Which of the following will be the preferred modality for RRT in this child?

a. Peritoneal dialysis

b. Hemodialysis

c. SLED

d. CRRT

4. A 12 yr old male child with acute kidney injury and hemodynamic instability is being treated in a tertiary care setup with good infrastructure backup. Which of the following will be the preferred modality for RRT?

a. Peritoneal dialysis

b. Hemodialysis

c. SLED

d. CRRT

5. What is significant fluid overload?

a. 1 - 5 %

b. 5 - 9 %

c. 10 - 15%

d. None of the above

6. Which of the following is not a component of PD fluid?

a. Glucose

b. Lactate

c. Sodium

d. Urea

7. Which of the following are mechanisms involved in RRT?

a. Diffusion

b. Osmotic drag

c. Hemofiltration

d. All the above are correct

8. Which of the following increases the chances of peritonitis in a child on chronic PD ?

a. Exit site facing downwards

b. Exit site situated away from the diaper area

c. Non tunneled PD catheter insertion

d. Regular dressing of exit site following all aseptic precautions

9. Convection is the one-way movement of solutes through a semi-permeable membrane with a water flow. Select the answer that is true of convection in continuous renal replacement therapy (CRRT):

a. Substitution fluids should be clean

b. Molecular size of solutes do not affect clearance

c. Occurs during hemofiltration

d. Only efficient for removing large molecules

10. Ultrafiltration is the movement of fluid through a semi-permeable membrane along a pressure gradient. Select the answer(s) below that also represent ultrafiltration in continuous renal replacement therapy (CRRT):

a. Positive and negative pressures affect ultrafiltration

b. Positive pressure is generally on the blood side of the membrane

c. Negligible convective solute clearance happens

d. All of the above

11. Select the statement(s) that correctly identifies the importance of vascular access in continuous renal replacement therapy (CRRT)

a. Central venous catheters provide rapid and easy access permitting immediate use in critically ill patients

b. Vascular access is a basic prerequisite to any form of extracorporeal therapy

c. To have a good CRRT treatment it is essential to have a good access

d. All of the above

V

12. Under certain conditions administering continuous anticoagulants may pose a risk to patients Select the answer(s) that include some of these conditions:

a. Active bleeding

b. Increased aPTT and INR

c. Liver failure and low platelet count

V

d. All of the above

Signature of the student: Adapala T

12

12

Signature of the assessor:

Date: 23.07.2019

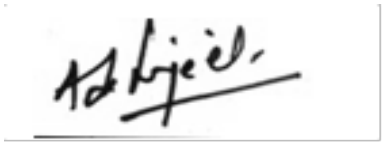
Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that _ ANJAN BANNERJEE _has actively participated in the Value Added Course on *Pediatric Renal Replacement Therapy* held during July – August 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.



Dr Abhijeet Shrivastava

RESOURCE PERSON



Dr V. Raghavendran

COORDINATOR

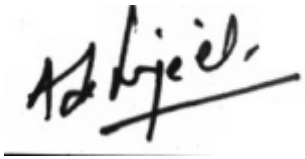
Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that __ABILASHA.K__ has actively participated in the Value Added Course on *Pediatric Renal Replacement Therapy* held during July – August 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.



Dr Abhijeet Shrivastava

RESOURCE PERSON



Dr V. Raghavendran

COORDINATOR

Annexure- V

Student Feedback Form

Course Name: Pediatric Renal Replacement Therapy

Subject Code: PECO10

Name of Student: _____ Roll No.: _____

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Feedback Form
FIVE POINT LIKERT SCALE

1. All the Sessions covered all the competencies like knowledge, analysis, training, practical Demonstration, Performance skill on your own and all other aspects related to overall global skills.

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

2. The content, method of delivery and ambience in the lecture session will help you to develop an overall performer?

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

3. Procedural skill by Tutor demonstration was done with clarity and made you to understand thoroughly.

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

4. This Methodology of Teaching Learning method made you to understand all aspects of Technical skill thoroughly.

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

5. You really feel that this method is good and there is increase in the self-confidence?

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

6. This method of Teaching Learning method is comprehensive in developing all competencies.

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

7. By DOPS Assessment method your knowledge, performance general skills and overall ability were completely assessed?

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

8. This method of assessment is Transparent?

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

9. You were given chance to analyze your mistakes and rectify in future in the form of feedback from Examinee?

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

10. Though it is elaborate and time consuming we can apply in future?

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

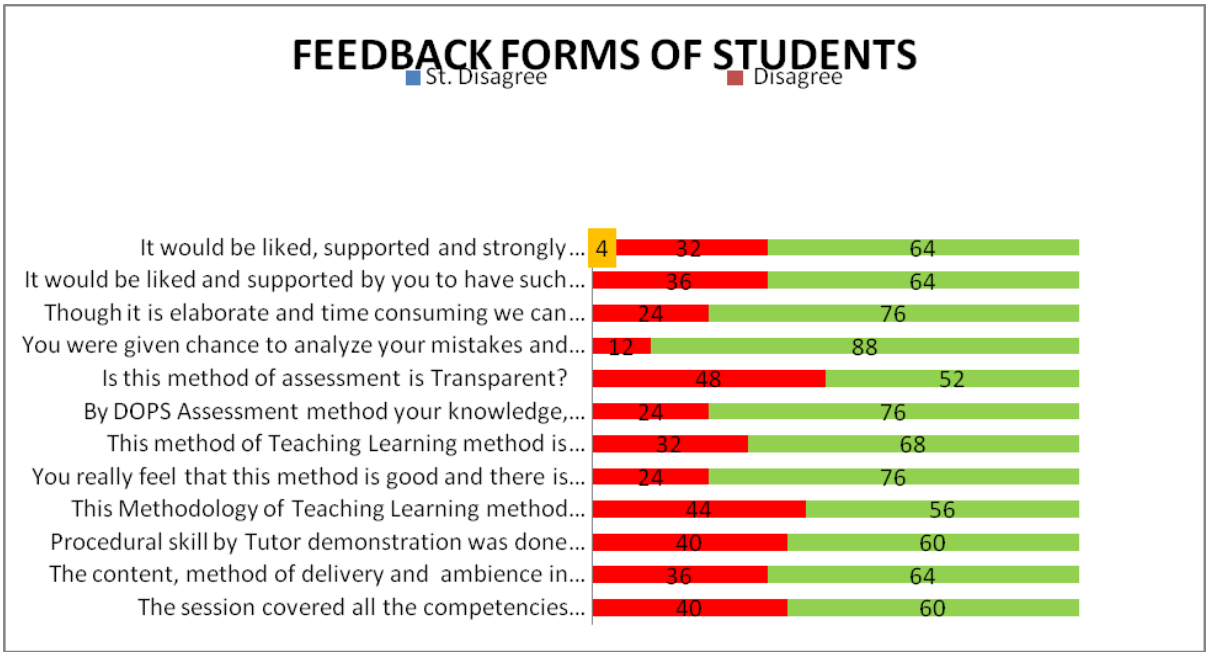
11. It would be liked and supported by you to have such comprehensive competency testing assessment methods in future?

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

12. It would be liked, supported and strongly recommended by you if this type of TL Method and assessment method is implemented in future.

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

Signature of the student:
Date:


FEEDBACK FORMS OF STUDENTS
St. Disagree
Disagree
It would be liked, supported and strongly...
It would be liked and supported by you to have such...
Though it is elaborate and time consuming we can...
You were given chance to analyze your mistakes and...
Is this method of assessment is Transparent?
By DOPS Assessment method your knowledge,...
This method of Teaching Learning method is...
You really feel that this method is good and there is...
This Methodology of Teaching Learning method...
Procedural skill by Tutor demonstration was done...
The content, method of delivery and ambience in...
The session covered all the competencies...
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Annexure- V

Student Feedback Form

Course Name: Pediatric Renal Replacement Therapy

Subject Code: PECO10

Name of Student: Anjan Banerjee Roll No.: U16MB263

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Feedback Form
FIVE POINT LIKERT SCALE

1. All the Sessions covered all the competencies like knowledge, analysis, training, practical Demonstration, Performance skill on your own and all other aspects related to overall global skills.

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Signature of the student: Anjan Banerjee.

Date:

Date: 07.8.2019

From

Dr. V. Raghavendran
Professor and Head,
Department of Pediatrics,
Sri Lakshmi Narayana Institute of Medical Scienc
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To

The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: Pediatric Renal Replacement Therapy

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: Pediatric Renal Replacement Therapy from July to August 2019 for 20 final year MBBS students. We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards,

Dr. V. Raghavendran

PAEDIATRICS HEAD
DEPT. OF PAEDIATRICS
SRI LAKSHMI NARAYANA INSTITUTE OF
MEDICAL SCIENCES
OSUDU, PUDUCHERRY

Encl: Certificates

Photographs



SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

OSSUDU AGARAM VILLAGE; KUDAPAKKAM POST,PONDICHERRY - 605003

Date 13.6.2019

From
Dr. PAMMY SINHA ,
HOD
Pathology
SriLakshmiNarayanaInstituteofMedicalSciences,Puducherry
Bharath Institute of Higher Education and Research,
Chennai.

To
The Dean,
SriLakshmiNarayanaInstituteofMedicalSciences,Puducherry
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: FNAC techniques and staining

Dear Madam,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: FNAC techniques and staining on JULY- SEP 2019. We solicit your kind permission for the same.

Kind Regard

Dr. PAMMY SINHA

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: Dr. JAYALAKSHMI

The HOD: Dr. PAMMY SINHA

The Expert: Dr. A.Manoharan

The committee has discussed about the course and is approved.

Dean	Subject Expert	HOD
(Sign &Seal)	(Sign &Seal)	(Sign &Seal)

Dr. G. JAYALAKSHMI, BSC.,MBBS.,DTCD.,M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Ageram Kudapakkam, Post,
Villanur Commune Puducherry 605 502.

Reg. No. 93333
Assistant Professor Department of Pathology
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry 605 502

PROFESSOR & HEAD DEPT OF PATHOLOGY
SRI LAKSHMI NARAYAN INSTITUTE OF
MEDICAL SCIENCES,
PUDUCHERRY - 605 502.

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

OSSUDU AGARAM VILLAGE; KUDAPAKKAM POST,PONDICHERRY - 605003

Circular

16.6.19

Sub: Organising Value-added Course: FNAC TECHNIQUES AND STAINING

With reference to the above mentioned subject, it is to bring to your notice that **SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES Bharath Institute of Higher Education and Research**, is organising"__FNAC TECHNIQUES AND STAINING_____". The course content [illegible] form is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before30.6.2019 . Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

Dr. G. JAYALAKSHMI, BSC.,MBBS.,DTCD.,M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Ageram Kudapakkam, Post,
Villanur Commune Puducherry-605 502.

Course Proposal

Course Title:FNAC techniques and staining

CourseObjective:

1. To define fine needle aspiration cytology and shall be able to discuss the principle and procedure of FNAC
2. Should know about the procedure of FNAC and its staining procedure
3. Should be able to perform the staining of FNAC slides and should also to know about the trouble shooting

CourseOutcome: Should know about the FNAC in detail
Course Audience: IInd year MBBS
Course Coordinator: Dr.A.Manoharan
Course Faculties with Qualification and Designation:

1.Dr.A.Manoharan Assistant professor
2.DR. J.PRIYADHARISINI
3. DR.SIVAGANESH@PORKO.G

Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Faculty	Time	Hours
1.	6.07.2019	Definition of FNAC and informed consent	Dr. A.MANOHARAN	1.30-4 pm	2.5 hrs
2.	13.07.2019	Location of FNAC	DR. J.PRIYADHARISINI	1.30-4 pm	2.5 hrs
3.	20.07.2019	Types of FNAC; Inpatient and Image guided	DR.SIVAGANESH@PORKO.G	1.30-4 pm	2.5 hrs
4.	27.07.2019	Conventional preparations	Dr. A.MANOHARAN	1.30-4 pm	2.5 hrs
5.	3.08.2019	Liquid based preparations	DR. J.PRIYADHARISINI	1.30-4 pm	2.5 hrs

6.	10.08.2019	Cell block preparation	DR.SIVAGANESH@PORKO.G	1.30-4 pm	2.5 hrs
7.	17.08.2019	Fixation techniques	Dr. A.MANOHARAN	1.30-4 pm	2.5 hrs
8.	24.08.2019	Pap staining and romanowsky staining	DR. J.PRIYADHARISINI	1.30-4 pm	2.5 hrs
		Practical Class	DR.SIVAGANESH@PORKO.G		
9.	31.08.2019	Hands on training of fixative procedures	Dr. A.MANOHARAN	1.30-4 pm	2.5 hrs
10.	7.09.2019	Pap staining	DR. J.PRIYADHARISINI	1.30-4 pm	2.5 hrs
11.	14.09.2019	Romnawsky staining	DR.SIVAGANESH@PORKO.G	1.30-4 pm	2.5 hrs
12	21.09.2019	Assesment and giving feed back	Dr. A.MANOHARAN	1.30-4 pm	2.5 hrs
		Total			30 hrs

REFERENCE BOOKS:

1. OrellAndSterrett's Fine Needle Aspiration Cytology By SvanteR.Orell
2. Koss Diagnostic Cytology And Its Histopathologic Basics By Leopold.G.Koss

COURSE DETAILS

Particulars	Description
Course Title	FNAC PROCEDURE AND STAINING
Course Code	PA11
Objective	1. INFORMED CONSENT 2. LOCATION OF FNAC 3. ASPIRATION TECHNIQUES 4. SLIDE PREPARATION 5. FIXATION TECHNIQUES 6. STAINING METHODS
Further learning opportunities	Ancillary techniques and molecular markers in cytology
Key Competencies	On successful completion of the course the students will have knowledge in the techniques of FNAC
Target Student	2NDMBBS Students
Duration	30hrs JULY- SEP 2019
Theory Session	20hrs
Practical Session	10hrs
Assessment Procedure	SHORT ANSWERS

VALUE ADDED COURSE

1. **Name of the programme& Code**

   FNAC techniques and staining PA11

2. **Duration& Period**

   30 hrsJuly – September 2019

3. **Information Brochure and Course Content of Value Added Courses**

   Enclosed as Annexure- I

4. **List of students enrolled**

   Enclosed as Annexure- II

5. **Assessment procedures:**

   Short notes questions- *Enclosed as Annexure- III*

6. **Certificate model**

   Enclosed as Annexure- IV

7. **No. of times offered during the same year**:

   1 TIME (JULY - SEPTEMBER 2019)

8. **Year of discontinuation: 2019**

9. **Summary report of each program year-wise**

Value Added Course- JULY - SEPTEMBER 2019					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength& Year**
1	PA11	FNAC techniques and staining	Dr. A.Manoharan	IInd MBBS	July – September 2019

10. **Course Feed Back**

Enclosed as Annexure- V

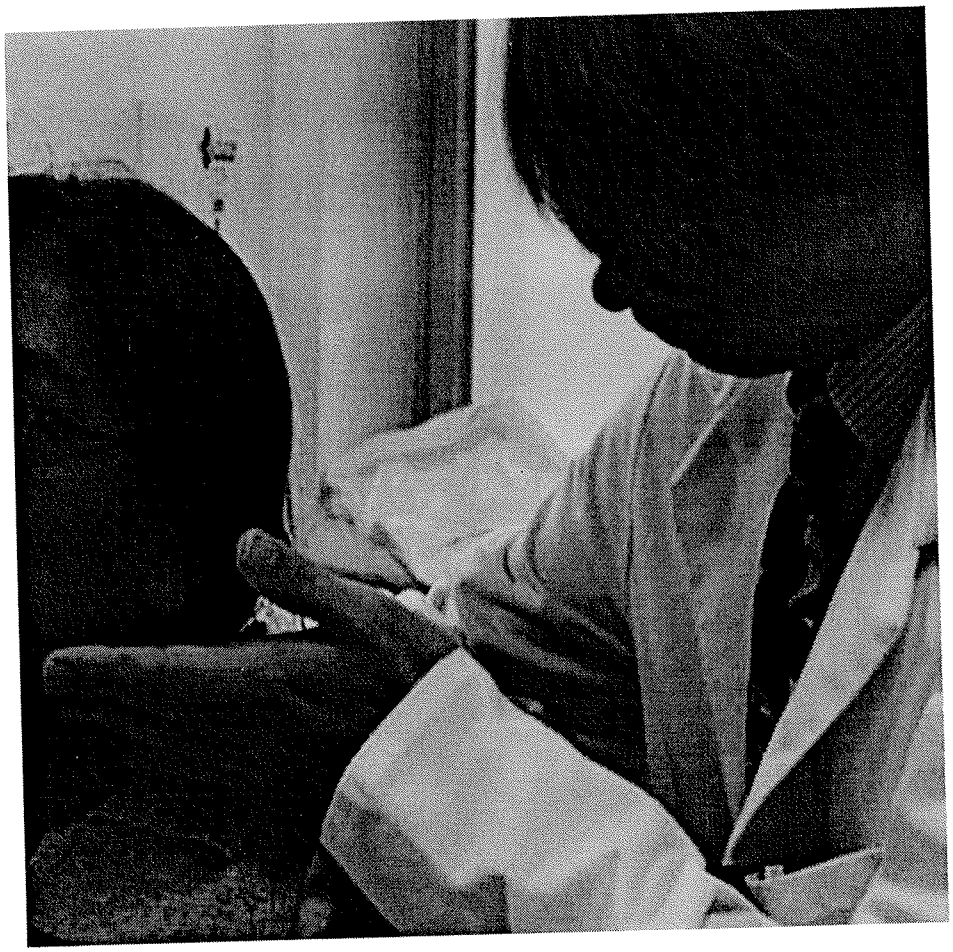
RESOURCE PERSON

Reg. No. 95555
Assistant Professor Department of Pathology
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

COORDINATOR

PROFESSOR & HEAD, DEPT. OF PATHOLOGY
SRI LAKSHMI NARAYAN INSTITUTE OF
MEDICAL SCIENCES,
PUDUCHERRY 605 502.

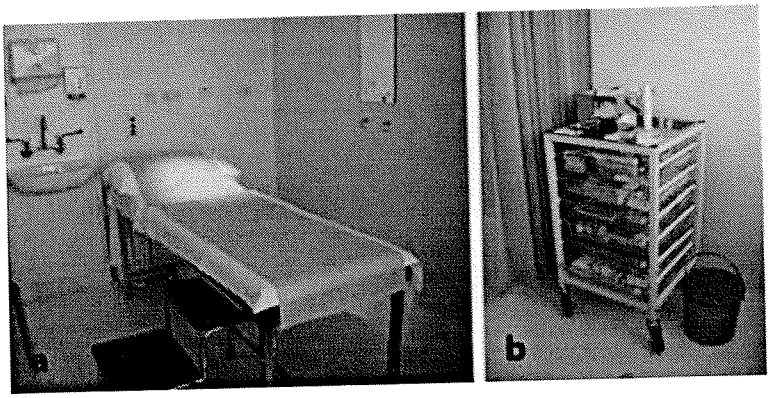
FNAC TECHNIQUES AND STAINING



PARTICIPANT HAND BOOK

centuries. The patient, after being explained the procedure, its format, purpose, risks, benefits and the alternative approach, makes a voluntary and informed decision to proceed. The modern concept of informed consent is a process of mutual communication rather than a signature on a standardised form The idea of modern informed consent dates back to 1914 when a judicial ruling stated: "Every human being of adult years and sound mind has a right to determine what shall be done with his body. Further legal developments included emphasis on the information given to the patient in order for a decision to be truly informed rather than just consented to. The patient should be allowed the opportunity to ask questions and the doctor should be satisfied that the patient understands what they are signing. Although there are different legal interpretations as to who has a duty to inform, it is generally accepted that the duty to inform lies with the person who performs the procedure. A consent form usually has two parts, the first part explaining the procedure and the second underlining the risks. Both need to be read and understood by the patient prior to the procedure [5]. It has been shown that twice as many patients read the information leaflet explaining the commencement of procedure when information is disseminated in advance rather than on the day of the procedure . It is sug-gested that the consent forms should be written in simple terms, using larger print and in duplicate copy. Patients should be given copies of the consent forms they sign so that they can reread them at home. For true patient autonomy to exist in informed consent, patients should be given the form in a language they understand or else be provided with a competent interpreter

LOCATION OF FNAC



One of the advantages of FNAC is that it can be performed at various locations. Most frequently it is performed in the hospital outpatients department, but it can also be performed in hospital wards, in a dedicated room within a pathology laboratory or in imaging or endoscopy suites

Inpatient FNAC

Inpatients have their FNAC samples taken in hospital wards. Ward staff usually have very little experience of what is needed, so it is useful to advise them in advance as to what the procedure entails and what equipment is needed, making sure that the patient is present on the ward at the time the FNAC is planned for. In some cases, a nurse may be asked to assist with the FNAC procedure.

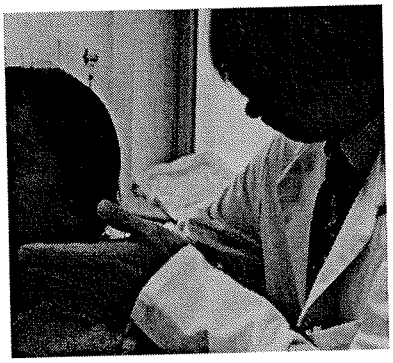


Image-Guided and Other FNAC

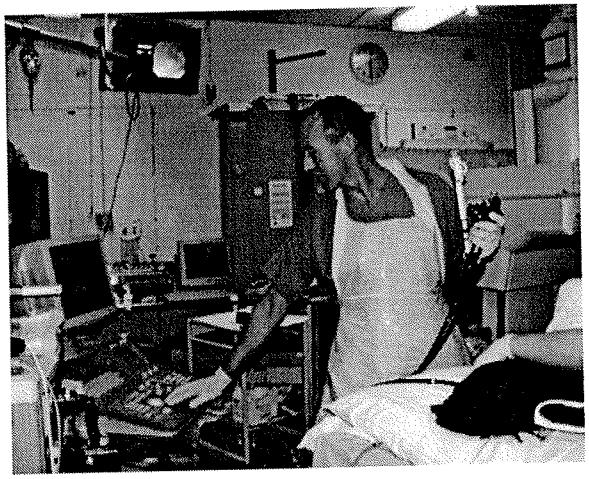
Ultrasound-Guided FNAC

Ultrasound-guided FNAC is practiced in some centres. This is the preferred method in some centres and is particularly useful in the staging of head and neck lesions, non-palpable breast lesions and thyroid lesions, in the case of the latter by helping to avoid surgery in 37% of cases . FNAC is performed either by a radiologist with or without the presence of a cytopathologist, or by a cytopathologist who has acquired ultrasonographic skills. The room is usually dark and there may be twice as many staff involved as when performing a non-image-guided FNAC. Unless this is performed by a well-trained team, an overlap of activity may occur. Image-guided FNAC is particularly advantageous in cases of small, non-palpable or multiple lesions.

Endoscopy-Guided

Ultrasound FNAC

The use of endoscopy-guided ultrasound (EUS) FNAC (EUS-FNAC) of the pancreas, mediastinum, duodenum, bile ducts, hypopharynx, rectum, lung and other sites accessible through the endoscope is increasing



Computed Tomography

(CT)-Guided FNAC

CT-guided FNAC is associated with high diagnostic accuracy and a low rate of complications, particularly in the diagnosis of pulmonary lesions.It has been shown

that an accurate diagnosis from FNAC of intrathoracic cancer is more likely when a cytopathologist is present than when not present during the procedure

Other FNAC Procedure

Locations

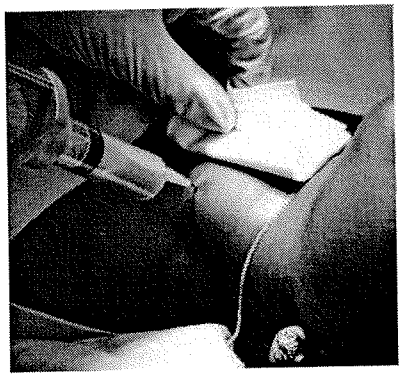
FNAC can be performed almost anywhere, provided the aforementioned conditions are met. As a first-line investigation, FNAC should have a place in primary care practices and hospital diagnostic units. This would introduce a means of triage for patients with lumps and bumps that would otherwise need specialist referral.

Suction FNAC

In this method, the needle is passed into the lesion and negative pressure is applied, usually by virtue of a syringe attached to the needle, and often with the help of a syringe holder (Cameco). In image-guided FNAC, most of the apparatus is designed to obtain material with the aid of negative- pressure suction. This method is particularly useful when draining a liquid from the lesion.

However, it is important that the negative pressure is released prior to exiting the lesion. If this is forgotten, after exiting the lesion the material from the needle may be accidentally aspirated into the syringe and it becomes more difficult to expel it in the traditional manner. In this case, making a cell solution would salvage the material. If, however, negative pressure is appropriately released before exiting the lesion, the cellular material is contained within the needle and its hub. The needle is then detached from the syringe and the material expelled onto a glass slide (or into a solution if an LBC sample is being made).

FNAC technique with suction applied is useful for draining abscesses or cysts.



The Capillary Method

In the past decade, FNAC has been performed increasingly without the aid of suction, with a needle alone, the so-called fine needle capillary (FNC) technique or non-aspiration aspiration . The needle is passed into the lesion and multiple fast jabbing movements in and out of the lesion as well as in different directions are performed. Once the material is seen in the hub of the needle, there is usually sufficient material.

Conventional Preparations

Material obtained with a fine needle is expelled onto appropriately labelled glass slides. This is usually performed by using a 20-ml syringe filled with air, attaching the needle to it and pushing the contents out of the needle. Sometimes, if the hub of the needle is full, it is possible to tap the hub against the glass and obtain the material directly from there. In this case, caution is needed to avoid needle-stick injury. The needle is discarded immediately into a special sharps container before spreading the material onto the slides.

The expelled material is ideally spread over several slides in small amounts rather than deposited in one large pool on a single slide. This way it is easier to obtain a thin-layer preparation that will be uniformly fixed or dried and will stain evenly throughout. Large amounts of blood are to be avoided because it clots, fibrin

trapping the cells and creating large cracks on the slideSpreading of the material is usually performedwith the help of another glass slide by sliding itover the FNAC material gently to avoid crushartefacts

If the fluid content is thick or gelatinous, some drops of fluid may be smeared onto glass slides and immediately air-dried and stained

with rapid stains. Heavily bloodstained fluids can be processed

with the help of some of the red blood cell lysing fixatives (e.g. Devine's lysing solution or Cyto- Rich Red; TriPath Care Technologies, Burlington,

North Carolina, USA) that increase the diagnostic utility of FNAC by lysing the red blood

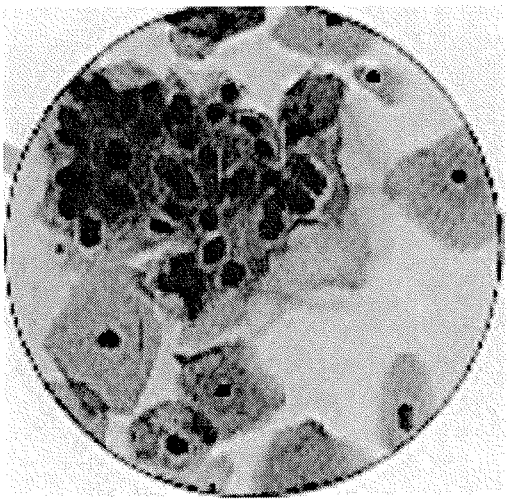
cells whilst preserving the cellular morphology and retaining the suitability for use in immunocytochemistry.

Liquid-Based Preparations

Liquid based cytology (LBC) was introduced initially for cervical smears, but some laboratories are increasingly processing other specimens, including FNAC, using this technology. After aspiration, the syringe and needle are thoroughly

rinsed with either saline or a fixative and for Shandon Cytospin preparations

or liquid-based preparations (LBC). Some laboratories prepare all FNAC specimens as Cytospin preparations. In order to enable a wider range of aspirators to obtain adequate FNAC samples, the specimen may be collected in a liquid preservative solution. The aspiration is performed in the usual way.



Cell Block

If the FNAC material is very bloody and paucicellular,

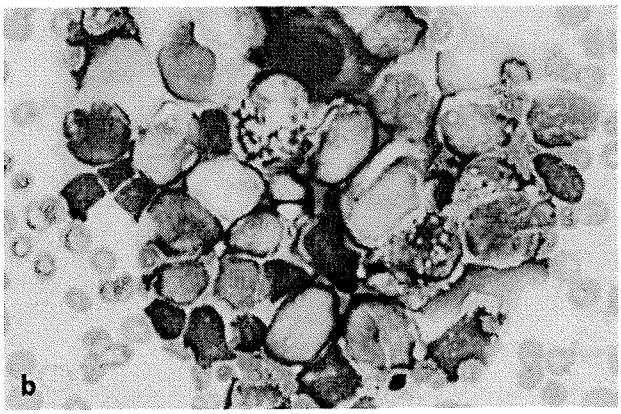
a cell-block technique may be helpful . The cell block is prepared with small tissue fragments or cell deposits after centrifugation. by using alcohol as the fixative.

Fixation

Air Drying

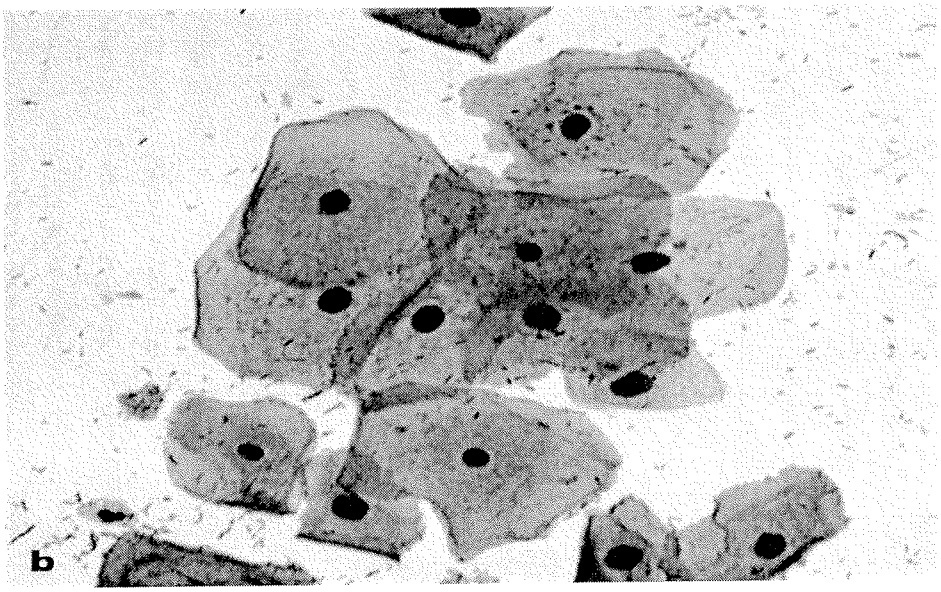
Immediate fixation of the FNAC specimen is crucial. The fixative depends on the choice of stain to be used, and the stain used depends on the preference within the laboratory; some prefer alcohol fixation followed by the Papanicolaou(Pap) stain, and some air-dried smears followed by Romanowsky staining (Diff Quick, May GrunwaldGiemsa). In conventional cell preparations, if slides are to be fixed by air drying, they need to be thinly spread and be dry to the naked eye within 5 min. If the specimen is very thick and does not visibly dry within that period, or if it is put into a sealed container before it is completely dry, air-drying artefacts will occur. Under the microscope, this is reflected by enlarged nuclei, fuzzy cell boundaries and the chromatin pattern assuming grotesque shapes, all of which may be misleading . Air-drying artefact may be the cause

of false positive or false negative diagnosis.

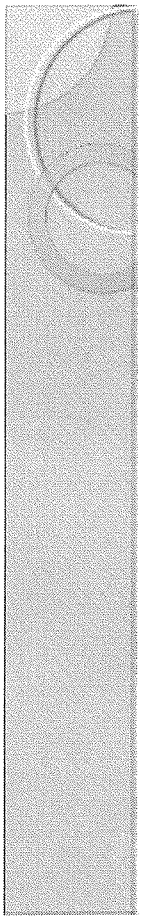


Papanicolaou Staining

The Pap stain uses a standard nuclear stain, haematoxylin, and two cytoplasmic counterstains, OG-6 and EA . The outcome of this method is crisp nuclear detail and transparency of the cytoplasm, which allows the examiner toIn FNAC practice, the use of Pap vs. Romanowskystains is subjective and depends on regi
or local preferences



Pap staining procedure



PAP stain

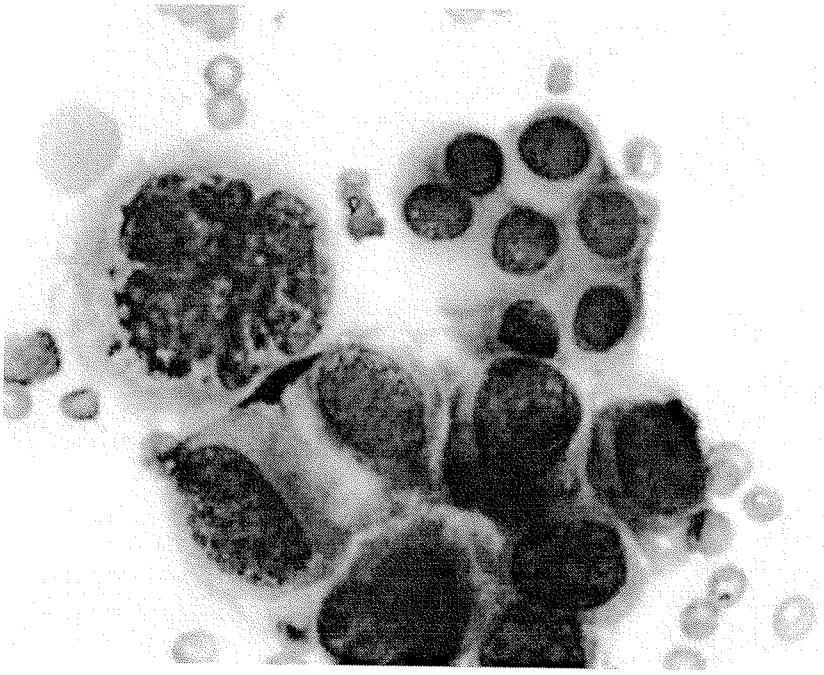
- 80% alcohol – 6 to 8 dips.
- 70% alcohol – 6 to 8 dips.
- 50% alcohol – 6 to 8 dips.
- Distilled water - 6 to 8 dips.
- Harris Haematoxylene – 6 minutes.
- 0.25% HCl- 6 to 8 dips.
- Running tap water – 6 minutes.
- 50% alcohol – 6 to 8 dips.
- 70% alcohol – 6 to 8 dips.
- 80% alcohol – 6 to 8 dips.
- 95% alcohol – 6 to 8 dips.
- O.G.G- 2 minutes.

dr. monika rama

Romanowsky Staining

Romanowsky stains, mixtures of eosin and methyleneblue, are a family of polychrome stains that achieve their effect by the production of azure dyes as a result of demethylation of thiazinesand the acidic component, eosin. Unlike the Pap stain they are metachromatic. Most Romanowsky stains used in cytology are aqueous stains as opposed to the methyl-alcohol-based stains of haematology. Many commercial stains are available, and most consist of a methanol based fixative and two dyes, which result in the differentiation of cytoplasmic and nuclear components. Most Romanowsky stains are rapid and

are useful in enhancing pleomorphism and distinguishing extracellular from intracytoplasmicmaterial



VALUE ADDED COURSE

FNAC TECHNIQUES AND STAINING, JULY – SEPT 2019, PA11

List of Students Enrolled

2nd Year MBBS Student			Signature
Sl. No	Name of the Student	Roll No	
1	JETESH SINGH	U18MB311	
2	KAMALESH C N	U18MB312	
3	KARTHIYAYINI .G	U18MB313	
4	KEERTHANA P	U18MB314	
5	KEISHAM LUXMIRANI	U18MB315	
6	LAKKAM UMESH KUMAR	U18MB316	
7	LAKSHMI PRIYA E	U18MB317	
8	LEKIWA O PALA	U18MB318	
9	LISHI YAM	U18MB319	
10	MADAN SHUBHAM SANJAY	U18MB320	
11	MAHI TYAGI	U18MB321	
12	MANIVANNAN N	U18MB322	
13	MARYAM MOHIDEEN PITCHAI	U18MB323	
14	MEDOZHAZO RUPREO	U18MB324	
15	MOHAMMED SALMAN	U18MB325	
16	MRINAL KUMAR	U18MB326	
17	NABAM YAMIN	U18MB327	
18	NALLI VASANTHSEETAL	U18MB328	
19	NEERAJ NAMASIVAYAM	U18MB329	
20	NEHA BARMAN	U18MB330	

RESOURCE PERSON

Dr.A. MANOHARAN
Reg. No 93333
Assistant Professor Department of Pathology
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kurlapakkam, Puducherry-605 502.

COORDINATOR

PROFESSOR & HEAD DEPT. OF PATHOLOGY
SRI LAKSHMI NARAYAN INSTITUTE OF
MEDICAL SCIENCES,
PUDUCHERRY - 605 502.

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

OSSUDU AGARAM VILLAGE; KUDAPAKKAM POST,PONDICHERRY - 605003

FNAC TECHNIQUES AND STAINING

SHORT ANSWERS 6X5= 30

Course Code: PA11

I. ANSWER ALL THE QUESTIONS

1. WRITE A SHORT NOTES ON FNAC PROCEDURE
2. WRITE IN DETAIL ABOUT ASPIRATION TECHNIQUES
3. FIXATION TECHNIQUES
4. VARIOUS STAINING PROCEDURE USED FOR FNAC PROCEDURES
5. ADVANTAGES AND DISADVANTAGES OF PAP STAIN
6. ADVANTAGES OF ROMNAWSKY STAIN

Malvi Tyagi.

FNAC TECHNIQUES & STAINING.

Roll. no 33

25/30

T

1. FNAC procedure :-

Fine Needle Aspiration Cytology is a simple, quick & inexpensive method that is used to sample superficial masses like those found in the neck and is usually performed in the Outpatient and clinic. It causes minimal trauma to the the patient and carries virtually no risk of complications.

2. Aspiration technique :-

Fine Needle aspiration is a type of biopsy procedure. In fine Needle aspiration, a thin needle is inserted into an area of abnormal appearing tissue or body fluid. As with other types of biopsies, the sample collected during fine needle aspiration can help make a diagnosis or rule out conditions such as cancer.

3. fixation techniques :-

Perfusion :- Tissues can be perfused with fixative following exsanguination and saline perfusion to allow rapid fixation of entire Organs.

Manivannan. N

FNAC TECHNIQUES AND STAINING

18/30

I ANSWER THE FOLLOWING

1) FNAC :

Fine Needle Aspiration Cytology (FNAC) is a technique whereby cells are obtained from a lesion using a thin bore needle and smears are made for cytopathology diagnosis. This technique is based on the fact that tumor cells are less cohesive and are easily aspirated.

2) Aspiration Techniques

There are 2 techniques :-

① FNAC with Aspiration

② FNAC without Aspiration

FNAC with Aspiration :-

* Site of FNAC should be cleaned by Spirit Swab
* Needle is introduced in the swelling and is

Student Feedback Form

Course Name: **FNAC TECHNIQUES AND STAINING**

Subject Code: **PA 11**

Name of Student: Keerthana · P Roll No.: U18MB314

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear					✓
2	Course contents met with your expectations					✓
3	Lecturer sequence was well planned				✓	
4	Lectures were clear and easy to understand					✓
5	Teaching aids were effective				✓	
6	Instructors encourage interaction and were helpful					✓
7	The level of the course					✓
8	Overall rating of the course	1	2	3	4	5 ✓

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

None

Signature

Date:

Student Feedback Form

Course Name: FNAC TECHNIQUES AND STAINING

Subject Code: **PA 11**

Name of Student: Tejesh Singh Roll No.: U18MB21

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear					✓
2	Course contents met with your expectations					✓
3	Lecturer sequence was well planned				✓	
4	Lectures were clear and easy to understand					✓
5	Teaching aids were effective				✓	
6	Instructors encourage interaction and were helpful					✓
7	The level of the course					✓
8	Overall rating of the course	1	2	3	4	✓5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

None

Signature

Date:

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that KEERTHANA. P has actively participated in the Value Added Course on FNAC TECHNIQUES AND STAINING held during July- Sep 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. A.Manoharan
RESOURCE PERSON

Dr. Pammy Sinha
COORDINATOR

PROFESSOR & HEAD, DEPT. OF PATHOLOGY
SRI LAKSHMI NARAYAN INSTITUTE OF
MEDICAL SCIENCES,
PUDUCHERRY - 605 502

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that JETESH SINH has actively participated in the Value Added Course on FNAC TECHNIQUES AND STAINING held during July- Sep 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. A.Manoharan

RESOURCE PERSON

A. MANOHARAN
Reg. No. 95333
Assistant. Professor Department. of Pathology
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

Dr. Pammy Sinha

COORDINATOR

PROFESSOR & HEAD. DEPT. OF PATHOLOGY
SRI LAKSHMI NARAYAN INSTITUTE OF
MEDICAL SCIENCES.
PUDUCHERRY 605 502.

22.09.2019

From

Dr.Pammy sinha
Professor and Head,
Department of pathology
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To

The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course:FNAC TECHNIQUE AND STAINING

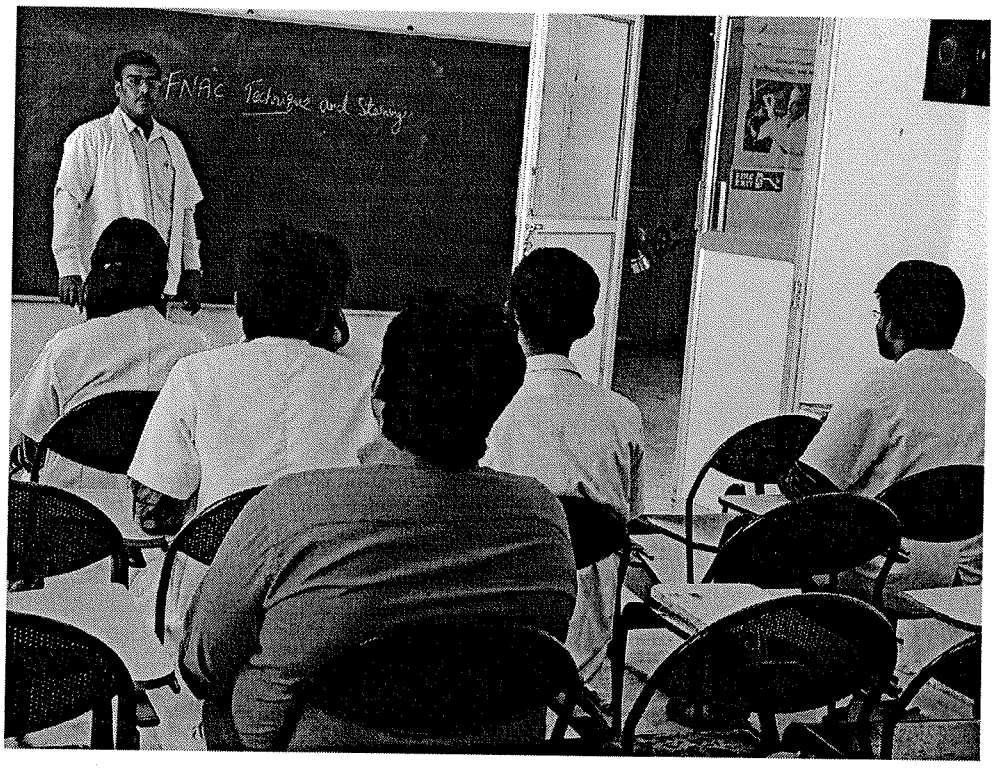
Dear Sir,

With reference to the subject mentioned above, the department has conducted thevalue-added course titled: :FNAC technique and staining procedure in IInd MBBS JULY- SEP 2019 for 20 students . We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards,

Dr.Pammysinha

PROFESSOR & HEAD, DEPT. OF PATHOLOGY
SRI LAKSHMI NARAYAN INSTITUTE OF
MEDICAL SCIENCES,
PUDUCHERRY - 605 502.


FNAC Technique and Story

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

Date:20.05.2019

From
Dr. Kalarani
Professor and HOD,
Department of Obstetrics and Gynaecology
Sri Lakshmi narayana Institute of Medical Sciences,
Bharath Institute of Higher Education and Research,
Chennai.

To
The Dean,
Sri Lakshmi Narayana Institue Of Medical Sciences,
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: Assisted Reproductive Technique

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: Assisted Reproductive Technique on July 2019 – December 2019. We solicit your kind permission for the same.

Kind Regards

Dr.Kalarani,

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean Dr. Balagurunathan

The HOD: Dr. Kalarani

The Expert: Dr. Sangeetha

The committee has discussed about the course and is approved.

DEAN
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
OSUDU, AGARAM VILLAGE,
KOODAPAKKAM POST,
PUDUCHERRY - 605 502

ASSISTANT PROFESSOR
DEPT. OF OBSTETRICS & GYNAECOLOGY
Sri Lakshmi Narayana Institute of
Medical Sciences
OSUDU, PUDUCHERRY.

PROFESSOR
DEPT. OF OBSTETRICS & GYNAECOLOGY
Sri Lakshmi Narayana Institute of
Medical Sciences
OSUDU, PUDUCHERRY.

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

Circular

15.06.2019

Sub: Organising Value-added Course: Assisted Reproductive Technique - reg

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research**, is organizing **"Assisted Reproductive Technique"**. The course content and registration form is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before 30.06.2019. Applications received after the mentioned date shall not be entertained under any circumstances.

DEAN
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
OSUDU, AGARAM VILLAGE,
KOODAPAKKAM POST,
PUDUCHERRY - 605 502

Course Proposal

Course Title: Assisted Reproductive Technique

Course Objective:

1. **Reproduction**
2. **IVF**
3. **Variations of IVF**
4. **Success Rate**
5. **Donor Sperm, Eggs and Embryos**
6. **Surrogacy**
7. **Risks of ART**
8. **Preparations**
9. **Selection of ART program**
10. **When to end Treatment ?**

Course Outcome: To gain Knowledge about Assisted Reproductive Technique

Course Audience: Final MBBS Undergraduates

Course Coordinator: Dr. Sangeetha

Course Faculties with Qualification and Designation:

1. **Dr. Kalarani, Prof. and HOD, OG**
2. **Dr. R. Sangeetha, Assistant Professor, OG**

Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Time	Hours
1	2.07.2019	Reproduction	4.00pm -7.00pm	3
2	10.07.2019	IVF	4.00pm -7.00pm	3
3	08.08.2019	Variations of IVF	4.00pm -7.00pm	3
4	16.08.2019	Success Rate	4.00pm -7.00pm	3
5	3.10.2019	Donor Sperm, Eggs and Embryos	4.00pm -7.00pm	3
6	12.10.2019	Surrogacy	4.00pm-7.00pm	3
7	26.10.2019	Risks of ART	4.00pm -7.00pm	3
8	05.11.2019	Preparations	4.00pm -7.00pm	3
9	11.11.2019	Selection of ART program	4.00pm -7.00pm	3
10	25.11.2019	When to end Treatment ?	4.00pm -7.00pm	3
			Total Hours	30

REFERENCE BOOKS: (Minimum 2)

Willaims Obstetrics Edition 21

START OG

VALUE ADDED COURSE

1. Name of the programme& Code

Assisted Reproductive Technique OBGY 11

2. Duration& Period

30 hrs & July 2019 – December 2019

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Multiple choice questions- *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7.No. of times offered during the same year:

1- July 2019 – December 2019

8. Year of discontinuation: 2019

9. Summary report of each program year-wise

Value Added Course					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength& Year**
1	OBGY 11	ASSISTED REPRODUCTIVE TECHNIQUE	Dr. Sangeetha	Final year MBBS	July 2019 to December 2019

10. Course Feed Back

Enclosed as Annexure- V

RESOURCE PERSON

ASSISTANT PROFESSOR
DEPT. OF OBSTETRICS & GYNAECOLOGY
Sri Lakshmi Narayana Institute of
Medical Sciences
OSUDU, PUDUCHERRY.

COORDINATOR

DEAN
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
OSUDU, AGARAM VILLAGE,
KOODAPAKKAM POST,
PUDUCHERRY - 605 502

AMERICAN SOCIETY FOR REPRODUCTIVE MEDICINE

ASSISTED REPRODUCTIVE TECHNOLOGY

A Guide for Patients

Revised 2018

A glossary of italicized words is located at the end of this bookletAssisted Reproductive Technology A Guide for Patients PATIENT INFORMATION SERIES AMERICAN SOCIETY FOR REPRODUCTIVE MEDICINE Published by the American Society for Reproductive Medicine under the direction of the Patient Education Committee and the Publications Committee. No portion herein may be reproduced in any form without written permission. is booklet is in no way intended to replace, dictate or fully de-ne evaluation and treatment by a quali-ed physician. It is intended solely as an aid for patients seeking general information on issues in reproductive medicine. Copyright © 2018 by the American Society for Reproductive Medicine 3 AMERICAN SOCIETY FOR REPRODUCTIVE MEDICINE ASSISTED REPRODUCTIVE TECHNOLOGY A Guide for Patients Revised 2018 A glossary of italicized words is located at the end of this booklet. INTRODUCTION is booklet will help you understand in vitro fertilization (IVF) and other assisted reproductive technology (ART) that have become accepted medical treatments for infertility. rough these procedures, many couples with otherwise untreatable infertility have given birth to healthy babies. UNASSISTED REPRODUCTION In order to understand assisted reproduction and how it can help infertile couples, it is important to understand how

conception takes place naturally. For traditional conception to occur, the man must ejaculate his semen, the -uid containing the sperm, into the woman's vagina around the time of ovulation, when her ovary releases an egg. Ovulation is a complex event controlled by the pituitary gland, which is located at the base of the brain. e pituitary gland releases follicle-stimulating hormone (FSH), which stimulates follicles in one of the ovaries to begin growing. e follicle produces the hormone estrogen and contains a maturing egg. When an egg is mature, the pituitary gland sends a surge of luteinizing hormone (LH) that causes the follicle to rupture and release (ovulate) a mature egg (Figure 1). To see the stages of embryo development, please see Appendix 1. Following ovulation, the egg is picked up by one of the fallopian tubes. Since fertilization usually takes place inside the fallopian tube, the man's sperm must be capable of swimming through the vagina and cervical mucus, up the cervical canal into the uterus, and up into the fallopian tube, where it must penetrate the egg in order to fertilize it. e fertilized egg continues traveling to the uterus and implants in the uterine lining, where it continues to develop. 4 Figure 1. Solid arrows indicate path sperm must travel to reach the egg. e fertilized egg continues traveling through the fallopian tube to the uterus. IN

VITRO FERTILIZATION (IVF) ere are many factors that can prevent the union of sperm and egg, and these are discussed in the ASRM patient information booklet titled, Infertility: An Overview. Fortunately, ART such as IVF can help. IVF is a method of assisted reproduction in which a man's sperm and a woman's eggs are combined outside of the body in a laboratory dish. One or more fertilized eggs (embryos) may be transferred into the woman's uterus, where they may implant in the uterine lining and develop. Excess embryos may be cryopreserved (frozen) for future use. Initially, IVF was used to treat women with blocked, damaged, or absent fallopian tubes. Today, IVF is used to treat many causes of infertility, such as endometriosis and male factor, or when a couple's infertility is unexplained. e basic steps in an IVF treatment cycle are ovarian stimulation, egg retrieval, fertilization, embryo culture, and embryo transfer. ese are discussed in the following sections. Ovarian Stimulation During ovarian stimulation, also known as ovulation induction, medications or "fertility drugs," are used to stimulate multiple eggs to grow in the ovaries rather than the single egg that normally develops each month (Table 1) (please see the ASRM booklet titled, Medications for Inducing Ovulation for more detailed information). Multiple eggs are stimulated because some eggs will not fertilize or

develop normally after fertilization. Uterus Fertilization usualy occurs here Egg released Cervix (Ovulated) Cervical mucus Vagina Sperm Ovary Fallopian Tube 5 Table 1 Medications for Ovarian Stimulation t human menopausal gonadotropin (hMG) t follicle-stimulating hormone (FSH) t luteinizing hormone (LH) (used in conjunction with FSH) t human chorionic gonadotropin (hCG) t clomiphene citrate t letrozole Medications to Prevent Premature Ovulation t Gonadatropin-releasing hormone (GnRH) agonists t GnRH antagonists Clomiphene citrate and letrozole are administered orally while the other medications listed are given by injection. ese oral medications are less potent than injectable medications and are not as commonly used in ART cycles. ere is no evidence that one injectable medication is superior to any other. Timing is crucial in an IVF cycle. e ovaries are evaluated during treatment with vaginal ultrasound examinations to monitor the development of ovarian follicles (Figure 2). Blood samples are drawn to measure the response to ovarian stimulation medications. Normally, estrogen levels increase as the follicles develop, and progesterone levels are low until after ovulation. Figure 2. Ovarian follicles, stimulated by ovulation medications, visible on ultrasound. e dark, circular areas are the follicles. 6 Using ultrasound examinations and blood testing, the

physician can determine when the follicles are ready for egg retrieval. Generally, 8 to 14 days of stimulation are required. When the follicles are ready, hCG or other medications are given. e hCG replaces the woman's natural LH surge and causes the nal stage of egg maturation so the eggs are capable of being fertilized. e eggs are retrieved before ovulation occurs, usually 34 to 36 hours after the hCG injection is given. Up to 20% of cycles may be cancelled prior to egg retrieval. IVF cycles may be cancelled for a variety of reasons, usually due to an inadequate number of follicles developing. Cancellation rates due to low response to the ovulation drugs increase with a woman's age, especially after age 35. When cycles are cancelled due to a poor response, alternate drug strategies may be helpful to promote a better response in a future attempt. Occasionally, a cycle may be cancelled to reduce the risk of ovarian hyperstimulation syndrome (OHSS). Treatment with a GnRH agonist or antagonist reduces the possibility of premature LH surges from the pituitary gland, and thereby reduces the risk of premature ovulation. However, LH surges and ovulation occur prematurely in a small percentage of ART cycles despite the use of these drugs. When this occurs, since it is unknown when the LH surges began and eggs will mature, the

cycle is usually cancelled. Collection of eggs from the peritoneal cavity after ovulation is not ecient. Egg Retrieval Egg retrieval is usually accomplished by transvaginal ultrasound aspiration, a minor surgical procedure that can be performed in the physician's oce or an outpatient center. Some form of pain medication is generally administered. An ultrasound probe is inserted into the vagina to identify the follicles, and a needle is guided through the vagina and into the follicles (Figure 3). 7 e eggs are aspirated (removed) from the follicles through the needle connected to a suction device. Removal of multiple eggs can usually be completed in less than 30 minutes. Some women experience cramping on the day of the retrieval, but this sensation usually subsides by the next day. Feelings of fullness and/or pressure may last for several weeks following the procedure because the ovaries remain enlarged. In some circumstances, one or both ovaries may not be accessible by transvaginal ultrasound. Laparoscopy may then be used to retrieve the eggs using a small telescope placed in the umbilicus. For more information on laparoscopy, consult the ASRM patient information booklet titled, Laparoscopy and Hysteroscopy. Uterus Ultrasound Probe Collection Tube Vagina Ovary Fallopian Tube Follicle Aspiration Needle Suction Pump Figure 3. Egg

retrieval is usually performed through the vagina with an ultrasound-guided needle. 8 Fertilization and Embryo Culture After the eggs are retrieved, they are examined in the laboratory for maturity and quality. Mature eggs (Figure 4) are placed in an IVF culture medium and transferred to an incubator to await fertilization by the sperm. Figure 4 Figure 4 Figure 4. A mature, unfertilized egg. Sperm is separated from semen usually obtained by masturbation or in a special condom used during intercourse. Alternatively, sperm may be obtained from the testicle, epididymis, or vas deferens from men whose semen is void of sperm either due to an obstruction or lack of production. Fertilization may be accomplished by insemination, where motile sperm are placed together with the oocytes and incubated overnight or by intracytoplasmic sperm injection (ICSI), where a single sperm is directly injected into each mature egg (Figure 5). In the United States, ICSI is performed in approximately 60% of ART cycles. ICSI is usually performed when there is a likelihood of reduced fertilization (e.g., poor semen quality, history of failed fertilization in a prior IVF cycle). Overall, pregnancy and delivery rates with ICSI are similar to the rates seen with traditional IVF. Genetic counseling is advisable before ICSI if inherited abnormalities are identied that

may be passed from father to son. For more information, see the ASRM fact sheet titled, Intracytoplasmic Sperm Injection. 9 Visualization of two pronuclei the following day conrms fertilization of the egg. One pronucleus is derived from the egg and one from the sperm. Usually 65% to 75% of mature eggs will fertilize after insemination or ICSI. Lower rates may occur if the sperm and/or egg quality are poor. Occasionally, fertilization does not occur at all, even if ICSI was used. Two days after the egg retrieval, the fertilized egg has divided to become a 2- to 4-cell embryo (Figure 6). Figure 5. Intracytoplasmic sperm injection (ICSI), in which a sperm is injected directly into an egg to facilitate fertilization. Figure 6. A fertilized egg has divided once and is now a 2-cell embryo. Larger tube that holds the egg still Small glass tube through which the sperm is injected into the egg 10 By the third day, a normally developing embryo will contain approximately 6 to 10 cells. By the fth day, a -uid cavity forms in the embryo, and the placenta and fetal tissues begin to separate. An embryo at this stage is called a blastocyst. Embryos may be transferred to the uterus at any time between one and six days after the egg retrieval. If successful development continues in the uterus, the embryo hatches from the surrounding zona pellucida and implants into the lining

of the uterus approximately 6 to 10 days after the egg retrieval. Assisted hatching (AH) is a micromanipulation procedure in which a hole is made in the zona pellucida just prior to embryo transfer to facilitate hatching of the embryo. Although AH has not been demonstrated denitively to improve live birth rates, AH may be used for older women or couples who have had unsuccessful prior IVF attempts. ere is no clear benet of AH to improve pregnancy or live birth rates in other groups of IVF patients. Please refer to the fact sheet on assisted hatching for more details. Preimplantation genetic diagnosis (PGD) is performed at some centers to screen for inherited diseases. In PGD, one or two cells are removed from the developing embryo and tested for a specic genetic disease. Embryos that do not have the gene associated with the disease are selected for transfer to the uterus. ese procedures require specialized equipment and experience together with IVF (in a couple who may otherwise not need IVF to conceive). Some couples, especially those who are carriers of genetic diseases, consider embryo screening benecial in reducing the risk of having an aected child. While PGD can reduce the likelihood of conceiving a pregnancy with an aected child, it cannot eliminate the risk. Conrmation with chorionic villus sampling (CVS), amniocentesis, or other testing is still necessary.

Embryo Transfer e next step in the IVF process is the embryo transfer. No anesthesia is necessary, although some women may wish to have a mild sedative. e physician identies the cervix using a vaginal speculum. One or more embryos suspended in a drop of culture medium are drawn into a transfer catheter (a long, thin sterile tube) with a syringe on one end. e physician gently guides the tip of the transfer catheter through the cervix and places the -uid containing the embryos into the uterine cavity (Figure 7). e procedure is usually painless, although some women experience mild cramping. ASRM 11 publishes guidelines regarding determination of how many embryos should be considered for transfer. Figure 7. Embryo transfer is performed through the cervix. e maximum number of embryos transferred is based on the patient's age and other individual patient and embryo characteristics. Since each embryo has a fair probability of implantation and development, the number of embryos to be transferred should be determined for each patient, taking into account the odds of achieving a pregnancy based on the number of embryos transferred weighed against the risk of multiple gestation. ese guidelines have been eective in helping U.S. ART programs maintain their high success rates while signicantly decreasing the number of high-order

multiple pregnancies (triplets and higher). e reproductive endocrinologist or embryologist will discuss this with the patient prior to the transfer. 12 Cryopreservation Extra embryos remaining after the embryo transfer may be cryopreserved (frozen) for future transfer. Cryopreservation makes future ART cycles simpler, less expensive, and less invasive than the initial IVF cycle, since the woman does not require ovarian stimulation or egg retrieval. Once frozen, embryos may be stored for prolonged periods, and live births have been reported using embryos that have been frozen for almost 20 years. However, not all embryos survive the freezing and thawing process, and the live birth rate is lower with cryopreserved embryo transfer. Couples should decide if they are going to cryopreserve extra embryos before undergoing IVF. ere are two methods used to cryopreserve embryos: conventional (slow) freezing and “vitri-cation” or fast freezing. Your center will determine which method is best to use based on their experience and the developmental stage at which the embryos are frozen. Although some reports claim that vitrication may have higher success rates after thawing/warming, this is not the case at all centers. It should also be noted that more and more ART centers are cryopreserving oocytes (eggs) prior to fertilization. is is done most

commonly in young women who are about to undergo treatments or procedures that may aect their future fertility, such as chemotherapy for cancer. However, it is also used for couples who do not wish to freeze embryos because of concerns over their survival during freezing and thawing or the dilemma of what to do with remaining embryos after they have completed their families. Clinic success rates may vary. Finally, it should be noted that although there are theoretical risks, freezing of sperm, eggs, and embryos is very safe. ere have been no documented cases of infectious disease transmission, nor do the risks of birth defects, chromosomal anomalies, or pregnancy complications appear to be increased compared with using fresh sperm, eggs, or embryos. VARIATIONS OF IVF Gamete intrafallopian transfer (GIFT) is similar to IVF, but the gametes (egg and sperm) are transferred to the woman's fallopian tubes rather than her uterus, and fertilization takes place in the tubes rather than in the lab. Another dierence is that laparoscopy, a surgical procedure, is necessary to transfer the sperm and egg to the tubes. GIFT is an option only for women who have normal fallopian tubes. Some couples may consider GIFT for religious reasons 13 because eggs are not fertilized outside the body. One limitation of GIFT is that fertilization cannot be conrmed as with IVF.

Today, GIFT comprises less than 1% of ART procedures performed in the United States. Another ART procedure is zygote intrafallopian transfer (ZIFT). is technique diers from GIFT in that fertilization takes place in the lab rather than the fallopian tube, but is similar in that the fertilized egg is transferred to the tube rather than the uterus. is procedure also requires a laparoscopy. Today, ZIFT comprises less than 1% of ART procedures performed in the United States. SUCCESS RATES e most recent rates for individual IVF programs in the United States are available on the Internet from the Society for Assisted Reproductive Technology (SART) at www.sart.org and from the Centers for Disease Control and Prevention (CDC): www.cdc.gov/art. Although this information is readily available, the results should be interpreted carefully. e success rates of an IVF center depend on a number of factors, and a comparison of clinic success rates is not meaningful because patient characteristics and treatment approaches vary from clinic to clinic. For example, the type of patients accepted into the program and the number of embryos transferred per cycle aect the program's statistics. Statistics calculated on small numbers of cycles may not be accurate. An IVF center's rates may change dramatically over time, and the compiled statistics may not represent a

program’s current success. It is also important to understand the denitions of pregnancy rates and live birth rates. For example, a pregnancy rate of 40% does not mean that 40% of women took babies home. Pregnancy does not always result in live birth. A biochemical pregnancy is a pregnancy conrmed by blood or urine tests but not visible on ultrasound, because the pregnancy stops developing before it is far enough along to be seen on ultrasound. A clinical pregnancy is one in which the pregnancy is seen with ultrasound, but stops developing sometime afterwards. erefore, when comparing the “pregnancy” rates of dierent clinics, it is important to know which type of pregnancy is being compared. Most couples are more concerned with a clinic’s live birth rate, which is the probability of delivering a live baby per IVF cycle started. Pregnancy rates, and more importantly live birth rates, are in-uenced by a number of factors, especially the woman’s age. 14 DONOR SPERM, EGGS, AND EMBRYOS IVF may be performed with a couple’s own eggs and sperm or with donor eggs and sperm, or both. A couple may choose to use a donor if there is a problem with their own sperm or eggs, or if they have a genetic disease that could be passed on to a child. Donors may be known or anonymous. In most cases, donor sperm is obtained from a sperm bank. Both

sperm and egg donors undergo extensive medical and genetic screening, as well as testing for infectious diseases. Sexually transmitted disease screening and testing for both sperm and egg donation are highly regulated by the U.S. Food and Drug Adminstration (FDA). Donor sperm is frozen and quarantined for six months, the donor is re-tested for infectious diseases including the human immunodeciency virus (HIV), and sperm are only released for use if all tests are negative. Donor sperm may be used for insemination or in an ART cycle. Unlike intrauterine insemination (IUI) cycles, the use of frozen sperm in IVF cycles does not lower the chance of pregnancy. Donor eggs are an option for women with a uterus who are unlikely or unable to conceive with their own eggs. Egg donors undergo much the same medical and genetic screening as sperm donors. Until recently, it has not been possible to freeze and quarantine eggs like sperm. Recent advances in oocyte freezing, though, have made this a possibility, and there are a few companies and clinics that are using such an approach. e egg donor may be chosen by the infertile couple or the ART program. Egg donors assume more risk and inconvenience than sperm donors. In the United States, egg donors selected by ART programs generally receive monetary compensation for their participation. Egg donation is

more complex than sperm donation and is done as part of an IVF procedure. e egg donor must undergo ovarian stimulation and egg retrieval. During this time, the recipient (the woman who will receive the eggs after they are fertilized) receives hormonal medications to prepare her uterus for implantation. After the retrieval, the donor's eggs are fertilized by sperm from the recipient's partner and transferred to the recipient's uterus. e recipient will not be genetically related to the child, but she is a biologic parent in the sense that she will carry the pregnancy and give birth. Egg donation is expensive because donor selection, screening, and treatment add additional costs to the IVF procedure. However, the relatively high live birth rate for egg donation, over 50% nationally, provides many couples with their best chance for success. Overall, donor eggs are used in nearly 10% of all ART cycles in the United States. 15 In some cases, when both the man and woman are infertile, both donor sperm and eggs have been used. Donor embryos may also be used in these cases. Some IVF programs allow couples to donate their unused frozen embryos to other infertile couples. Appropriate screening of the individuals whose genetic embryos are used should adhere to federal and state guidelines. e use of donor sperm, eggs, or embryos is a complicated issue that has lifelong implications. Talking

with a trained counselor who understands donor issues can be very helpful in the decision-making process. Many programs have a mental health professional on sta or the physician may recommend one. If a couple knows the donor, their physician may suggest that both the couple and the donor speak with a counselor and an attorney. Some states require and most IVF centers recommend an attorney to le paperwork for the couple with the court when donor gametes or embryos are used. SURROGACY/GESTATIONAL CARRIER A pregnancy may be carried by the egg donor (traditional surrogate) or by another woman who has no genetic relationship to the baby (gestational carrier). If the embryo is to be carried by a surrogate, pregnancy may be achieved through insemination alone or through ART. e surrogate will be biologically related to the child. If the embryo is to be carried by a gestational carrier, the eggs are removed from the infertile woman, fertilized with her partner's sperm, and transferred into the gestational carrier's uterus. e gestational carrier will not be genetically related to the child. All parties benet from psychological and legal counseling before pursuing surrogacy or a gestational carrier. RISKS OF ART e medical risks of ART depend on each specic step of the procedure. e following are some of the primary risks of ART procedures: Ovarian

stimulation carries a risk of hyperstimulation, where the ovaries become swollen and painful. Fluid may accumulate in the abdominal cavity and chest, and the woman may feel bloated, nauseated, and experience vomiting or lack of appetite. Up to 30% of women undergoing ovarian stimulation have a mild case of OHSS that can be managed with over-the-counter painkillers and a reduction in activity. In moderate OHSS, women develop or accumulate -uid within the abdominal cavity, and gastrointestinal symptoms may occur. ese women are monitored closely, but generally do very well with simple outpatient 16 management. e condition tends to resolve without intervention unless pregnancy occurs, in which case recovery may be delayed for several weeks. Up to 2% of women develop severe OHSS characterized by excessive weight gain, -uid accumulation in the abdomen and chest, electrolyte abnormalities, over-concentration of the blood, and, in rare cases, the development of blood clots, kidney failure, or death. It may be medically necessary to drain -uid from the abdomen with a needle if breathing becomes dicult. Women with severe OHSS require hospitalization until the symptoms improve. If pregnancy occurs, OHSS can worsen. Occasionally, termination of pregnancy must be considered in the most severe cases. Although

initial reports suggested that women who use fertility drugs have an increased risk for ovarian cancer, numerous recent studies support the conclusion that fertility drugs are not linked to ovarian cancer. Nevertheless, there is still uncertainty whether a risk exists, and research continues to address this question. An annual gynecologic visit is recommended for all women with examination of the ovaries, regardless of prior use of ovulation medications. ere are risks related to the egg retrieval procedure. Laparoscopy carries the risks of any surgery that requires anesthesia. Removing eggs through an aspirating needle entails a slight risk of bleeding, infection, and damage to the bowel, bladder, or a blood vessel. is is true whether the physician uses laparoscopy or ultrasound to guide the needle. Less than 1 patient in 1,000 will require major surgery to repair damage from complications of the egg retrieval procedure. In rare cases, infection may occur from the retrieval or embryo transfer. e chance of multiple pregnancy is increased in all assisted reproductive technologies when more than one embryo is transferred. Although some would consider twins a happy result, there are many problems associated with multiple births, and problems become progressively more severe and common with triplets and each additional fetus thereafter. Women carrying a multiple

pregnancy may need to spend weeks or even months in bed or in the hospital in an attempt to delay preterm delivery. e risk of preterm delivery in multiple pregnancies is high, and babies may be born too early to survive. Premature babies require prolonged and intensive care and risk lifelong handicaps due to premature birth. Some couples may consider multifetal pregnancy reduction to decrease the risks due to multiple pregnancy, 17 but this is likely to be a dicult decision. For more information on this topic, refer to the ASRM patient information booklet titled Multiple Pregnancy and Birth: Twins, Triplets, and Higher Order Multiples and the ASRM patient fact sheet, Complications and Problems Associated with Multiple Birth. Data also suggest that IVF conceptions, even singletons, have a slightly increased risk of preterm delivery or low birth weight. First-trimester bleeding may signal a possible miscarriage or ectopic pregnancy. If bleeding or pain (before 13 weeks) occurs, a medical evaluation is needed to determine the cause. Some evidence suggests that early bleeding is more common in women who undergo IVF and GIFT and is not associated with the same poor prognosis as it is in women who conceive spontaneously. Miscarriage may occur after ART, even after ultrasound identies a pregnancy in the uterus. Miscarriage occurs after

ultrasound in nearly 15% of women younger than age 35, in 25% at age 40, and in 35% at age 42 following ART procedures. In addition, there is approximately a 5% chance of ectopic pregnancy with ART. It is not clear whether the risk of birth defects is increased with IVF. Most studies do not show an increased risk, but several studies do. Research is ongoing to determine the magnitude, if any, of this risk. Furthermore, when ICSI is used in cases of severe male factor infertility, a genetic cause of male infertility may be passed on to the ospring. Assisted reproductive technologies involve signicant physical, nancial, and emotional commitments on the part of the couple. Psychological stress is common, and some couples describe the experience as an emotional roller coaster. e treatments are involved and costly. Patients have high expectations, yet failure is common in any given cycle. Couples may feel frustrated, angry, isolated, and resentful. At times, frustration can lead to depression and feelings of low self-esteem, especially in the immediate period following a failed ART attempt. e support of friends and family members is very important at this time. Couples are encouraged to consider psychological counseling as an additional means of support and stress management. Many ART programs have a mental health professional on sta to

help couples deal with the grief, tension, or anxieties associated with infertility and its treatment. 18 PREPARATION FOR ART Preliminary preparation for an ART procedure may be as important as the procedure itself. Testing for ovarian reserve may be recommended in order to predict how the ovaries will respond to fertility medication. e chance of success may be poor, for example, if tests demonstrate diminished ovarian reserve or fertility potential. Ovarian reserve may be determined by any of these methods: measuring FSH and estradiol levels on the second or third day of a menstrual cycle, measuring the level of AMH (antimüllerian hormone), performing a clomiphene citrate challenge test (CCCT), or counting the number of small follicles in the ovary (antral follicle count). An elevated FSH and/or estradiol level, a low antral follicle count, or a low AMH level is associated with reduced pregnancy rates, especially in women over the age of 35 years. However, age itself is the single most important factor in determining the chances for success with IVF. Uterine cavity abnormalities such as -broids, polyps, or a septum may need to be corrected before IVF or GIFT. A hydrosalpinx, a -uid-lled, blocked fallopian tube, reduces IVF success. Some physicians advise clipping or removing the aected tube prior to IVF. For more

information, see the ASRM patient fact sheet titled, Hydrosalpinx. Semen is tested before ART. If semen abnormalities are identied, consultation with a specialist in male infertility should determine if there are correctable problems or underlying health concerns. For example, genetic abnormalities in the Y chromosome have been linked to some cases of male infertility; and men born without a vas deferens, the tube that transports sperm from the testicle, are often carriers of a gene that causes cystic brosis. In these circumstances, genetic testing may be advisable. Major advances have been made in the treatment of male infertility, and IVF may help some men who were previously considered sterile. Detailed consultation with a specialist in male infertility is essential. When sperm cannot be collected by masturbation, other forms of sperm retrieval are available. For example, for men who cannot ejaculate, such as those with spinal cord injuries, medical procedures to assist ejaculation are recommended. ese procedures include penile vibratory stimulation (PVS) and electroejaculation (EEJ). During PVS, a strong vibrator is placed on the head of the penis to deliver stimulation resulting in ejaculation. During EEJ, electrical impulses from a probe placed in the rectum near the prostate often 19 stimulate ejaculation. For men who are able to

ejaculate, but who do not produce sperm in their semen, medical procedures are available to retrieve sperm from reproductive tissues. ese procedures include microepididymal sperm aspiration (MESA), percutaneous epididymal sperm aspiration (PESA), or testicular sperm extraction (TESE). MESA can be performed to recover sperm after vasectomy or after failed vasectomy reversal, and in some men with absence of the vas deferens. TESE involves testicular biopsy and recovery of sperm directly from testicular tissue, and may be performed in an oce setting with local anesthesia. Sperm obtained by these methods may be frozen, stored, and thawed for later ART. Lifestyle issues should be addressed before ART. Smoking, for example, may lower a woman's chance of success by as much as 50%. Live birth rates after ART decrease signicantly with obesity, due to a combination of lower pregnancy rates and higher miscarriage rates. Achieving a more optimal weight prior to undergoing IVF appears to be appropriate. All medications, including over-the-counter supplements, should be reviewed since some may have detrimental eects. Alcohol and recreational drugs may be harmful, and excessive caeine consumption should be avoided. Because folic acid taken prior to pregnancy reduces the risk of neural tube defects such as spina bi-da, women

should take prenatal vitamins containing at least 400 micrograms of folic acid before beginning an ART cycle. A complete exam and Pap smear may identify problems that should be treated before pregnancy. A detailed examination of ART insurance benets is helpful. Even if ART is excluded from a policy, coverage may be available for some aspects of these procedures. Couples should consult their company's benets director in advance, since options such as a medical savings account may be available. It also is important to determine the costs for the ART treatment cycle. Keep in mind that fees for initial consultation, screening tests, medications, and special procedures such as ICSI and cryopreservation may not be included in the estimate. Other expenses to consider include travel, lodging, and time missed from work. SELECTING AN ART PROGRAM When selecting an ART program, information is crucial. Important points for consideration include the qualications and experience of personnel, types of patients being treated, support services available, cost, convenience, live birth rates per ART cycle started, and multiple pregnancy rates. Older 20 programs have established live birth rates based on years of experience. Small and new programs may still be determining their live birth rates, although their personnel may be equally well qualied. Every

couple wants to use the most successful ART program, but many factors contribute to the overall success of a program. For example, some clinics may be willing to accept patients with a low chance of success. A clinic may specialize in certain types of infertility treatment. Costs may vary among programs. A couple may prefer a program based on interpersonal interactions with the ART team, or may feel more condent in the recommended treatment plan. Consequently, it is not appropriate to compare programs based only on the published pregnancy rates. Credibility is important too. Does the program adhere to the guidelines set forth by the American Society for Reproductive Medicine (ASRM)? Is the program a member of SART, a society aliated with the ASRM? Is the IVF lab accredited by the College of American Pathologists or by the Joint Commission? ese organizations require ART programs to have personnel on their sta who have been trained in reproductive endocrinology, laparoscopic surgery, sonography, hormone measurement, tissue culture technique, and sperm/egg interaction. Are the physicians board certied in reproductive endocrinology and infertility? Does the program report its results to SART/ CDC? e compiled results are published in Fertility and Sterility, the ASRM journal, and results are available on the SART web site at www.sart.org and the

CDC’s web site at: www.cdc.gov/art. e above considerations and answers to the following questions, which may be asked of each program, will help you make an informed decision when choosing an ART program. Cost and Convenience t What pre-cycle screening tests are required? How much do they cost? Will my insurance provide coverage for these tests? t How much does the ART procedure cost, including drugs per treatment cycle? t Do I pay in advance? How much? What are the methods of payment? t If applicable, will you submit any bills to my insurance company? How much do I pay if my treatment cycle is canceled before egg recovery? Before embryo transfer? t What are the costs for embryo freezing, storage, and transfer? t How much work will I miss? How much will my partner miss? t Do you help arrange (low-cost) lodging, if needed? 21 Details about the Program t Is the program a member of SART? t Does the program meet and follow ASRM/SART guidelines? t Does the program report its results to SART/CDC? t How many physicians will be involved in my care? t Are one or more physicians board certied in reproductive endocrinology? t To what degree can my own physician participate in my care? t What types of counseling and support services are available? t Who do I call day or night if I have a problem? t Do you freeze embryos

(cryopreservation)? t Is donor sperm available in your program? Donor eggs? Donor embryos? t Do you have an age or basal FSH cut-o? t Do you perform ICSI? If so, when? What is the cost? t Do you perform assisted hatching? If so, when? What is the cost? t How many eggs/embryos would be transferred in my case? t Who makes the nal decision to cancel the cycle if my response to stimulation is sub-optimal? Success of the Program SART is a very good source of information from which to obtain ART outcomes for each member program in the United States. is information may be a year old, so it is important to nd out if there have been any signicant changes in the program since the most recent report, including: t Personnel changes t Changes in the approach to ovarian stimulation, egg retrieval, embryo culture, or embryo transfer t Change in the number of cycles t Change in the miscarriage rate, live birth rate per cycle started, or the multiple pregnancy rate If a program cites a live birth rate for each procedure, be sure that the program representative counts twins as one successful pregnancy, not two. When discussing recent ART program outcomes, keep in mind that the live birth rate may vary depending on the denominator used —that is, per cycle started, per retrieval, or per embryo transfer. For example, live birth rates per egg retrieval do not consider cancelled

cycles, and rates based per embryo transfer do not include cancelled cycles or fertilization failures. - erefore, live birth rates per cycle are higher per egg retrieval and are highest per embryo transfer. 22 WHEN TO END TREATMENT Studies indicate that the chance for pregnancy in consecutive IVF cycles remains similar in up to four cycles. However, many other factors should be considered when determining the appropriate endpoint in therapy, including nancial and psychological reserves. Members of the IVF team can help couples decide when to stop treatment and discuss other options such as egg and/or sperm donation or adoption, if appropriate. e physician, support groups, and other couples undergoing infertility treatment can provide valuable support and guidance. CONCLUSION e decision to seek treatment for infertility is a viable one due to the assisted reproductive technologies available today. With patience, a positive attitude, and the appropriate treatment, most infertile couples will eventually experience the joys of parenthood. For additional information, visit www. sart.org and www.cdc.gov/art. 23 Appendix 1: Stages of Embryo Development 24 GLOSSARY American Society for Reproductive Medicine (ASRM). A professional medical organization of more than 8,000 healthcare professionals dedicated

to reproductive medicine. Amniocentesis. A procedure in which a small amount of amniotic -uid is removed through a needle from the fetal sac at about 16 weeks into a pregnancy. e -uid is studied for chromosomal or other abnormalities which may aect fetal development. Antimüllerian hormone (AMH). A hormone which is often measured in a woman to help determine her egg supply, or "ovarian reserve." It is secreted by small, growing follicles. Antral follicle count. e number of follicles noted by ultrasound at the beginning of the menstrual cycle, usually day 2 or 3. Assisted hatching (AH). A procedure in which the zona pellucida (outer covering) of the embryo is partially opened, usually by application of an acid or laser, to facilitate embryo implantation and pregnancy. Assisted reproductive technology (ART). All treatments which include the handling of eggs and/or embryos. Some examples of ART are in vitro fertilization (IVF), gamete intrafallopian transfer (GIFT), pronuclear stage tubal transfer (PROST), tubal embryo transfer (TET), and zygote intrafallopian transfer (ZIFT). Biochemical pregnancy. When a woman's pregnancy test is initially positive but becomes negative before a gestational sac is visible on ultrasound. Blastocyst. An embryo that has formed a -uid-lled cavity and the cells have begun to form the early placenta and embryo, usually 5 days

after ovulation or egg retrieval. Centers for Disease Control and Prevention (CDC). Federal agency for protecting the health and safety of people at home and abroad, providing credible information to enhance health decisions, and promoting health through strong partnerships. Cervical canal. e passageway leading from the vagina into the uterus. Cervical mucus. e substance in the cervix through which sperm must swim to enter the uterus. Cervix. e narrow, lower end of the uterus. Clinical pregnancy. A pregnancy conrmed by an increasing level of hCG and the presence of a gestational sac detected by ultrasound. Clomiphene citrate challenge test (CCCT). A test of ovarian reserve in which serum FSH is checked on days 3 and 10 of the menstrual cycle and clomiphene citrate is taken on days 5 through 9. 25 Clomiphene citrate. An oral antiestrogen medication used to induce ovulation. Cryopreservation. Freezing at a very low temperature, such as in liquid nitrogen (-196°C) to keep embryos, eggs, or sperm viable. Cryopreserved. Frozen. Ectopic pregnancy. A pregnancy in the fallopian tube or elsewhere outside the lining of the uterus. Egg (oocyte). e female sex cell (ovum) produced by the ovary, which, when fertilized by a male's sperm, produces an embryo. Egg retrieval. e procedure in which eggs are obtained by inserting a needle into the

ovarian follicle and removing the -uid and the egg by suction. Also called oocyte aspiration. Electroejaculation (EEJ). Procedure to cause ejaculation of sperm, performed by electrical stimulation of tissue in the region of the prostate. Embryo. A fertilized egg that has begun cell division. Embryo culture. Growth of the embryo in a laboratory (culture) dish. Embryo transfer. Placement of an embryo into the uterus or, in the case of ZIFT and TET, into the fallopian tube. Endometriosis. A disease in which tissue resembling endometrium (the lining of the uterus) grows outside the uterus. It is often associated with infertility. Epididymis. e duct between testes and vas deferens where sperm are stored and mature. Estradiol. e predominant estrogen (hormone) produced by the follicular cells of the ovary. Estrogen. e female hormone largely responsible for thickening the uterine lining during the rst half of the menstrual cycle in preparation for ovulation and possible pregnancy. Estradiol is the main estrogen. Fallopian tubes. A pair of tubes attached to the uterus, one on each side, where sperm and egg meet in normal conception. Fertilization. e fusion of sperm and egg. Fibroids. Benign (non-cancerous) tumors of the uterine muscle wall that can cause abnormal uterine bleeding and pain. Follicle. A -uid-lled structure in the ovary

containing an egg and the surrounding cells that produce hormones. As the follicle matures, the -uid can be visualized by ultrasound. Follicle-stimulating hormone (FSH). e pituitary hormone responsible for stimulating the growth of the follicle that surrounds the egg. In addition, it is the hormone in injectable ovulation medications that promotes growth of the follicles. Gamete intrafallopian transfer (GIFT). e direct transfer of sperm and 26 eggs into the fallopian tube. Fertilization takes place inside the tube. Gestational carrier. A woman who carries a pregnancy for another couple. e pregnancy is derived from the egg and sperm of the couple. Although she carries the pregnancy to term, she does not have a genetic relationship to the resulting child. Gonadotropin-releasing hormone (GnRH). Hormone secreted by the hypothalamus, a control center in the brain, which prompts the pituitary gland to release FSH and LH into the bloodstream. GnRH agonists. A GnRH analog that initially stimulates the pituitary gland to release LH and FSH, followed by a delayed suppressive eect. GnRH agonists are also used to help stimulate follicle growth when started at the beginning of an IVF cycle. GnRH analogs. Synthetic hormones similar to the naturally occurring gonadotropin-releasing hormone used to prevent premature ovulation. ere are two types of GnRH

analogs: GnRH agonists and GnRH antagonists. GnRH antagonists. Synthetic hormones similar to the naturally occurring gonadotropin-releasing hormone used to prevent premature ovulation. ese medications have an immediate suppressive eect on the pituitary gland. Human chorionic gonadotropin (hCG). A hormone produced by the placenta; its detection is the basis for most pregnancy tests. Also refers to the medication used to induce ovulation and during the nal stages of egg maturation. Human menopausal gonadotropin (hMG). An ovulation drug that contains follicle-stimulating hormone (FSH) and luteinizing hormone (LH) derived from the urine of postmenopausal women. hMG is used to stimulate the growth of multiple follicles. Hydrosalpinx. A blocked, dilated, -uid-lled fallopian tube. Insemination. Placement of sperm into the uterus or cervix for producing a pregnancy, or adding sperm to eggs in IVF procedures. Intracytoplasmic sperm injection (ICSI). A micromanipulation procedure in which a single sperm is injected directly into an egg to attempt fertilization, used with male infertility or couples with prior IVF fertilization failure. In vitro fertilization (IVF). A process in which an egg and sperm are combined in a laboratory dish to facilitate fertilization. If fertilized, the resulting embryo is transferred to the uterus. IVF

culture medium. A special -uid into which sperm, eggs, and embryos are placed when outside the human body. Laparoscopy. A surgical procedure that allows viewing of the internal pelvic 27 organs. During the procedure, a long, narrow, ber optic instrument, called a laparoscope, is usually inserted through an incision in or below the woman's navel. One or more additional incisions may be made for inserting additional instruments. Luteinizing hormone (LH). e pituitary hormone that normally causes ovulation and maturation of the egg. Male-factor infertility. Infertility caused by a problem in the male; for example the inability to ejaculate or insucient number of sperm. Microepididymal sperm aspiration (MESA). Outpatient microsurgical procedure used to collect sperm in men with blockage of the male reproductive ducts such as prior vasectomy or absence of the vas deferens. Used in IVFICSI procedures. Micromanipulation. e IVF laboratory process whereby the egg or embryo is held with special instruments and surgically altered by procedures such as intracytoplasmic sperm injection (ICSI), assisted hatching, or embryo biopsy. Motile. Moving. Multifetal pregnancy reduction. Also known as selective reduction. A procedure to reduce the number of fetuses in the uterus. is procedure is sometimes performed on women who are pregnant with multiple

fetuses who are at an increased risk of late miscarriage or premature labor. ese risks increase with the number of fetuses. Oocyte. Medical term for egg, the female gamete. Also called ovum (singular) or ova (plural). Ovarian hyperstimulation syndrome (OHSS). A condition that may result from ovulation induction characterized by enlargement of the ovaries, -uid retention, and weight gain. Ovarian reserve. A woman's fertility potential in the absence of specic pathophysiologic changes in her reproductive system. Diminished ovarian reserve is associated with depletion in the number of eggs and worsening of oocyte quality. Ovarian stimulation. See Ovulation induction. Ovary (Ovaries). e two female sex glands in the pelvis, located one on each side of the uterus. e ovaries produce eggs and hormones including estrogen, progesterone, and androgens. Ovulation. Release of an egg from the ovary. Ovulation induction. e administration of hormone medications (ovulation drugs) that stimulate the ovaries to produce multiple eggs. Sometimes called enhanced follicular recruitment or controlled ovarian hyperstimulation. 28 Penile vibratory stimulation (PVS). A procedure to cause ejaculation of sperm, performed by vibratory stimulation of the penis. Percutaneous epididymal sperm aspiration (PESA). A sperm aspiration procedure

in which a needle is inserted into the epididymis (gland that carries sperm from testicle to vas deferens) in order to retrieve sperm for use in an IVF procedure. Pituitary gland. A small gland just beneath the hypothalamus in the brain that secretes follicle-stimulating hormone (FSH) and luteinizing hormone (LH). Polyps. A general term that describes any mass of tissue that bulges or projects out or upward from the normal surface level. Preimplantation genetic diagnosis (PGD). A test performed by an embryologist in which one or two cells are removed from an embryo. e removed cells are then screened for genetic abnormalities. PGD may be performed in conjunction with IVF. Progesterone. A female hormone secreted during the second half of the menstrual cycle. It prepares the lining of the uterus for implantation of a fertilized egg. Pronuclei. e nuclei of the male and female gametes (sperm and egg) seen in the one-cell embryo (zygote). Septum, uterine. A band of brous tissue present from birth that forms a wall within the uterine cavity. A septum may increase the risk of miscarriage and other pregnancy complications. Semen. e -uid ejaculated by the male. Society for Assisted Reproductive Technology (SART). A society aliated with the ASRM and comprised of representatives from ART programs who have

demonstrated their ability to perform IVF. Sperm. e male reproductive cells that fertilize a woman's egg. e sperm head carries genetic material (chromosomes), the midpiece produces energy for movement, and the long, thin tail wiggles to propel the sperm. Spina bida. A birth defect of the spinal column. Spina bida is the failure of the spine to close properly during development. Testicular sperm extraction (TESE). Operative removal of testicular tissue in an attempt to collect living sperm for use in an IVF-ICSI procedure. Traditional surrogate. A woman who carries a pregnancy intended for an infertile couple. e surrogate's egg is fertilized with sperm from the male partner of the infertile couple. Transvaginal ultrasound aspiration. An ultrasound-guided technique for egg retrieval whereby a long, thin needle is passed through the vagina into the ovarian follicle and suction is applied to accomplish retrieval. Ultrasound. A technology that uses high-frequency sound waves to form an image of internal organs on a monitor screen; used by fertility specialists to monitor the growth of ovarian follicles and to retrieve the eggs from the follicles and evaluate a pregnancy. Uterus (womb). e hollow, muscular female reproductive organ in the pelvis in which an embryo implants and grows during pregnancy. e lining of the uterus, called the

endometrium, produces the monthly menstrual blood -ow when there is no pregnancy. Vagina. e canal in the female that leads to the cervix, which leads to the uterus. Vas deferens. e two muscular tubes that carry sperm from the epididymis to the urethra. Vitrication. An ultra-rapid method of freezing eggs and embryos that may oer certain advantages compared with traditional types of cryopreservation. Zona pellucida. e egg's outer layer that a sperm must penetrate in order to fertilize the egg. Zygote. A fertilized egg before cell division (cleavage) begins. Zygote intrafallopian tube transfer (ZIFT). An egg is fertilized in the laboratory and the zygote is transferred to the fallopian tube before cell division takes place. Eggs are retrieved and fertilized on one day and the embryo is transferred the following day. For more information on this and other reproductive health topics visit www.ReproductiveFacts.org Let Us Know What You ink Email your comments on this booklet to asrm@asrm.org. In the subject line, type "Attention: Patient Education Committee." Notes AMERICAN SOCIETY FOR REPRODUCTIVE MEDICINE 1209 MONTGOMERY HIGHWAY BIRMINGHAM, AL 35216 (205) 978-5000 asrm@asrm.org www.asrm.org www.reproductivefacts.org

VALUE ADDED COURSE

ASSISTED REPRODUCTIVE TECHNIQUES

List of Students Enrolled Jul 2019 – Dec 2019

S.No	Register No	Students List	Signature
1	U16MB311	KAVITHA .M	
2	U16MB312	KAVIYA .K	
3	U16MB313	KEERTHANA .K	
4	U16MB314	KEERTHI K DAS	
5	U16MB315	KUNCHAL BALA VENKATA RAMANA REDDY	
6	U16MB316	LAKSHMIPURAM VEDA SREEVIDYA	
7	U16MB317	LOGESH BABU J.S	
8	U16MB318	LOKESHWARAN .M	
9	U16MB319	MADHUMITHA .R	
10	U16MB320	MADHUMITHA .S	
11	U16MB321	MANIMAARANE .R	
12	U16MB322	MATHIVAANANE .R	
13	U16MB323	MATHIVANAN .J	
14	U16MB324	MD ALTAF KHAN	
15	U16MB325	MEKALA CHARAN CHOWDARY	
16	U16MB326	MERLIN.S	
17	U16MB327	MERLINE SHEEBA .B	
18	U16MB328	MOHAN .B	
19	U16MB329	MOHIT BHARDWAJ	
20	U16MB330	MONISH PALEI PATRA	

ASSISTED REPRODUCTIVE TECHNIQUE

MCQs

1. **Veer and Bani have been trying to have a baby for over a year. They just found out that Bani Ova are viable, but she is not ovulating on a Regular basis. What fertility method are they candidates for ?**
   a) Adoption b) IVF c) Artificial Insemination d) Donor IVF

2. **Rhonitah missed her periods about 3 weeks ago and asks her physician for pregnancy test . She is confirmed as pregnant if there is …….in her urine**
   a) Hyaluronidase b) HCG c) LH d) FSH

3. **The Ovum can be fertilized for about how many hours after ovulation**
   a) 1-3 days b) 5-7 days c) more than 48 hours d) 24-48 hours

4. **Ovulation is controlled by……. Gland**
   a) Pituitary gland b) Pineal gland c) Adrenal gland d) None of the above

5. **Drug of Choice for Ovulation induction** ……
   a) Clomiphene citrate b) Metformin
   b) Antioxidants d) ALL THE ABOVE

6. **Complications of ART**
   a) Multiple Pregnancy b) Anomalies c) Miscarriage d) ALL THE ABOVE

7. **Maximum no. of. Embryos can be transferred……..**
   a) 3 b) 4 c)2 d) 5

8. **Medication to prevent premature ovulation**

a) GnRH agonist b) GnRH antagonist c) both A and B d) none

9. **Removal of multiple eggs can usually be completed in less than…….minutes**

a)40 mints b)30 mints c)50mints d)60mints

10.egg retrieval is usually accomplished by ……

a) TV ultrasound aspiration

b)trans abdominal ultrasound aspiration

c) both a and b

d) colposcopy

REG NO -
U16MB326

ASSISTED REPRODUCTIVE TECHNIQUE (II)

MCQs

1. **Veer and Bani have been trying to have a baby for over a year. They just found out that Bani Ova are viable, but she is not ovulating on a Regular basis. What fertility method are they candidates for ?**
   a) Adoption b) IVF c) Artificial Insemination d) Donor IVF

2. **Rhonitah missed her periods about 3 weeks ago and asks her physician for pregnancy test . She is confirmed as pregnant if there is .....in her urine**
   a) Hyaluronidase b) HCG c) LH d) FSH

3. **The Ovum can be fertilized for about how many hours after ovulation**
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5. **Drug of Choice for Ovulation induction** .....
   a) Clomiphene citrate b) Metformin
   b) Antioxidants d) ALL THE ABOVE

6. **Complications of ART**
   a) Multiple Pregnancy b) Anomalies c) Miscarriage d) ALL THE ABOVE

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Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that **LOGESHWARAN** has actively participated in the Value Added Course on **ASSISTED REPRODUCTIVE TECHNIQUES** held during Jul 2019 – Dec 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

RESOURCE PERSON

ASSISTANT PROFESSOR
DEPT. OF OBSTETRICS & GYNAECOLOGY
Sri Lakshmi Narayana Institute of
Medical Sciences
OSUDU, PUDUCHERRY.

COORDINATOR

DEAN
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
OSUDU, AGARAM VILLAGE,
KOODAPAKKAM POST,
PUDUCHERRY - 605 502

Sri Lakshmi Narayana Institute of Medical Sciences

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CERTIFICATE OF MERIT

This is to certify that **LOGESH BABU** has actively participated in the Value Added Course on **ASSISTED REPRODUCTIVE TECHNIQUES** held during Jul 2019 – Dec 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

RESOURCE PERSON

ASSISTANT PROFESSOR
DEPT. OF OBSTETRICS & GYNAECOLOGY
Sri Lakshmi Narayana Institute of
Medical Sciences
OSUDU, PUDUCHERRY.

COORDINATOR

DEAN
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
OSUDU, AGARAM VILLAGE,
KOODAPAKKAM POST,
PUDUCHERRY - 605 502

Annexure 4

Course/Training Feedback Form

Course:
Date:
Name:
Reg NO.
Department: Obstetrics and Gynaecology

Q 1: Please rate your overall satisfaction with the format of the course:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 2: Please rate course notes:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 3: The lecture sequence was well planned

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 4: The lectures were clear and easy to understand

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 5: Please rate the quality of pre-course administration and information:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 6: Any other suggestions:

Comments:

Thank you for taking the time to complete this survey, your comments are much appreciated.

***OPTIONAL Section*:** Name _____
Signature _____ Date _____

Course/Training Feedback Form

Course: ASSISTED REPRODUCTIVE TECHNIQUES
Date:
Name: KAVIYA.K
Reg NO. U16MB312
Department: Obstetrics and Gynaecology

Q 1: Please rate your overall satisfaction with the format of the course:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 2: Please rate course notes:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 3: The lecture sequence was well planned

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 4: The lectures were clear and easy to understand

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 5: Please rate the quality of pre-course administration and information:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 6: Any other suggestions:

Comments:

Thank you for taking the time to complete this survey, your comments are much appreciated.

***OPTIONAL Section*:** Name _____
Signature _____ Date _____

Course/Training Feedback Form

Course: ASSISTED REPRODUCTIVE TECHNIQUES
Date:
Name: KAVITHA.M
Reg NO. U16MB311
Department: Obstetrics and Gynaecology

Q 1: Please rate your overall satisfaction with the format of the course:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 2: Please rate course notes:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 3: The lecture sequence was well planned

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 4: The lectures were clear and easy to understand

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 5: Please rate the quality of pre-course administration and information:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 6: Any other suggestions:

Comments:

Thank you for taking the time to complete this survey, your comments are much appreciated.

***OPTIONAL Section*:** Name _____
Signature _____ Date _____

Date: 28.12.2019

From
Dr. Sangeetha
Assistant Professor,
Obstetrics and Gynaecology,
Sri Lakshmi Narayana institute of Medical sciences,
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To
The Dean,
Sri Lakshmi Narayana institute of Medical Sciences,
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: Assisted Reproductive Technique

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: **Assisted Reproductive Technique** on July 2019 to Dec 2019. We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards

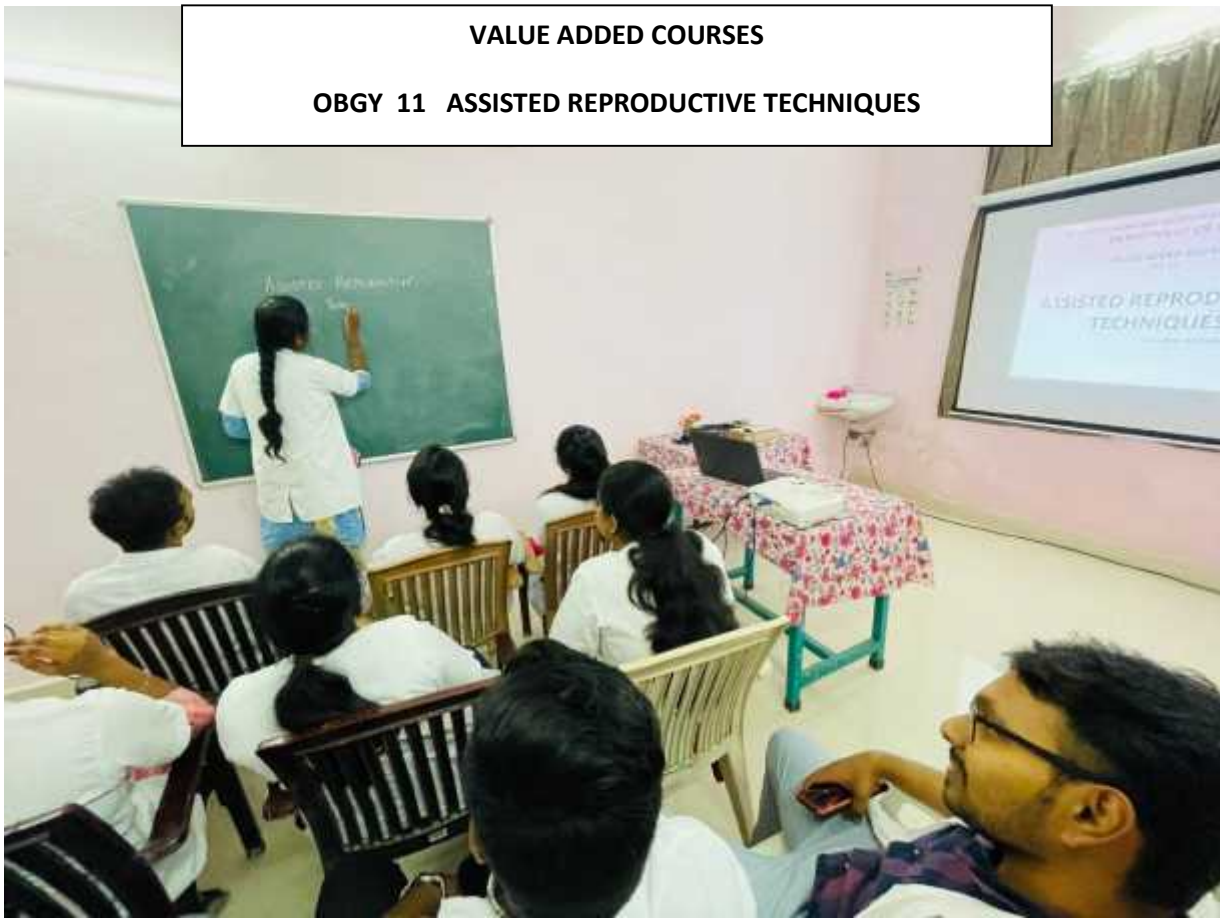


Dr.Sangeetha



VALUE ADDED COURSES

OBGY 11 ASSISTED REPRODUCTIVE TECHNIQUES



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PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affliated to Bharath University, Chennai - TN]

Date 25.06.2019

From
DR.Sankarlal
Professor and Head,
Department of orthopaedics,
SLIMS,
Bharath Institute of Higher Education and Research,
Pondicherry.

To
The Dean,
SLIMS,
Bharath Institute of Higher Education and Research,
Pondicherry.

Sub: Permission to conduct value-added course: yoga for low back pain &rehabitation

Respected Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **YOGA FOR LOW BACK PAIN &REHABITATION**on __17.07.19_____. We solicit your kind permission for the same.

Kind Regards

PROFESSOR & HOD
Department of Orthopaedics
Sri Lakshmi Narayana Institute of Medical Sciences
Pondicherry - 605 502.

DR.Sankarlal

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean:DR.K.BALAGURUNATHAN

The HOD:DR.SANKAR LAL

The Expert:Dr.Vijayaragavan

OFFICE OF THE DEAN

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The committee has discussed about the course and is approved.

Dean	Subject Expert	HOD
DEAN Prof.K.BALAGURUNATHAN,M.S (General surgeon) SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES OSUDU PONDICHERRY	Department of Orthopaedics Sri Lakshmi Narayana Institute of Medical Sciences Pondicherry - 605 502.	PROFESSOR & HOD Department of Orthopaedics Sri Lakshmi Narayana Institute of Medical Sciences Pondicherry - 605 502.

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Circular

07.06.2020

Sub: Organising Value-added Course: YOGA FOR LOW BACK PAIN.

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research** is organizing **YOGA FOR LOW BACK PAIN .** 30 hrs & July 2019– January 2020

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before JULY 2019- JAN 2020. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

DEAN
Prof.K.BALAGURUNATHAN,M.S
(General surgeon)
SRI LAKSHMI NARAYANA
INSTITUTE OF MEDICAL SCIENCES
OSUDU PONDICHERRY

OFFICE OF THE DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
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Course Proposal

Course Title: yoga for low back pain and rehabitation

CourseObjective: Effects of yoga in low back pain

CourseOutcome: day to day modifications

Course Audience: 25

Course Coordinator:DR.Balagurunathan

Course Faculties with Qualification and Designation:

1. DR. VINCENT MS ORTHO

Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Time	Hours
1	17/07/19	OBJECTIVES	4-6pm	2
2	22/7/19	DISCLOSURES	4-6pm	2
3	31/7/19	LOW BACK PAIN	4-6pm	2
4	9/8/19	FUNCTIONAL ANATOMY	4-6pm	2
5	15/08/19	THORACOLUMBAR FASCIA	4-6pm	2
6	22/8/19	MUSCLES OF LUMBAR	4-6	2
7	6/9/19	REHABITATIONS	4-6	2
8	20/9/19	YOGA -8 LIMBS	4-6	2
9	30/9/19	MECHANICAL ATTRIBUTES	4-6	2
10	17/10/19	REST	4-7	3
11	14/11/19	CORRECTIONS IN YOGA	4-7	3
12	4/12/19	MECHANISM OF ACTION	4-6	2
13	9/1/20	ADVERSE EFFECTS	4-6	2
14	13/1/20	ASANAS	4-6	2
			Total Hours	30

REFERENCE BOOKS:

OFFICE OF THE DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
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1)YOGA APPLICATION FOR LOW BACK PAIN **DAYANAND DONGAONKAR**

2)YOGA THERAPHY FOR LOW BACK PAIN **JOHN EBNEZAR**

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VALUE ADDED COURSE

1. Name of the programme & Code

Yoga for low back pain & Rehabilitation – OR11

2. Duration & Period

30 hrs & July 2019– January 2020

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Short notes- *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

1 July 2019– January 2020

8. Year of discontinuation: 2021

Value Added Course- July 2019– January 2020					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	OR11	Yoga for low back pain & Rehabilitation	Dr. Vincent	THIRD YEAR MBBS	25 (July 19– Jan 20)

9. Summary report of each program year-wise

10. Course Feed Back *Enclosed as Annexure- V*

DR.VINCENT
RESOURCE PERSON

Department of Orthopaedics
Sri Lakshmi Narayana Institute of Medical Sciences
Pondicherry - 605 502.

DR.BALAGURUNATHAN
COORDINATOR

DEAN
Prof.K.BALAGURUNATHAN,M.S
(General surgeon)
SRI LAKSHMI NARAYANA
INSTITUTE OF MEDICAL SCIENCES
OSUDU PONDICHERRY

OFFICE OF THE DEAN
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YOGA FOR LOW BACK PAIN MANAGEMENT

17/07/19

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YOGA FOR LOW BACK PAIN MANAGEMENT

Particulars	Description
Course Title	Yoga for low back pain & Rehabilitation
Course Code	OR11
Objective	1. Objectives 2. Disclosures 3. Low back pain 4. Functional anatomy 5. Thoracolumbar fascia 6. Muscles of lumbar 7. Rehabilitations 8. Yoga - 8 limbs 9. Mechanical attributes 10. Rest 11. Corrections in yoga 12. Mechanism of action 13. Adverse effects 14. Asanas
Further learning opportunities	Types of yogasanas
Key Competencies	On successful completion of the course the students will have knowledge in yoga for management in low back pain
Target Student	PRE FINAL YEARStudents
Duration	30hrs Every July 2019– January 2020
Theory Session	10hrs
Practical Session	20hrs
Assessment Procedure	SHORT NOTES

OBJECTIVES

❖ Describe how yoga may be beneficial for the care and rehabilitation of patients with low back pain

❖ Identify yoga as a system of health promotion

❖ Describe ideas central to the practice of yoga

❖ Compare and contrast yogic principles with osteopathic philosophy and practice

❖ Review literature for yoga for low back pain

❖ Identify yoga best for patients with low back pain

DISCLOSURES

❖ Dr. Pierce-Talsma has no financial interests or relationships to disclose

❖ The opinions offered in this presentation are of the presenter and do not represent the opinions of the American Academy of Osteopathy

❖ All materials and content are the intellectual property of the presenter or are cited and do not infringe on the intellectual property of any other person or entity

❖ The speaker does not endorse any product, service or device with this presentation

Low Back Pain

• Major reason why people use Complementary and Alternative Methods (CAM)

• Ssecondarily suffer anxiety, depression, disability, reduced quality of life

• Causes are not well understood and therapy frequently fails

FUNCTIONAL ANATOMY

• Difficult to identify the source of pain

• Structural vs. Functional

• Lumbar musculature as spinal stabilizers

• Retraining should target multiple muscles that influence spinal loading

Thoracolumbar Fascia System

Three layers:

❖ Posterior

❖ Middle

❖ Anterior

❖ Point of attachment for abdominal musculature (EO, IO, TA)

Muscles of the LE, Pelvis, Abdominals

❖ Strengthening of the Pelvis and LE muscles is important for rehabilitation due to muscular, fascial and ligamentous linkages

❖ Fascia Lata system ❖ Iliopsoas as a stabilizer

To Rehabilitate Low Back Pain

❖ Form Closure

❖ Force Closure

❖ Neural Function

❖ Motor control

❖ Emotional State

❖ Body Awareness

❖ Vleeming et al24

❖ "Multidimensional approaches that incorporate the dimensions of physical, psychological, and social function, are now generally accepted as better determinants of the individual's experience with pain." ~Galantino et al.

Yoga- The 8 Limbs

1. Yamas- Restraints

2. Niyamas- Observances

3. Asanas- Postures

4. Pranayama- Breath work

5. Pratyahara- Inhibit the senses

6. Dharana- Concentration

7. Dhyana- Meditate on the truth

8. Samadhi- Union with the divine

Yoga's Mechanical Attributes

- Rest
- Flexibility
- Strength/Endurance
- Correct action
- Alignment
- Postural Awareness
- Proprioception/ Balance

"These Movements are "intricate" and highlight the mind-body nature of Yoga that emphasizes awareness, concentrations, and bidirectional communication between the mental, nervous, skeletal and muscular systems"

REST :

- Rest and relaxation of the affected area
- Awareness of where you are holding tension
- Restorative Yoga
- Total relaxation
- Uses props to allow for surrender into the pose

- Yoga Nidra
- A guided meditation-"yogic sleep"- deep relaxation while still remaining conscious
- Yin Yoga
- Slow yoga with LONG holds- 5 minutes or longer
- Passive postures that target deep connective tissue stretching

Flexibility

- Reciprocal inhibition
- Breath as activation
- Long holds in stretches
- Affects intrafusal muscle fibers and golgi tendon
- Range of Motion work
- Stretching what is tight

Strength/ Correct Action

- Working against gravity
- Isometric contraction
- Balance of left and right hemispheres
- Engagement of core muscle groups

Alignment/Postural Awareness

- Release of subconscious gripping
- Self-knowledge
- Asymmetry
- Correct posture
- Identification of tendencies/ patterns
- Strength to hold correct posture

Proprioception

- ❖ Sensorimotor System
- ❖ Altered input = altered output
- ❖ Balance
- ❖ Concentration

Upper and Lower Crossed Syndromes

- Retrain Proprioception
- Stretch what is tight
- Strengthen what is weak
- Reduces dead space ventilation
- Decreases sympathetic tone
- Down regulates the HPA access
- Calms the mind
- Alters fascial tensions
- Combined with asana can change ventilation to perfusion ratio in different parts of the lungs

YOGA- MECHANISMS OF ACTIONPSYCHOLOGICAL

- ❖ Group intervention- motivation
- ❖ Relaxation, stress management, coping skills
- ❖ New Awareness/Learning
- ❖ Identification of emotional response to pain

- Self-efficacy
- Cognitive Behavioral Treatment

Adverse Events

- Finnish Ashtanga survey- 62% at least 1 yoga injury
- Australian- 2500 79% never been injured- most were minor
- US- less than 1% of yoga practioners reported a yoga related adverse event
- Germany survey- 303 patients- 4% reported adverse events
- Cramer 2013- 10 RCT- Not associated with serious adverse events

3 studies with mild to moderate adverse events,1 study with severe- n=1 herniated disc, n=1 severe pain

- Chang Systematic Review 2016-

"10-15% incidence of temporarily increased LBP"

- Cramer 2015 Systematic review of RCT- the safety of yoga

301 RCT (8,430 participants) 92 reported on adverse events

"yoga appears as safe as usual care and exercise"

- Better reporting of harms has been suggested as a need

The lower back is a sensitive spot for many people. While there can be a ton of causes of lower back pain, a weak core and poor posture from sitting all day (and consequently shortening the hip muscles that then pull on the lower back) are two really common contributing factors to lower back aches and discomfort. It's always important to figure out what's causing pain so you can address it and prevent it from happening again. But in most situations, doing some gentle yoga can help relieve tightness and give your lower back some relief.

"Yoga is great for working on flexibility and core stability, correcting posture, and breathing—all of which are necessary for a healthy back," Sasha Cyrelson, P.T., D.P.T., O.C.S., clinical director at Professional Physical Therapy in Sicklerville, New Jersey, tells SELF. She adds that yoga is safe to do daily. It's important, though, to make sure you're in tune with your body and stop doing anything that makes your discomfort worse. "Never stretch into a position of pain. Pain is how our bodies tell us something is wrong. If it actually hurts, ease up on the stretch."

If you have any history of lower back injuries, problems with your discs, or experience pain that lasts more than 72 hours without improving, Cyrelson suggests seeing a physical therapist before doing any exercises. If you have an issue that requires medical attention, it's best to address it before it becomes worse.

If your lower back pain is more of a general achiness or discomfort, it's worth trying some yoga stretches to address any tightness and alignment issues. We asked New York City-based yoga instructor Shanna Tyler to suggest and demo some of her favorite yoga stretches for lower back pain relief. She recommends doing the stretches below as a flow, holding each pose for anywhere from one to three minutes. "As long as it feels good, then do it all," she says.

Here are the stretches she recommends:

- Child's Pose
- Cat/Cow
- Downward Facing Dog
- Standing Forward Bend
- Sphinx Pose
- Knees to Chest With Slow Rock
- Reclined Pigeon Pose
- Reclined Supine Twist

And here's how to do each one:

1. CHILD'S POSE 1 TO 3 MINUTES

"Child's Pose takes the pressure off your lower back by elongating and aligning the spine, which decompresses it and gives you a nice stretch," Tyler says.

- Kneel on your mat with your knees hip width apart and your feet together behind you. Take a deep breath in, and as you exhale, lay your torso over your thighs.
- Try to lengthen your neck and spine by drawing your ribs away from your tailbone and the crown of your head away from your shoulders.
- Rest your forehead on the ground, with your arms extended out in front of you.
- Hold for one to three minutes.



2. CAT/COW 1 TO 3 MINUTES

"This is probably my personal favorite stretch for my back," Tyler says. It allows for a nice flexion and extension of the spine, promotes mobility, and "it also helps to just relieve any tension in the lower back." Cat/Cow also helps you get familiar with what your neutral spine is—not too arched and not too rounded—which can help improve posture.

- Start on all fours with your shoulders over your wrists and hips over knees.
- Take a slow inhale, and on the exhale, round your spine and drop your head toward the floor (this is the “cat” posture).
- Inhale and lift your head, chest, and tailbone toward the ceiling as you arch your back for “cow.”

- Do this for one to three minutes.



3. DOWNWARD FACING DOG 1 TO 3 MINUTES

"Sometimes, we feel lower back pains because the backs of our legs are so tight," Tyler explains. Down Dog is a great way to stretch out your hamstrings and calves. If you're extra tight, you can bend your knees a little bit to make the stretch more comfortable.

- From Child's Pose, keep your hands on the floor, sit up on your knees, and then lift your butt and press back into Downward Facing Dog.
- Spread your fingers wide. Work on straightening your legs and lowering your heels toward the ground.
- Relax your head between your arms, and direct your gaze through your legs or up toward your belly button.
- Hold for one to three minutes.



4. STANDING FORWARD BEND

This stretch also stretches out the backs of the legs and lengthens the spine, both of which relieve the lower back. Modify by keeping the knees slightly bent if straightening your legs hurts your back, Tyler suggests.

- From Downward Facing Dog, slowly step forward to the top of your mat. Stand with your feet shoulder width apart.
- Straighten your legs out as much as you can and let your torso hang down.
- Tuck your chin in toward your chest, relax your shoulders, and extend the crown of your head toward the floor to create a long spine.
- Hold for one to three minutes.

Pro tip from Cyrelson: "Try thinking about keeping your butt sticking out during this move so that the bend comes from your hips, not your back."



5. SPHINX POSE 1 TO 3 MINUTES

- "Sphinx pose creates a nice natural curve of the lower back," Tyler says. It also engages your abs a bit, which is helpful for supporting the lower back.

  - Lie on your stomach, legs together and straight out behind you.
  - Place your elbows under your shoulders and your forearms on the floor as you lift your chest up off the floor.
  - Press your hips and thighs into the floor, and think about lengthening your spine while keeping your shoulders relaxed.
  - Sit up just enough to feel a nice stretch in your lower back. Don't hyperextend, and stop immediately if you start to feel any discomfort or pain.
  - Hold this position for one to three minutes.

  Cyrelson suggests tucking your tailbone under and pulling your belly button in toward your spine to minimize any hyperextension of the back.



6. KNEES TO CHEST WITH SLOW ROCK 1 TO 3 MINUTES

- Tyler says that she likes to add a slow rocking motion to this basic stretch because it "gives you a nice, natural body weight massage."

  - Lie on your back.
  - Hug both knees into your chest.
  - Slowly rock your torso back and forth while firmly holding onto your legs.
  - Do this for one to three minutes.



7. RECLINED PIGEON POSE 1 TO 3 MINUTES, EACH LEG

- This moves, also known as "figure-four," stretches the hips, butt, and inner thighs, Tyler says.

  - Lie on your back.
  - Cross your left foot over your right quad, and bend your right knee.
  - Hold the back of your right leg and gently pull it toward your chest.
  - When you feel a comfortable stretch, hold there for one to three minutes.
  - Switch sides and repeat.



8. RECLINED SUPINE TWIST 1 TO 3 MINUTES

Tyler says that this is a great stretch for the lower back, and can provide some pain relief if you're tight. For some people, though, twisting movements can irritate the lower back. If this stretch starts to hurt, stop doing it. You can also try putting a towel underneath your knees to help you ease into it if you're super tight, she says.

- Lie on your back.
- Hug your knees into your chest. Then, drop both knees over to one side as you twist your torso in the opposite direction.
- Try to keep your knees and hips in line with each other as you draw them toward the floor, and keep your chest as square to the ceiling as you can.
- Hold this stretch for one to three minutes, and then repeat on the other side.



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VALUE ADDED COURSE

Yoga for low back pain & Rehabilitation

OR11

4. List of Students Enrolled July 2019 – Jan- 2020

Pre final Year MBBS Student			
Sl. No	**Name of the Student**	**Roll No**	**sign**
1	ALLARI KARTHIK ABHIROOP	U16MB258	
2	AMAL ASHOK	U16MB259	
3	AMIRTHAVARSHNI .R	U16MB260	
4	ANANYA SHARMA	U16MB261	
5	ANGALAKUDURU DEEPCHAND	U16MB262	
6	ANJAN BANERJEE	U16MB263	
7	ANWESHA CHATTERJEE	U16MB264	
8	ARCHANA .A	U16MB265	
9	ARCHITHA.A	U16MB266	
10	ARIVUMATHI .R	U16MB267	
11	ARJUN.S	U16MB268	
12	ASHVANTH KUMAR .A	U16MB269	
13	ASMITHA S.V	U16MB270	
14	AVIDI VENKATA SAISUSHMA	U16MB271	
15	AVIRAL PATPATIA	U16MB272	
16	BALACHANDRAN .A	U16MB273	
17	BALAJI .S	U16MB274	
18	BHASKARAN .K.C	U16MB275	
19	BHAVANI . K.M	U16MB276	
20	BLESSY AMALA RISHA .J	U16MB277	
21	CAREENA DANIEL	U16MB278	
22	CHANDRA PRAKASH.M	U16MB279	
23	CHINJU S.R	U16MB280	
24	DASARI VENKATA SAI	U16MB281	

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DR.VINCENT
RESOURCE PERSON

Dr. VINCENT BOSCO SAVERY, M.S. (ORTHO)
Reg. No. : 100933
Assistant Professor
Sri Lakshmi N
O

DR.BALAGURUNATHAN
COORDINATOR

DEAN
Prof.K.BALAGURUNATHAN,M.S
(General surgeon)
SRI LAKSHMI NARAYANA
INSTITUTE OF MEDICAL SCIENCES
OSUDU PONDICHERRY

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Annexure 4

Course/Training Feedback Form

Course: YOGA FOR LOW BACK PAIN
Date: 13/120
Name:arjun.s
Reg NO.
Department:ORTHO

Q 1: Please rate your overall satisfaction with the format of the course:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 2: Please rate course notes:
a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 3: The lecture sequence was well planned
a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 4: The lectures were clear and easy to understand
a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 5: Please rate the quality of pre-course administration and information:
a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 6: Any other suggestions:

Comments:

Thank you for taking the time to complete this survey, your comments are much appreciated.

***OPTIONAL Section*:** Name _____
Signature _____ Date _____

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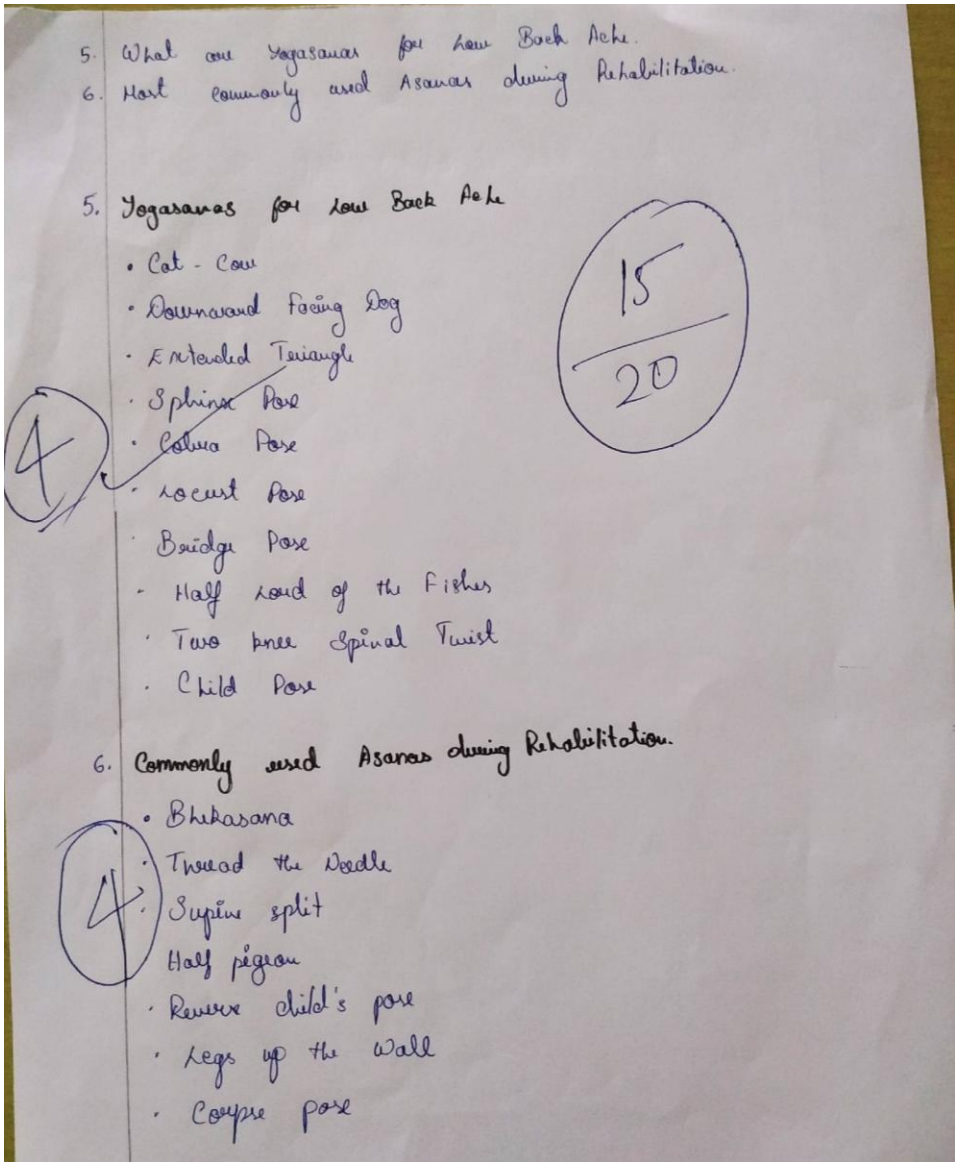

5. What are Yogasanas for Low Back Ache.
6. Most commonly used Asanas during Rehabilitation.

5. Yogasanas for Low Back Ache

- Cat - Cow
- Downward facing Dog
- Extended Triangle
- Sphinx Pose
- Cobra Pose
- Locust Pose
- Bridge Pose
- Half Lord of the Fishes
- Two knee Spinal Twist
- Child Pose

15/20

6. Commonly used Asanas during Rehabilitation.

- Bhekasana
- Thread the Needle
- Supine split
- Half pigeon
- Reverse child's pose
- Legs up the Wall
- Corpse pose

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(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that __ARJUN.S___ has actively participated in the Value Added Course on *Yoga for low back pain & Rehabilitation* held during July 2019 – Jan 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. Vincent
RESOURCE PERSON

Dr. Balagurunathan
COORDINATOR

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Student Feedback Form

Course Name: **YOGA FOR LOW BACK PAIN & REHABILITATION**
Subject Code: OR11

Name of Student: CHINJU S.R Roll No.: U16MB280

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear					✓
2	Course contents met with your expectations					✓
3	Lecturer sequence was well planned					✓
4	Lectures were clear and easy to understand					✓
5	Teaching aids were effective					✓
6	Instructors encourage interaction and were helpful					✓
7	The level of the course					✓
8	Overall rating of the course	1	2	3	4	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

Signature

Date: 13/01/20

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Date: 13.01.2020

From
DR.Sankarlal,
Department of orthopaedics,
SLIMS,
Bharath Institute of Higher Education and Research,
Pondicherry.

Through Proper Channel

To
The Dean,
SLIMS,
Bharath Institute of Higher Education and Research,
Pondicherry.

Sub: Completion of value-added course: yoga for low back pain and rehabitation

Dear Sir,

With reference to the subject mentioned above, the department has conducted thevalue-added course titled: **yoga for low back pain and rehabiation**on 13.01.2020. We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards

DR.Sankarlal

PROFESSOR & HOD
Department of Orthopaedics
Sri Lakshmi Narayana Institute of Medical Sciences
Pondicherry - 605 502.

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Sri Lakshmi Narayana Institute of Medical Sciences

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SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

OSUDU, AGARAM VILLAGE, KUDAPAKKAM POST,PUDUCHERRY-605502.

Date30.7.19

From
DR.BALAJI SUBRAMANIYAN.R,
Professor and Head,
DEPARTMENT OF DENTISTRY
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
Bharath Institute of Higher Education and Research,
Chennai.

To
The Dean,
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: OCCLUSION

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **OCCLUSION** on 3.8.19_. We solicit your kind permission for the same.

Kind Regards

DR.BALAJI SUBRAMANIYAN

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: DR.JAYALAKSHMI

The HOD: DR.BALAJI SUBRAMANIYAN.R

The Expert: DR.AMUTHAVALLI.V

The committee has discussed about the course and is approved.

Dean

DEAN
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
OSUDU, AGARAM VILLAGE,
KOODAPAKKAM POST,
PUDUCHERRY - 605 502

Subject Expert

Dr. V. AMUTHAVALLI, MDS.,
Reg. No. [illegible]
Asst. [illegible]
Sri Lak[illegible]
Osudu, Kudapakkam, Puducherry-605 502.

HOD

Dr. BALAJI SUBRAMANIAN, MDS.,
Reg. No. [illegible]
Professor HOD Dental
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502

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Circular

30.7.19

Sub: Organising Value-added Course: OCCLUSION reg

With reference to the above mentioned subject, it is to bring to your notice that SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES, **Bharath Institute of Higher Education and Research**, is organising**"_OCCLUSION ON 3.8.19"**. The course content and registration form is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before 1.8.19. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

Encl: Copy of Course content and Registration form.

COURSE PROPOSAL

Course Title: OCCCLUSION

Course Objective: To enlighten students about significance of occlusion

Course Outcome: In depth knowledge regarding occlusion

Course Audience: MBBS STUDENTS

Course Coordinator: DR.BALAJI SUBRAMANIYAN

Course Faculties with Qualification and Designation:

1. **DR.AMUTHAVALLI.V M.D.S & ASSISTANT PROFESSOR**

Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Time	Hours
1.	3.8.19	Eruption sequence of deciduous teeth	4PM-7PM	3 hrs
2.	10.8.19	Eruption sequence of permanent teeth	4pm-7 pm	3hrs
3.	18.8.19	Ugly- duckling stage	5pm-8pm	3 hrs
4.	25.8.19	Overjet/Overbite	4pm-7pm	3hrs
5.	3.9.19	Deep bite/ open bite	5pm-8pm	3 hrs
6.	10.9.19	Bruxism	5pm-8pm	3 hrs
7.	18.9.19	Supra eruption of posteriors	4pm-7pm	3 hrs
8.	25.9.19	Impacted third molars	5pm-8pm	3 hrs
9.	3.10.19	Correlation of malocclusion	5pm-8pm	3 hrs
10.	15.10.19	Oral examination of teeth	4pm-7pm	3 hrs
			Total Hours	30

REFERENCE BOOKS: (Minimum 2)

1.CYNTHIA PETERSON TEXT BOOK OF TMJ AND OCCLUSION

2. TANAKA TMJ DISORDERS

OCCLUSION

ABSTRACT

Occlusion and its relationship to the function of the stomatognathic system have been widely studied in dentistry since many decades. This series of articles describe about occlusion in the complete denture, fixed partial denture, and implants. Part I and II of this articles series describe concepts and philosophies of occlusion in complete denture. So far, available research has not concluded a superior tooth form or occlusal scheme to satisfy the requirements of completely edentulous patients with respect to comfort, mastication, phonetics, and esthetics. Since then, several balanced and nonbalanced articulation concepts were proposed in the literature. A balanced articulation appears to be most appropriate because of tooth contacts observed during nonfunctional activities of patients. This article discusses about evolution of different concepts of occlusion and occlusal schemes in complete denture occlusion.

Dentate status can affect diet, nutritional status, and general health. A complete maxillary denture can have an impact on taste and swallowing ability. Masticatory efficiency in complete denture wearers is approximately 80% lower than in people with natural dentition. Other factors that affect chewing ability include mobile teeth, bone resorption, reduced sensory perceptions, and motor impairment.

The early history of the first artificial tooth is obscure, but it is known that 100s of years ago, teeth were carved from stone, wood, ivory, and metal. Human teeth were also used in early dentures. Every time opposing teeth contact there is a resultant force. Although this force may vary in magnitude and direction, it must always be resisted by supporting tissues. Some dentists believe there should be cusps on the teeth and that they must be in complete harmony with the dynamics of temporomandibular joint function. Other dentists believed that the teeth should not have cusps. There are numerous concepts, techniques, and philosophies concerning complete denture occlusion.

OCCLUSION

INTRODUCTION

Occlusion is a factor that is common to all branches of dentistry. It is a term generally accepted to describe the contact relationship of the upper and lower teeth. Teeth whether natural or artificial are not immobile; so occlusion can never be considered a purely static relationship. Natural teeth move in their socket and change perceptibly from day to day. They move under load into their sockets and return to position when the load is removed. Artificial occlusion discloses even more apparent movement, since the teeth move as a group on a common base because of the nature of the supporting structures.

There are numerous concepts, techniques and philosophies concerning complete denture occlusion. Keeping abreast with the changes in this area is a challenging task. Some prosthodontists believe that there should be cusps on the artificial teeth and that they must be in harmony with the dynamics of mandibular functions. Other prosthodontists think that the artificial teeth should not have cusps because they create forces that are difficult to control.

THEORIES AND CONCEPTS OF OCCLUSION

Occlusion according to glossary of prosthodontic terms 8th ed, is defined as "the static relationship between the incising and masticating surfaces of the maxillary or mandibular teeth or teeth analogues."

Articulation is another terminology that deals with occlusion. It is the dynamic relationship or relationship in function of the maxillary and mandibular teeth.

Occlusion of natural and artificial teeth varies to a great extent. It is important for one to know about these differences in order to understand the need of balanced occlusion in a complete denture.

The first description of occlusal relationship of the teeth was made by Edward Angle in 1899. Occlusion became a topic of interest and much discussion in the early years of dentistry as the restorability and replacement of teeth became more feasible. The first significant concept developed to describe optimum functional occlusion was called balanced occlusion.

DEVELOPMENT AND MATURATION OF OCCLUSION:

The primary components of human dental occlusion are

(1) The dentition,

(2) The neuromuscular system, and

(3) The craniofacial structures.

The development and maturation of these components are interrelated so that growth, adaptation, and change actively participate in the development of an

adult occlusion. Dentition development is characterized by a period of dental alveolar and craniofacial adaptability, which is also a time when motor skills and neuromuscular learning are developing. Clinical treatment at this time may take advantage of such responsive adaptive mechanisms; for example, teeth can be guided into their correct alignment by orthodontic treatment.

In a healthy adult dentition, dental adaptive mechanisms are restricted to wear, extrusion, and drifting of teeth. Bony adaptations are essentially of a reparative nature and are slow in their operation. Protective reflexes are learned so one can avoid pain and inefficiency of the masticatory system. If and when an adult dentition begins to deteriorate, the prosthodontist resorts to fixed or removable prosthodontic therapy in attempts to maintain a functional occlusal equilibrium. This period is characterized by greatly diminished dental and reflex adaptation and by bone resorption.

Obviously, the presence of tooth loss and disease and the depletion of reparative processes pose a major prosthodontic problem. Finally, in the edentulous state, there are few natural adaptive mechanisms left. The prosthesis rests on tissues that will change progressively and irreversibly, and the artificial occlusion serves in an environment characterized by constant change that is mainly regressive.

The modern complete denture service is characterized by an integration of biological information with instrumentation, materials and clinical techniques. Orofacial and tongue muscles play an important role in retaining and stabilizing complete dentures. This is accomplished by arrangement of the artificial teeth to occupy a "neutral zone" in the edentulous mouth so the teeth will occupy a space determined by the functional balance of the orofacial and tongue musculature.

DIFFERENCES BETWEEN OCCLUSION IN ARTIFICIAL TEETH AND NATURAL TEETH

Artificial teeth

Artificial teeth function as a group and the occlusal loads are not individually managed.

- Malocclusions pose immediate drastic problems
- Non-vertical forces damage the supporting tissues
- Incising will lift the posterior part of the denture.
- Heavy mastication over the second molar can tilt or shift the denture base.
- Bilateral balance is mandatory to produce stability of the denture.
- There is no feedback and the denture rests in centric relation. Any prematurities in this position can shift the base. [1,5.]

Natural teeth

Natural teeth function independently and each individual tooth disperses the occlusal load.

- Malocclusion can be non problematic for a long time
- Non-vertical forces are well tolerated
- Incising does not affect the posterior teeth
- The second molar is the favored area for heavy mastication for better leverage and power.
- Bilateral balance is not necessary and usually considered a hindrance.
- Proprioceptive impulses give feedback to avoid occlusal prematurities. This helps the patient to have a habitual occlusion away from centric relation. [1,5.]

Requirements of artificial occlusion for tissue preservation

1. optimum orthopedically stable joint position
2. optimum functional tooth contacts
3. direction of force placed on the teeth
4. amount of force placed on the teeth
5. postural considerations and functional tooth contact. [9]

DETERMINANTS OF OCCLUSION

Fixed determinants of occlusion,

1. Angulation and curvature of the condylar guidances
2. Intercondylar distance
3. Hinge axis being closely related to centric relation (CR).
4. Mandibular lateral movements (defining the Bennett angle)
5. Bennett shift (or side shift) of the mandible.
6. Centric occlusion and rest position.

Variable determinants of occlusion,

1. Anterior guidance
2. Occlusal plane
3. Curve of Spee
4. Curve of Wilson
5. Cusp height
6. Vertical overlapping (or trespassing)
7. Overjet and overbite

THEORIES

Monson's Spherical Theory of Occlusion:

G.S. Monson proposed this theory in **1918**, based on the observations of natural teeth and skulls. According to this theory, the anteroposterior and mesiodistal inclines of the artificial teeth should be arranged in harmony with a spherical surface. This theory of occlusion, showed that, the lower teeth moved over the surface of the upper teeth as over the surface of a sphere with a diameter of 8 inches (approximately 20 cm). The centre of the sphere was located in the region of glabella and the surface of the sphere passed through glenoid fossae concentric with the articulating eminences.

Monson felt that the condylar path and the occlusal plane form a curve. Bonwill said that the two condyles and the incisors formed an equilateral triangle with sides of 4 inches. Monson associated with **Bonwill's** triangle with his own observations and formulated his spherical theory.

TYPES OF BALANCED OCCLUSION

Occlusal balance or balanced occlusion can be classified as follows:

Unilateral balanced occlusion

· Bilateral balanced occlusion

· Protrusive balanced occlusion

· Lateral balanced occlusion.

Unilateral Balanced Occlusion

This is a type of occlusion seen on occlusal surfaces of teeth on one side when they occlude simultaneously with a smooth, uninterrupted glide. This is not followed during complete denture construction. It is more pertained to fixed partial dentures.

Bilateral Balanced Occlusion

This is a type of occlusion that is seen when simultaneous contact occurs on both sides in centric and eccentric positions. Bilateral balanced occlusion helps to distribute the occlusal load evenly across the arch and therefore helps to improve stability of the denture during centric, eccentric or parafunctional movements. This total concept of balanced complete denture occlusion must be considered in terms of the following:

The tooth size and position in relation to the ridge size and shape.

1. The extent of denture base coverage.
2. Occlusal balance with stable contacts at the retruded border position and in an area (long centric) anterior to it.
3. Right and left eccentric occlusal balance by simultaneous contacts at the limit of functional and parafunctional activity.
4. Intermediate occlusal balance for all positions between centric occlusion and all other functional or parafunctional excursions to the right, left, and protrusive. This balance is probably the most important, as it allows for smooth uninterrupted tooth contacts in the dynamics of daily mandibular movements.

The concepts of occlusal balance have generally been accepted and limited to the factors controlling the contacts of the teeth from centric to eccentric jaw positions. It is important that both aspects of balance, one due to tooth position and one due to tooth contact, complement one another for total denture base stability.

Importance of Bilateral Balanced Occlusion

Balanced occlusion is one of the most important factors that affect denture stability. Absence of occlusal balance will result in leverage of the denture during mandibular movement. Sheppard stated that, *"Enter bolus, Exit balance"*. According to this statement, the balancing contact is absent when food enters the oral cavity. This makes us think that balanced occlusion has no function during mastication; hence, it is not essential in a complete denture. But this is not true. Brewer reported the importance of balanced occlu,sion. He reported that on an average, a normal individual makes masticatory tooth contact only for 10 minutes in one full day compared to 4 hours of total tooth contact during other functions. So, for these 4 hours of tooth contact, balanced occlusion is important to maintain the stability of the denture. Hence, balanced occlusion is more critical during parafunctional movements.

Protrusive Balanced Occlusion

This type of balanced occlusion is present when mandible moves in a forward direction and the occlusal contacts are smooth and simultaneous anteriorly and posteriorly. There should be at least three points of contact in the occlusal plane. Two of these should be located posteriorly and one should be located in the anterior region. This is absent in natural dentition.

Factors of Protrusive Balance

1. The inclination of the condylar path on the, articulator. This inclination recorded on the patient represents the path of the condyle in protrusion

modified by the combined action of all of the tissues of the temporomandibular joint and the ridges covered by the recording bases.

2. The inclination of the incisal guidance chosen for the patient.
3. The inclination of the plane of occlusion set to physiologic factor.
4. The compensating curve set to harmonize with condylar path and the incisal guidance.
5. The control of cusp heights and tooth in clination of the posterior teeth.

Lateral Balanced Occlusion

In lateral balance, there will be a minimal simultaneous three point contact (one anterior, two posterior) present during lateral movement of the mandible.

Lateral balanced occlusion is absent in normal dentition. When a dentulous person with canine guided occlusion moves his mandible to the right, there will be canine guided disocclusion of all his teeth. That is, the canine will be the only tooth that contacts the opposing tooth. Even the canine of the opposite side will not have contact .

Factors of Lateral Balance

1. The inclination of the condylar path on the balancing side.
2. The inclination of the incisal guidance and cuspid lift.
3. The inclination of-the plane of occlusion on the balancing side and working side.
4. The compensating, curve on the balancing side and working side.
5. The buccal cusp heights or inclination of the teeth on the balancing side.
6. The lingual cusp heights or inclination on the working side.
7. The Bennett side shift on the working side.

The relationship of tooth molds to balanced occlusion:

Specific tooth molds have been suggested to provide the needed tooth contacts for this concept. The classical example of bilateral balanced articulation dates back to 1914, when **Gysi introduced the 33-degree cusp form** arranged according to the movements of the articulator. These teeth arranged in a balanced occlusal concept were meant to enhance stability and direct the contact forces toward the ridges.

Annexure- II

VALUE ADDED COURSE

OCCLUSION

DI-11

List of Students Enrolled AUG 2019 – OCT 2019

MBBS Student		
Sl. No	**Name of the Student**	**Roll No**
1	THEEPTHI .T	U16MB389
2	UDDIP DATTA RAY	U16MB390
3	VASIPALLI SUJITHA	U16MB391
4	VENKAT SRI RANGAN.P.B	U16MB392
5	VENKATACHALAPATHY .G	U16MB393
6	VIDHY ADHARAN.S	U16MB394
7	VIGNESH .D	U16MB395

Dr. Amuthavalli. V

RESOURCE PERSON

Dr. Jayalakshmi

COORDINATOR

Bharath Institute of Higher Education and Research

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

Participant list of Value added course: **OCCLUSION**

Sl.No	Reg.No	Name of the candidate	Signature
1	U16MB389	THEEPTHI .T	
2	U16MB390	UDDIP DATTA RAY	
3	U16MB391	VASIPALLI SUJITHA	
4	U16MB392	VENKAT SRI RANGAN.P.B	
5	U16MB393	VENKATACHALAPATHY .G	
6	U16MB394	VIDHY ADHARAN.S	
7	U16MB395	VIGNESH .D	

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

OCCLUSION

QUESTIONS

Course Code: DI-11

ANSWER ALL THE QUESTIONS

1.Eruption of permanent teeth seqeuale?

2. Position of tongue?

3. Muscles of mastication?

4. Path of closure?

5. Role of TMJ in Occlusion?

NAME: VIGNESH.S
ROLL NO: U16MB395

33/50

Occlusion

Definition:

Contact relationship of the upper and lower teeth during various activities of the mandible (mastication, swallowing, and speech)

Overjet: Horizontal relation of the upper teeth to the lower teeth in centric occlusion.

Overbite: Vertical relation of the upper teeth to the lower teeth in centric occlusion

Importance:

- prevent soft tissue biting
- Guide the mandible through various lateral movement

Leeway Space:

The erupting premolars are smaller in mesiodistal dimension than the primary molars.

- The difference in sizes between the premolars and primary molars as well as the deciduous canines called Leeway Space.

Curve of Spee.

- Sagittal planes.
- Incisal Ridges of the anterior teeth and the B cusps of the posterior teeth follow a curve which end at the anterior surface of the condyle.

Curve of wilson:

- coronal plane

The Occlusal surfaces of posterior teeth conform to a curved plane.

- The Crowns of mandibular posterior teeth must incline to the lingual while the crowns of the maxillary posterior teeth must incline toward the buccal.

- Deeper posteriorly that of the premolar. - molars Inclination is greater than the premolar.

Bonwill triangle:

- Describe the mandible and form that the mandibular dental arch adapts itself to an equilateral triangle of 4 inches length.

Angle's Classification:

- Class I
- class II
- class III

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that VIDHYADHARAN.S has actively participated in the Value Added Course on OCCLUSION held during AUG 2019 – OCT 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. Amuthavalli.V
RESOURCE PERSON

Dr. Jayalakshmi
COORDINATOR

Student Feedback Form

Course Name: OCCLUSION

Subject Code: DT – 11

Name of Student: VIGNESH. D Roll No.: V16MB395

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear			✓		
2	Course contents met with your expectations		✓			
3	Lecturer sequence was well planned			✓		
4	Lectures were clear and easy to understand		✓	✓		
5	Teaching aids were effective			✓		
6	Instructors encourage interaction and were helpful		✓			
7	The level of the course			✓		
8	Overall rating of the course	1	2	3 ✓	4	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

Signature

Date: 16.7.19

COURSE COMPLETION

Date 17.10.19

From
DR.BALAJI SUBRAMANIYAN.R
DENTISTRY,
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To
The Dean,
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: OCCLUSION

Dear Sir

With reference to the subject mentioned above, the department has conducted the value-added course titled: **OCCLUSION** on 15.10.19. We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

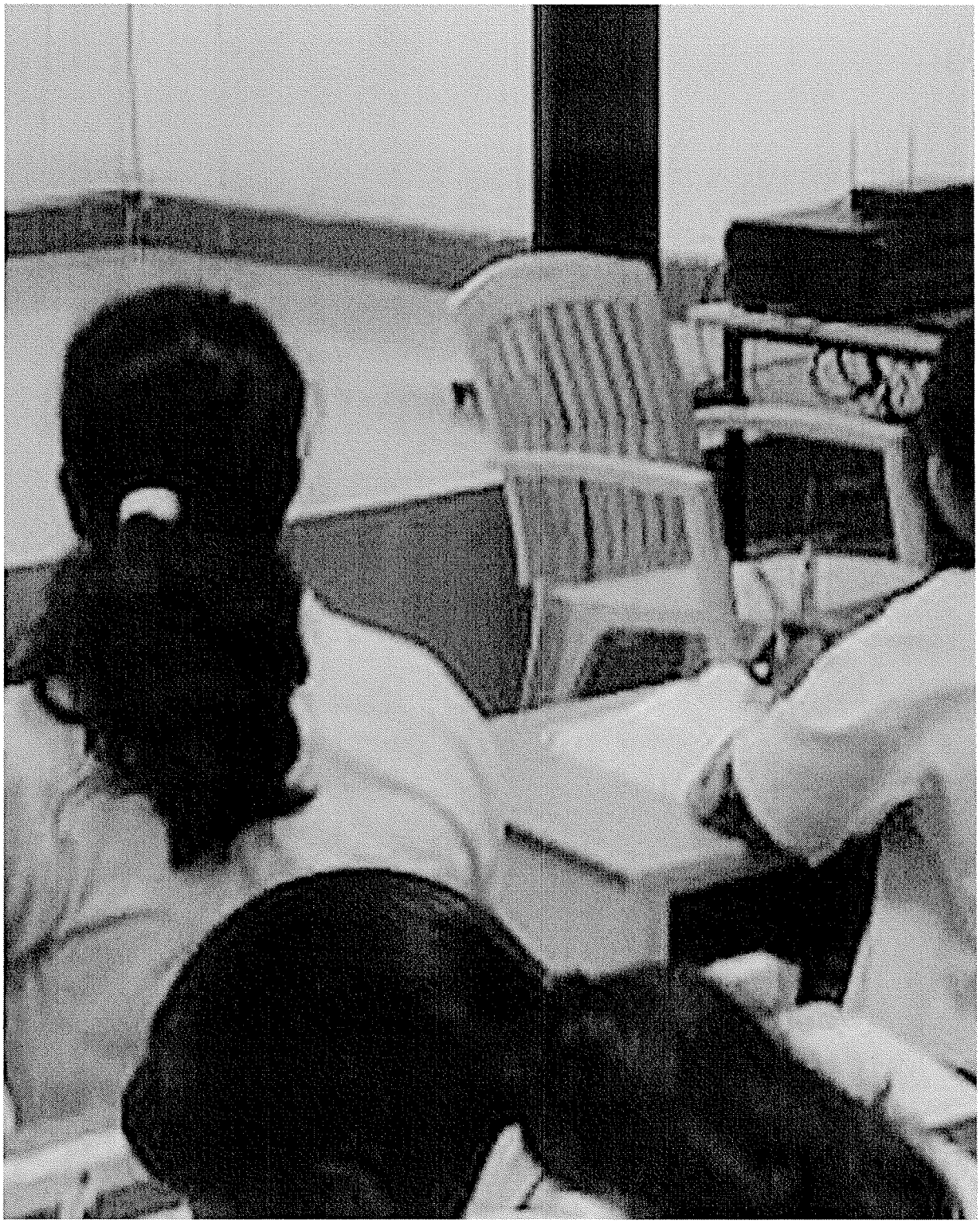
Kind Regards

DR.BALAJI SUBRAMANIYAN.R

Professor & HOD Dental
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam

Encl: Certificates

Photographs



Sri Lakshmi Narayana Institute of Medical Sciences

Osudu, Agaram Village, Kudapakkam post, Puducherry – 605 502

Department of Anatomy

Date:15.08.2019

From

Dr. Vijisha Phalgunan
Professor and Head,
Department of Anatomy,
Sri Lakshmi Narayana Institute of Medical Sciences
BIHER
Puducherry

To

The Dean,
Sri Lakshmi Narayana Institute of Medical sciences
BIHER
Puducherry

Sub: Permission to conduct value-added course: Building Leadership Skills

Dear sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **Building Leadership Skills for 1st year MBBS students** in Sept 2019. We solicit your kind permission for the same.

Kind Regards

Dr. Vijisha Phalgunan

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: **Dr. Jayalakshmi**

The HOD: **Dr. Vijisha Phalgunan**

The Expert: **Dr. Vijisha Phalgunan**

The committee has discussed about the course and is approved.

Dean | Subject Expert | HOD

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affliated to Bharath University, Chennai - TN]

Circular

15.08.2019

Sub: Organising Value-added Course on Building leadership skills. reg

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry affiliated by Bharath Institute of Higher Education and Research is organizing a value added course on **"Cytogenetics" during September 2019 for 1st year MBBS students(2019-2020)**. The course content for the same is enclosed below."

Dean

(Dr.Jayalakshmi)

Encl: Copy of Course content

COURSE CONTENT

Particulars	Description
Course Title	Cytogenetics
Course Code	ANA01
Topics and content of the course in the Hand book	1. Self-awareness-1 2. Self-awareness-2 3. Interpersonal relationships-1 4. Interpersonal relationships-2 5. listening skills, and empathy. 6. Influence 7. 8. Leading during times of change 9. Communication skills-1 10.Communication skills -2 11.Motivation and engagement 12.leading with vision, and purpose 13.Building effective team 14.Building effective team 15.Reflective writing
Advantages of learning and evaluation	In-depth knowledge of genetics and its application
Further learning	Advanced techniques cytogenetics

Opportunities	
Key Competencies	On successful completion of the course the students will have skill in karyotyping
Target Student	1st MBBS
Duration	30 hours, Dec-Jan2020
Theory Session	28hrs
Practical Session	2 hrs
Assessment Procedure	Short answer questions

COURSE PROPOSAL

COURSE TITLE: BUILDING LEADERSHIP SKILLS

Course Objective:

1. introduction to various aspects of communication & interpersonal relationships
2. To learn basics of working in effective teams
3. To learn the basic skills involved in leadership

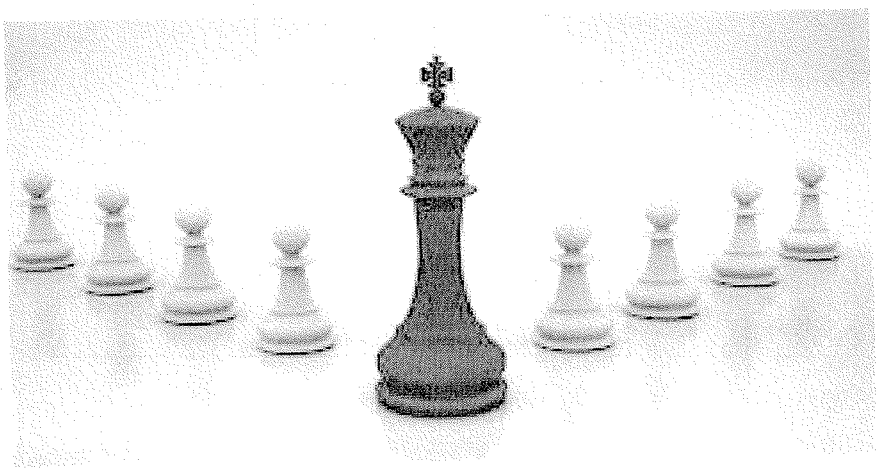
Course Outcome: leadership skills
Course Audience: Medical undergraduates
Course Coordinator: Dr.Vijisha Phalgunan
Course Faculties with Qualification and Designation:
1.Dr. Vijisha Phalgunan – Professor & H.O.D
Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Time	Hours
1.	15.09.2019	Self-awareness-1	4-5p.m	1
2.	16.09.19	Self-awareness-2	4-5p.m	1
3.	17.09.19	Interpersonal relationships-1	4-6p.m	2
4.	18.09.2019	Interpersonal relationships-2	4-6p.m	2
5.	19.09.2019	listening skills, and empathy. Influence	1-4 p.m	3
6.	20.09.2019	Leading during times of change	4-6p.m	2
7.	21.09.2019	Communication skills-1	1-4p.m	3
8.	22.09.2019	Communication skills -2	1-4p.m	3
9.	24.09.2019	Motivation and engagement	4-6p.m	2
10.	25.09.2019	leading with vision, and purpose	4-6p.m	2
11.	26.09.2019	Building effective team	1-4p.m	3
12.	27.09.2019	Building effective team	4-6p.m	2
13.	28.09.2019	Reflective writing	4-6p.m	2
			Total Hours	30

REFERENCE BOOKS:

1. The Leader Who had no Title – Robin Sharma
2. Emotional Intelligence 2.0 – Travis Bradberry

BUILDING LEADERSHIP SKILLS



PARTICIPANT HAND BOOK

COURSE DETAILS

Particulars	Description
Course Title	Building Leadership skills
Course Code	ANA02
Objective	Self-awareness-1 Self-awareness-2

	Interpersonal relationships-1 Interpersonal relationships-2 listening skills, and empathy. Influence Leading during times of change Communication skills-1 Communication skills -2 Motivation and engagement leading with vision, and purpose Building effective team Building effective team Reflective writing
Further learning opportunities	Advanced communication
Key Competencies	Interpersonal communication Team work Reflective writing
Target Student	1st MBBS Students
Duration	30hrs – Sept 2019
Theory Session	20hrs
Practical Session	10hrs
Assessment Procedure	Multiple choice questions

The four styles of leadership are:

- Direct,
- Coach,
- Support, and. **Delegate**
- **WHAT ARE LEADERSHIP SKILLS?**
- A broad definition of leadership focuses on the ability to inspire and organize other people to achieve a shared goal, typically on a schedule. Leadership skills are important in any organization, since they facilitate strong teams and the ability to get tasks done efficiently. Since this is an all-encompassing definition, your leadership skill set might differ from your colleague's. You might demonstrate "soft" leadership skills like patience, empathy and deep listening while your colleague demonstrates strengths in risk-taking and decision-making. Whatever your natural strengths are, developing leadership skills that align with those aptitudes is your ticket to greater effectiveness on the job.

- **DEVELOPING LEADERSHIP SKILLS**
- Developing leadership skills is one of the most powerful moves you can make to transform your professional and personal life. It's an empowering process of harnessing your natural talents to inspire others. As you work on developing leadership skills, you become more attuned to your strengths and weaknesses, which creates self-awareness and the ability to relate to others.

Increasing your capacity as a leader requires asking yourself three questions:

- **WHAT IS MY LEADERSHIP STYLE?**
- Understanding your leadership style opens the door for building managerial skills in harmony with your true nature. Is your leadership approach democratic, visionary, coaching, affiliative, pacesetting or commanding? With a sense of where you fall in these categories, you're better equipped to develop leadership skills.

- **WHAT ARE MY WEAK SPOTS?**
- What are leadership skills going to accomplish without a roadmap for improving on your weaknesses? Be honest in your self-examination. Are you empathetic to others' needs and feelings or do you focus solely on your own? Do you work to bring out the best in others, or do you dominate others? Are you confident in your decision-making abilities or are you plagued with self-doubt? When you know what your weaknesses are, you know where to start addressing them.

- **WHAT IS MY LEADERSHIP STYLE?**
- With a clear idea of your strengths and weaknesses, you're ready to take action by making a game plan aligned with your leadership style. If you identified a lack of confidence as a weakness, take steps to build self-confidence. If you identified poor communication as a weakness, start practicing effective communication techniques. With practice, you'll begin to embody examples of leadership skills to facilitate success in any endeavor.

- **EXAMPLES OF LEADERSHIP SKILLS**
- The following examples of leadership skills encapsulate outcomes that will help you become the most effective leader you can be.

- **1. BE PASSIONATE**
- No one wants to seek counsel from someone who doesn't care about the topic as much or more than they do. Passion is effort; passion is exertion. Passion is never giving up. Without it, you cease innovating and stagnate. When you display authentic enthusiasm and passion for the end result, your people will keep working to achieve their goals.

- Employees respond to those who are eager to help them learn and grow. Show passion for everything you do, including in your efforts at developing leadership skills. Your desire will be clear to your employees, and inspire them to improve leadership skills, too.

- **2. MODEL GREAT LEADERSHIP FOR OTHERS**
- What are leadership skills going to accomplish if they don't inspire others to action? Not much. People respect someone who walks the walk. Research supports this statement; a core characteristic of transformational leaders is the ability to be a role model. One of the most powerful examples of leadership skills is showing those around you exactly what you'd like to see them do. Don't waver on this. The strongest message you can send to your team is to model the behaviors you'd like to see. "If they can do this," your team will think, "So can I."

- **3. UNDERSTAND YOUR STRENGTHS AND USE THEM**
- No leader is born with everything necessary to succeed. Developing leadership skills takes time and effort, and it begins with a thorough examination of your strengths and weaknesses. A strong knowledge of your innate gifts and abilities means you can put them to work for you, while an understanding of your weaknesses provides you with areas you know you can improve. Addressing your shortcomings leads to true growth. You become strong enough to not only ask "What are leadership skills?" but also the pivotal question of "What are *my* leadership skills?"

- **4. SET CONCRETE GOALS AND EXECUTE THEM**
- Even the most formidable leaders don't come up with success out of nowhere. The grandest vision will never get off the ground if you don't plot a path to get there. When you're developing leadership skills, invest time in clarifying your goals and solidifying them. Formulating the right plan and setting meaningful benchmarks along the way gives you a map to follow, a methodology that will guide your business through the next week, month, year and decade. Once you achieve a particular goal, look toward another; constant striving to meet that next benchmark will give you and your employees a sense of meaning and pride. As you make progress on your goals, the examples of leadership skills you embody will speak volumes about your tenacity in realizing your business vision.

- **5. ADMIT WHEN YOU FAIL AND MOVE ON**
- What are leadership skills – does being an effective leader mean never making mistakes? Even the most powerful, inspiring leaders make mistakes. When you recognize an error, admit it openly and take action to correct it. Be open about your failures; discuss them with yourself and with your team. Learn from them. Ask yourself and your team, "How can I avoid making this mistake in the future?" Learning from your failures sends a powerful message to those around you. They understand that you will lead well even when you make a mistake. Those wondering how to improve leadership skills should learn how to recognize successes and failures.

- **6. INSPIRE OTHERS**
- If you're complaining about every little detail and can only see the worst-case scenario at the end of every plan, you have little chance of inspiring others. Inspiration is an extension of belief; if you say, "No, that won't work" or "why bother?" to an employee, you're signaling to them that you do not believe in their idea, in them or even in the business itself. An employee who feels you do not believe in them will not perform well, and can even create a domino effect of poor morale across the business. Instead, believe in others and what they are capable of. Inspire them to work harder and reach greater heights. Developing leadership skills throughout your business by generating and focusing positive energy, even when

things aren't going according to plan, is the secret to sustained growth.

7. FIND YOUR HIGHER PURPOSE

- When developing leadership skills, it's essential that you know why you're putting time and effort into your chosen goal. What drives you? Your immediate response may be straightforward: a larger paycheck from a job well done or the prestige that comes from higher rank. But step back for a moment. Why do you want that larger paycheck? Is it so your family feels more secure? Perhaps you want to lead because you feel you can help others by developing products and services that they need, or you see a place where you can cause positive change in your industry. These are all higher purposes, and by identifying your own, you can better operate as a confident, knowledgeable and empowering leader for others.

- As you hone your effectiveness as a leader in your own life – whether that's in a professional or personal capacity – you'll strengthen the efforts you put into your own goals. Those around you will see the hard work and passion you bring to the table each day, stirring them work on developing leadership skills, too.

- Developing leadership skills is one of the most powerful steps you can take for your career. Discover the driving force that inspires you to become the best leader you can be.

- Leadership skills can play a large role in a person's career development. Technical skills and a college degree may only take you so far. To be an effective leader and help move your career forward, you'll also need soft skills, such as the ability to be a good listener and communicator.
- There are several core leadership skills that are considered important traits to help you become a more effective leader. Whether it's taking the initiative, developing critical thinking skills, or learning how to motivate and empower those around you, you must constantly be challenging yourself to enhance your leadership capabilities.

- By showing that you have what it takes to be a leader, you can fast-track your career. If you're looking for a new job or promotion, you're more likely to get where you want to go if you have a steady track record of being successful in leadership roles in your professional and personal life.
- There are many different types of leaders, but very few people are natural, born leaders. Most of us need to learn, develop, and improve on how to be a good leader. Leadership development involves identifying and mastering the key skills and characteristics that are required to become a successful leader.
- KEY TAKEAWAYS

. Taking Initiative

Most bosses will only assign employees tasks they know they can do. That's why it's important to volunteer to take on more responsibilities while going above and beyond at your current position. Focus on learning competencies that fall outside your primary knowledge area.

Don't be complacent. Step out of your comfort zone and challenge yourself to improve. Remember, the more work you do, the more you are learning. Learning more and taking on more responsibility will eventually help move you into a leadership role at your workplace. Also, others will more easily accept you as a leader when that day comes, because you will have established a track record of taking the initiative, being a student of learning, and using that newfound knowledge for making improvements.

Critical Thinking

To be hired for a high-profile job, you will need to be a critical thinker. Good leaders can foresee potential problems before they happen. They can also develop ways to prevent problems from happening.

Good leaders are also aware of potential opportunities and take advantage of them to benefit the company and employees. In other words, be proactive. Don't wait for things to happen; instead, anticipate them, and help the team be ready in case something goes wrong. If you're a leader and an employee brings a problem to your attention, help them determine the cause and put preventive measures in place to ensure it doesn't negatively impact the employees, the company, and the customers.

Be a Follower

Leaders should learn to recognize the value of team members, learn from them, and encourage other team members to learn from them. Learn things that you didn't know from a person who specializes in a particular area. If an employee has a new idea, encourage it, and see where it goes. Be one of their biggest fans. Help them to step out of their comfort zone and by believing in them; you'll instill confidence. Recognize when one of your employees is taking the type of initiative that you took when you were just starting out, building your skillset, and honing your leadership skills.

The Bottom Line

Good leadership skills are essential to career development. If you want to improve your leadership skills, think about what actions you can take to be more influential. If you are already a leader, think about how you can influence others.

Annexure- II

VALUE ADDED COURSE

Building leadership skills ANA02

Batch 01 - List of Students Enrolled July 2019

2019	U19MB273	ARUSHI MAHINDRA GAIKWAD	Anatomy
2019	U19MB274	ASHA J	Anatomy
2019	U19MB275	ASHMI RAHIMAN	Anatomy
2019	U19MB276	ATHULYA RAVINDRAN	Anatomy
2019	U19MB277	BALAJI M	Anatomy
2019	U19MB278	BALAJI S	Anatomy
2019	U19MB279	BAVINENI RAMYA SAI SREE	Anatomy
2019	U19MB280	BHUVAN SUNDAR M	Anatomy
2019	U19MB281	BIPIN HARIKUMAR	Anatomy
2019	U19MB282	BOOPATHISHANKAR K	Anatomy
2019	U19MB283	CAMILUS D	Anatomy
2019	U19MB284	CELINA OKRAM	Anatomy
2019	U19MB285	CHALLA SINDHOOR	Anatomy
2019	U19MB286	CHATE RUTUJA BHALCHANDRA	Anatomy
2019	U19MB287	DHARSHANA G	Anatomy
2019	U19MB288	K DHARSHNI	Anatomy
2019	U19MB289	DHIR ASUTOSH ASHIM	Anatomy
2019	U19MB290	EZHILMARAN R	Anatomy

RESOURCE PERSON **COORDINATOR**

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - IV

BUIDING LEADERSHIP SKILLS

Multiple choice question

Course Code: ANA02

I. ANSWER ALL THE QUESTIONS : (5x2=10 marks)

1.What are the most important values you demonstrate as a leader?

A.integrity, b.money, c.status, d.power

2. How have you gained commitment from your team?

A.influencing & persuading ,b.conducting parties, c.constant nagging

D.being very generous

3.How can a leader fail?

A.goals not achieved,b.scores not reached,c.reaching late,d.none of the above

4. What is Team leader ?

A.motivate the team,b.not participate in work,c.not effectively supervise,d.negative feedback

5.what is team manager?

A.handle tasks & responsibilities, b.relax, c.will complaint, d.none of the above

Kavitha
U19MB338

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - IV

BUIDING LEADERSHIP SKILLS

Multiple choice question

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5.what is team manager?

A.handle tasks & responsibilities, b.relax, c.will complaint, d.none of the above

Ajith R
U19HB259

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - IV

BUIDING LEADERSHIP SKILLS

Multiple choice question

Course Code: ANA02

(5x2=10 marks)

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1. What are the most important values you demonstrate as a leader?

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A.motivate the team,b.not participate in work,c.not effectively supervise,d.negative feedback

5. what is team manager?

A.handle tasks & responsibilities, b.relax, c.will complaint, d.none of the above

Student Feedback Form

Course Name: Building leadership skills
Subject Code: **ANA02**

Name of Student: Balaji M Roll No.: V19MB277

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear					✓
2	Course contents met with your expectations					✓
3	Lecturer sequence was well planned					✓
4	Lectures were clear and easy to understand					
5	Teaching aids were effective					✓
6	Instructors encourage interaction and were helpful					
7	The level of the course					✓
8	Overall rating of the course	1	2	3	4	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

Balaji

Signature

Date:

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that Asha J has actively participated in the Value Added Course on Cytogenetics held during Sept'2019 Organized by Department of Anatomy, Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. Vijisha P	Dr. B. Rajesh	Dr.Vijisha P	Dr. S.Balagurunathan
RESOURCE PERSON	**RESOURCE PERSON**	**COORDINATOR**	**DEAN**

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that Dharshni has actively participated in the Value Added Course on Cytogenetics held during Sept'2019 Organized by Department of Anatomy, Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. Vijisha P	Dr. B. Rajesh	Dr.Vijisha P	Dr. S.Balagurunathan
RESOURCE PERSON	**RESOURCE PERSON**	**COORDINATOR**	**DEAN**

Sri Lakshmi Narayana Institute of Medical Sciences

Date 02/09/2019

From
Dr.R.Venkataramanan,
Professor and Head,
otorhinolaryngology,
SLIMS
Bharath Institute of Higher Education and Research,
Puducherry.

To
The Dean,
SLIMS
Bharath Institute of Higher Education and Research,
Puducherry.

Sub: Permission to conduct value-added course: ENG-An mordern era for vertigo evaluation reg.

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: Simulation Based Training In Audiology on Sep 2019 to Dec 2019. We solicit your kind permission for the same.

Kind Regards

Dr.R.Venkataramanan

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:
The Dean:
The HOD:
The Expert:

The committee has discussed about the course and is approved.

Dean

(Sign&Seal)

DEAN
Prof.K.BALAGURUNATHAN,M.S
(General surgeon)
SRI LAKSHMI NARAYANA
INSTITUTE OF MEDICAL SCIENCES
OSUDU PONDICHERRY

Dr. R. NITHISH TIMOTHY, MS.,
Reg. No.108008
Assistant Professor ENT
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

SUBJECT EXPERT
(Sign &Seal)

Dr. R. VENKATARAMANAN, MS.,
Reg. No: 72549
Professor ENT
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

HOD (SIGN AND SEAL)

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affliated to Bharath University, Chennai - TN]

Ref. No. SLIMS/Dean Off/VAC/024 **Date:03/09/19**

From
The Dean
Sri Lakshmi Narayana Institute of Medical sciences,
Pondicherry – 605502

To
The Registrar,
Bharath Institute of Higher Education and Research,
Chennai - 600073.

Respected Sir

Sub: Request for permission and approval of Syllabus for certificate course (Value Added course) for the academic year 2019-20 - Reg
Ref: Requesting letter received from Departments

*****

With reference to the above, herewith forwarding the proposed list of Value-added courses for necessary permission and approval of syllabus to conduct the same.

This is for your kind information and needful action.

Thankingyou

Yours faithfully

[DEAN]

DEAN
Prof.K.BALAGURUNATHAN,M.S
(General surgeon)
SRI LAKSHMI NARAYANA
INSTITUTE OF MEDICAL SCIENCES
OSUDU PONDICHERRY

Encl's:

1. Requesting letter received from department
2. Syllabus of thecourse
3. Details of faculty handlingcourse

Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry

VALUE ADDED COURSE : ENG-An mordern era for vertigo evaluation

COURSE CO-ORDINATOR DETAILS

Faculty Name: Dr.R.Nithish Thimothy

Email ID:e n t s l i m s @ g m a i l . c o m

Bharath
INSTITUTE OF HIGHER EDUCATION AND RESEARCH
(Declared as Deemed - to - be - University under section 3 of UGC Act 1956)

Ref. No. BHIER/ VAC/B-02 **Date:05.09.2019**

From

The Registrar,
Bharath Institute of Higher Education and Research,
Chennai - 600073.

To

The Dean
Sri Lakshmi Narayana Institute of Medical sciences,
Pondicherry – 605502

Sir / Madam,

Sub: Approval of Syllabus to conduct certificate course (Value Added course) for the academic year 2019-2020 – Reg.

Ref: Ref. No. SLIMS/Dean Off/VAC /024 Dated: 03.09.2019

*****

With reference to the above, it is to inform that the proposal submitted to conduct Value Added Course has been accepted and approved by BIHER, council meeting. List of the VAC are mentioned below for the academic year 2019– 2020. The abstract of the VAC course completion detail should be submitted to the Registrar office.

Thanking you

Yours faithfully

REGISTRAR

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affliated to Bharath University, Chennai - TN]

Circular

.

07/09/2019

Sub: Organising Value-added Course: ENG-An mordern era for vertigo evaluation **reg.**

With reference to the above mentioned subject, it is to bring to your notice that SLIMS,**Bharath Institute of Higher Education and Research**, is organising **"ENG-An mordern era for vertigo evaluation"**. The course content and registration form is enclosed below.

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before 15/09/2019. Applications received after the mentioned date shall not be entertained under any circumstances.

DEAN

DEAN
Prof.K.BALAGURUNATHAN,M.S
(General surgeon)
SRI LAKSHMI NARAYANA
INSTITUTE OF MEDICAL SCIENCES
OSUDU PONDICHERRY

Encl: Copy of Course content

VALUE ADDED COURSE

1. Name of the programme &Code

ENG-An mordern era for vertigo evaluation – A value added course for the medical students.
& **ENT 11**

2. Duration &Period

30 hrs & Sep 2019-Dec 2019

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Pre test and post test which includes 10 mcqs - *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

1 time Sep 2019- Dec 2019

8. Year of discontinuation:2020

9. Summary report of each program year-wise

Value Added Course- Sep 2019- Dec 2019					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	ENT 11	ENG-An mordern era for vertigo evaluation	1.Dr.Venkataramanm 2. Dr.S.Ganesh	3rd year MBBS students	16 students & 2019

10. Course FeedBack

Enclosed as Annexure- V





RESOURCEPERSON
1. **Dr.R. VENKATARAMANAN**
2. **Dr.S. GANESH**

COORDINATOR
Dr.R . NITHISH TIMOTHY

COURSE PROPOSAL

1. NAME OF THE PROGRAMME

ENG-Anmordern era for vertigo evaluation– A value added course for the medical students.

2. AIM

Training the students to provide hands on experience on Electronystagmography.

3. OBJECTIVES

a) To teach the students how to connect the ENG leads and interpret the results in various disease patterns

4. METHODOLOGY

Students who are interested in participating in value added course are enrolled and the course is conducted for them during the non college hours for a period of 30 hours from Sep 2019 – Dec 2019 . This course is conducted every 6 months.

Course Audience: 3rd year MBBS students

Course Coordinator: Dr.R.Nithish Thimothy

Course Faculties with Qualification and Designation:

1.Dr. R. Venkataramanan

2.Dr. S.Ganesh

Schedule followed during the course

No	Topic	Title	Duration	Date and time
1	ENG-An mordern era for vertigo evaluation	Introduction & Learning outcomes of electronystagmography	3hrs	4pm-6pm(20/9/19),4pm-5pm(26/9/19)
		Vestibular reflexes	4hrs	4pm-6pm(30/9/19),4pm-6pm(5/10/19)
		Fundamentals of electronystagmography	5hrs	4pm-6pm(10/10/19),4pm-6pm(16/10/19),4pm-5pm(20/10/19)
		Electrode placement and description of the procedure	3hrs	4pm-6pm(27/10/19),4pm-5pm(2/11/19)
		Clausens butterfly chart	3hrs	4pm-6pm(9/11/19),4pm-5pm(14/11/19)
		Demonstration of ENG lead placement and interpretation of the various results	6hrs	4pm-6pm(19/11/19),4pm-6pm(23/11/19),4pm-6pm(27/11/19)
		Hands on experiance of ENG lead placements and interpretation ofthe results	6hrs	4pm-6pm(30/11/19),4pm-6pm(4/12/19),4pm-6pm(9/12/19)
		TOTAL	30HRS	

REFERENCE BOOKS: 1) SCOTT BROWN 8th edition

2) ANIRBAN BISWAS 5th edition

ELECTRONYSTAGMOGRAPHY

HANDBOOK of Balance Function Testing

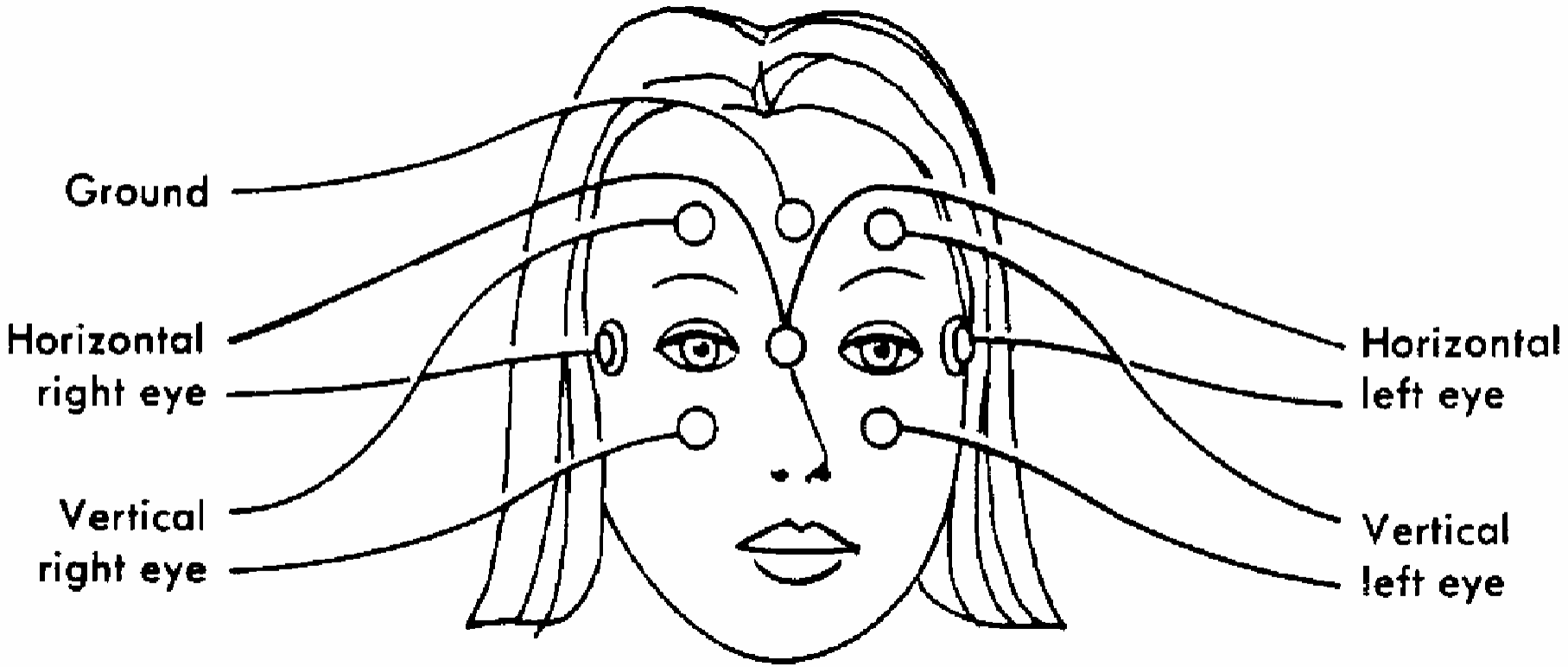
Gary P. Jacobson
Craig W. Newman
Jack M. Kartush

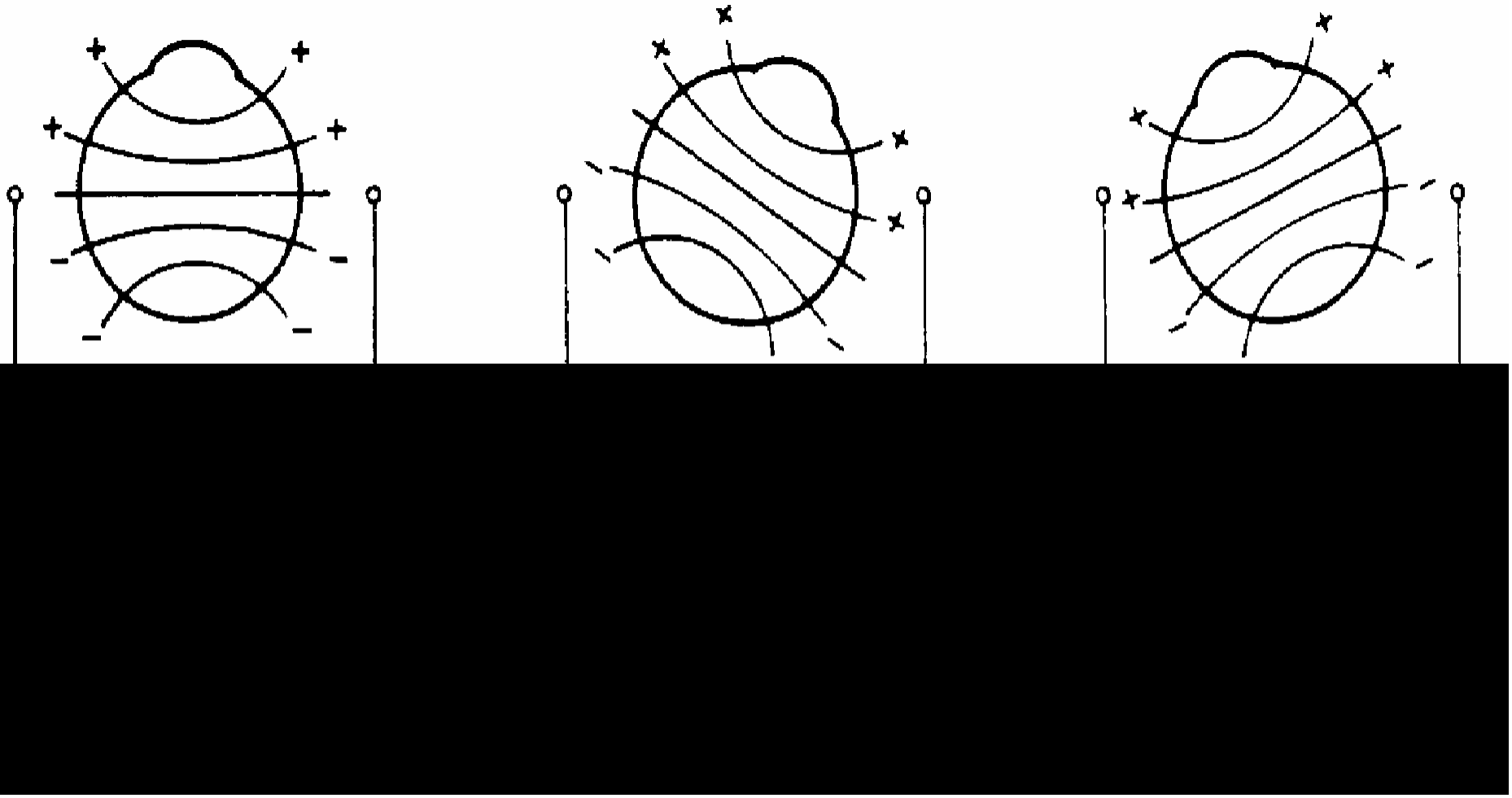


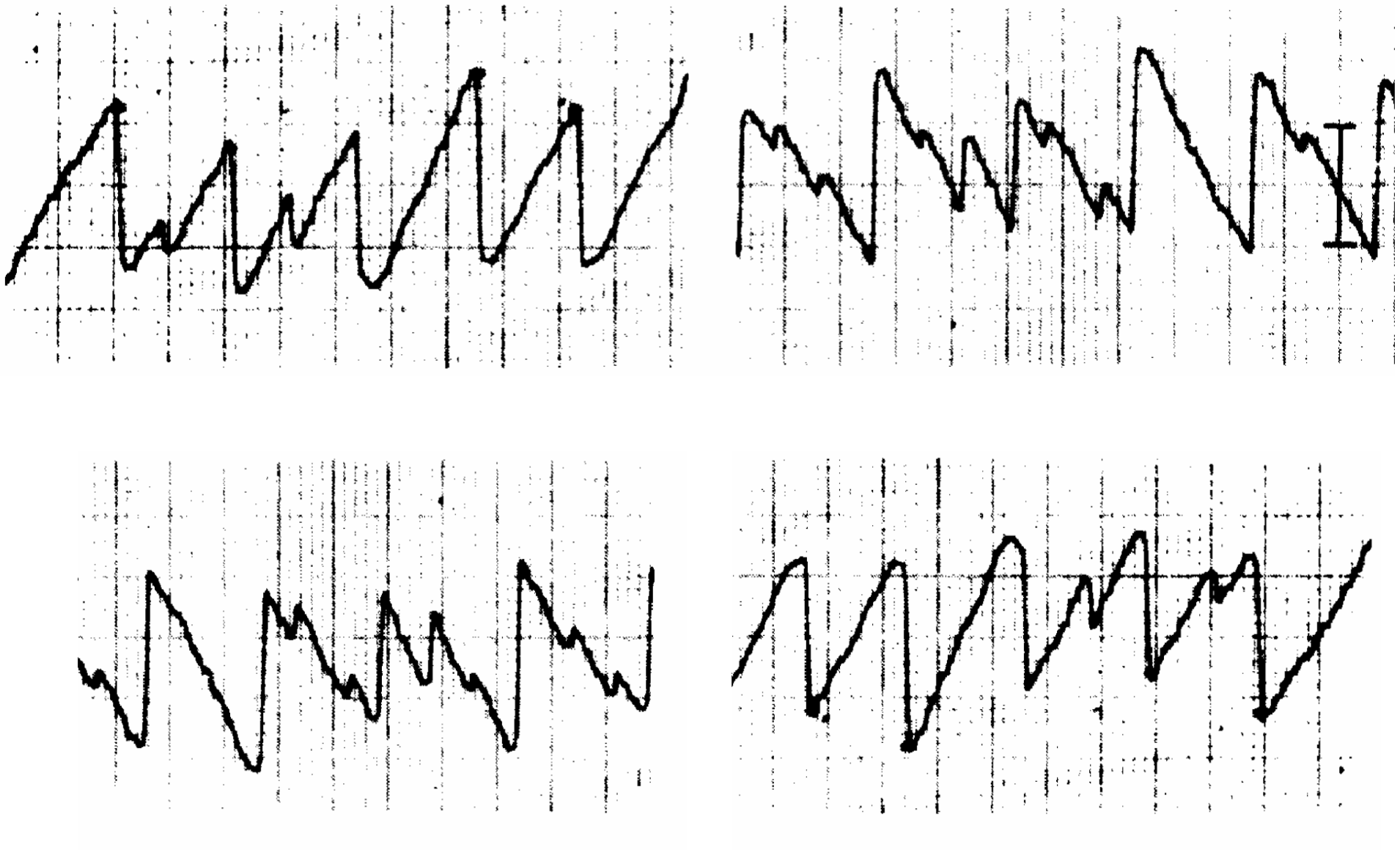
SINGULAR PUBLISHING GROUP, INC.
SAN DIEGO · LONDON

ENG measurements based on the presence of the *corneoretinal potential*

Cornea has a positive pole Retina has a negative pole


Ground
Horizontal
right eye
Vertical
right eye
Horizontal
left eye
Vertical
left eye





Essentially ENG consists of 3 parts

- oculomotor evaluation
  - Calibration
  - Gaze
  - Fixation
  - Saccade
  - Tracking (Pursuit)
  - Optokinetic
- positioning/positional testing
- caloric stimulation.

History

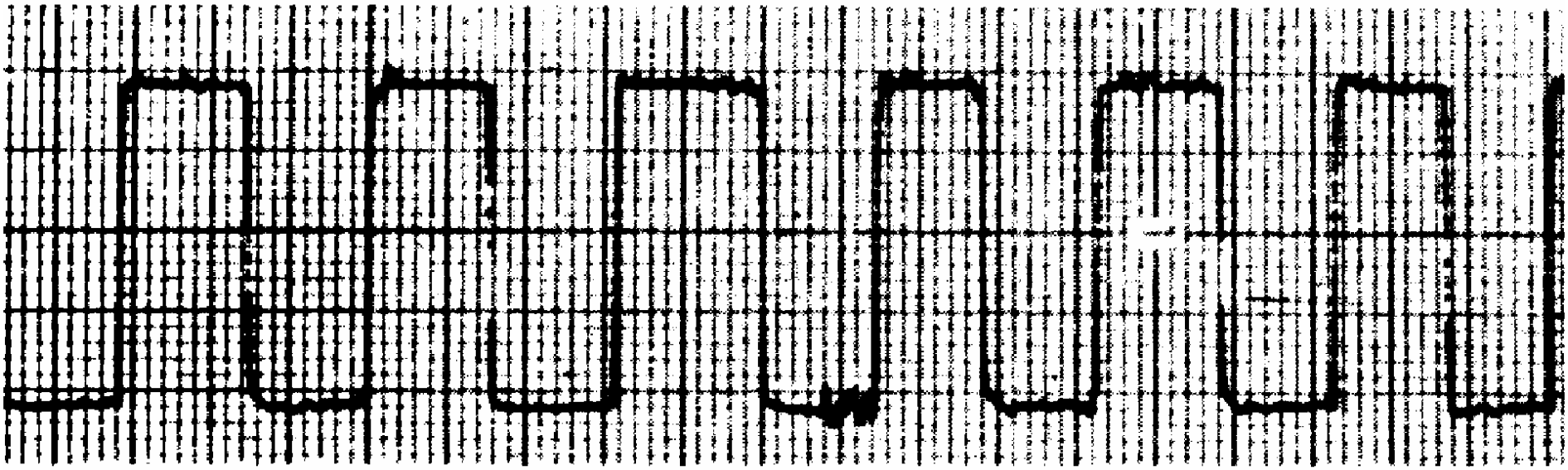
- Stop all medications 24-72 h prior to testing
- 72 hours Alcohol (agonist or antagonist)
- Any medications taken should be clearly noted on the test results
- limit food intake prior to examination
- arrange for transportation after the examination

Examination

- Large perforations
  - increase air stimulation above expectation
  - cooling effect for warm (evaporation).
- cerumen must be removed
- Middle ear fluid affects stimulation

Saccades (calibration)

- Dots on the wall or ceiling
- center and 10°, 20°, and 30° off center
- patient to look back and forth between the dots
- head fixed



Gaze

spontaneous nystagmus

nystagmus in the absence of stimulation

- presence or absence of spontaneous nystagmus
- presence, absence, or exacerbation of nystagmus with addition of off-center gaze
- fixation suppression of spontaneous nystagmus

Gaze Test

- Nystagmus present with eyes open and enhanced by eye closure - lesion is peripheral
- Nystagmus is enhanced with ocular fixation and reduced by eye closure - lesion is central

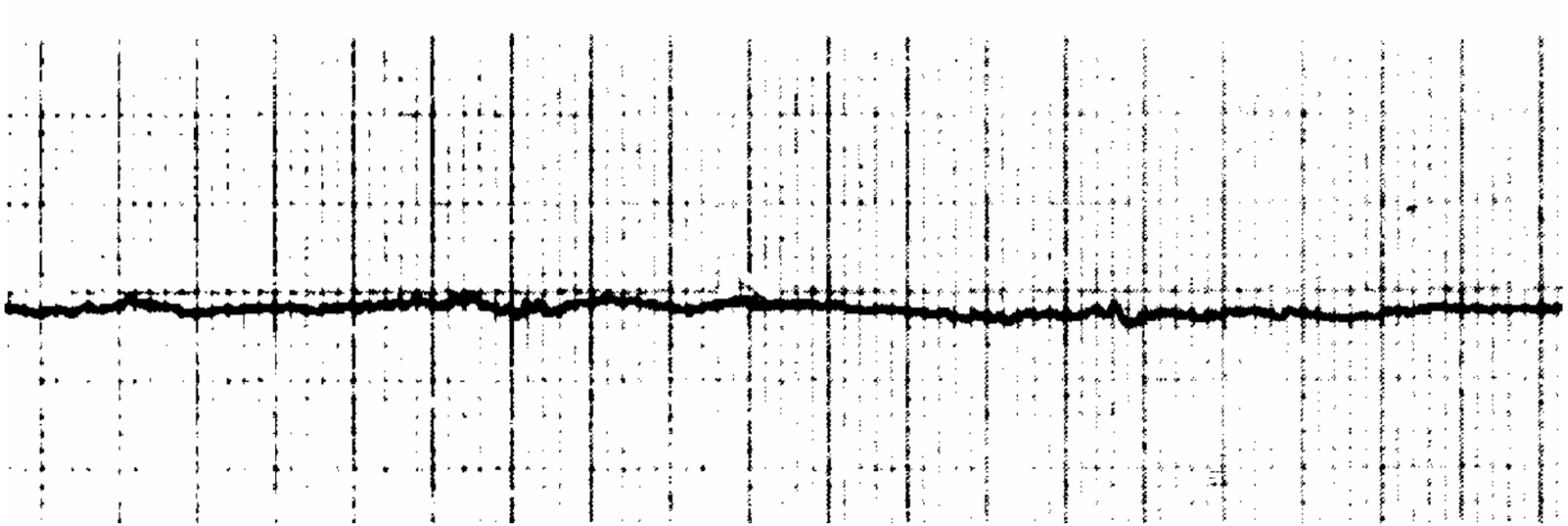
Administration

- For gaze testing
  - the patient is instructed to look straight ahead and then to fixate on a target 30° to the right, left, up, and down.
  - Fixation is maintained for approximately 30 seconds in center gaze and 10 seconds in eccentric gaze.

- Spontaneous nystagmus (eliminating suppression)
  - eyes open in a dark room
  - eyes closed.
  - mental tasks (eg, answering questions, counting by twos).

Gaze

- Normal gaze position - patient is able to maintain position with eyes open and closed



Spontaneous nystagmus

- Either central or peripheral pathology.
- with eyes open is always diagnostically significant.
- Peripheral indicators
  - Horizontal or horizontal rotary
  - Suppressed by visual fixation
  - Nondirection changing
  - Exacerbated by gazing in the direction of the fast phase*
- Central indicators
  - Vertical
  - Not suppressed by fixation
  - Direction changing

Alexander's law

- Nystagmus increases when the patient gazes in the direction of the fast phase.
- Nystagmus decreases or disappears when the gaze in the direction of slow phase.
- This pattern is often seen in peripheral vestibular disorders and occasionally in central disorders.

Unilateral gaze-paretic nystagmus

- Nystagmus only occurs with eccentric gaze in one direction.
- Elicited nystagmus beats in the direction of the gaze.
- consistent with CNS pathology

Bilateral gaze-paretic nystagmus

- right gaze⓪ right-beating nystagmus
- left gaze ⓪ left-beating nystagmus
- suggests CNS pathology

Bruns nystagmus

- Combination of
  - Unilateral gaze-paretic nystagmus
  - Vestibular nystagmus
- Asymmetrical nystagmus in both directions of a gaze
- associated with extra-axial mass lesions on the side of the gaze-paretic nystagmus

Ewald law

- Eyes always move in the plane of the canal being stimulated and in the direction of endolymph flow
- Ampulopetal in HSCC causes greater response than ampulofugal
- Ampulofugal in vertical SCCs cause greater response than ampulopetal

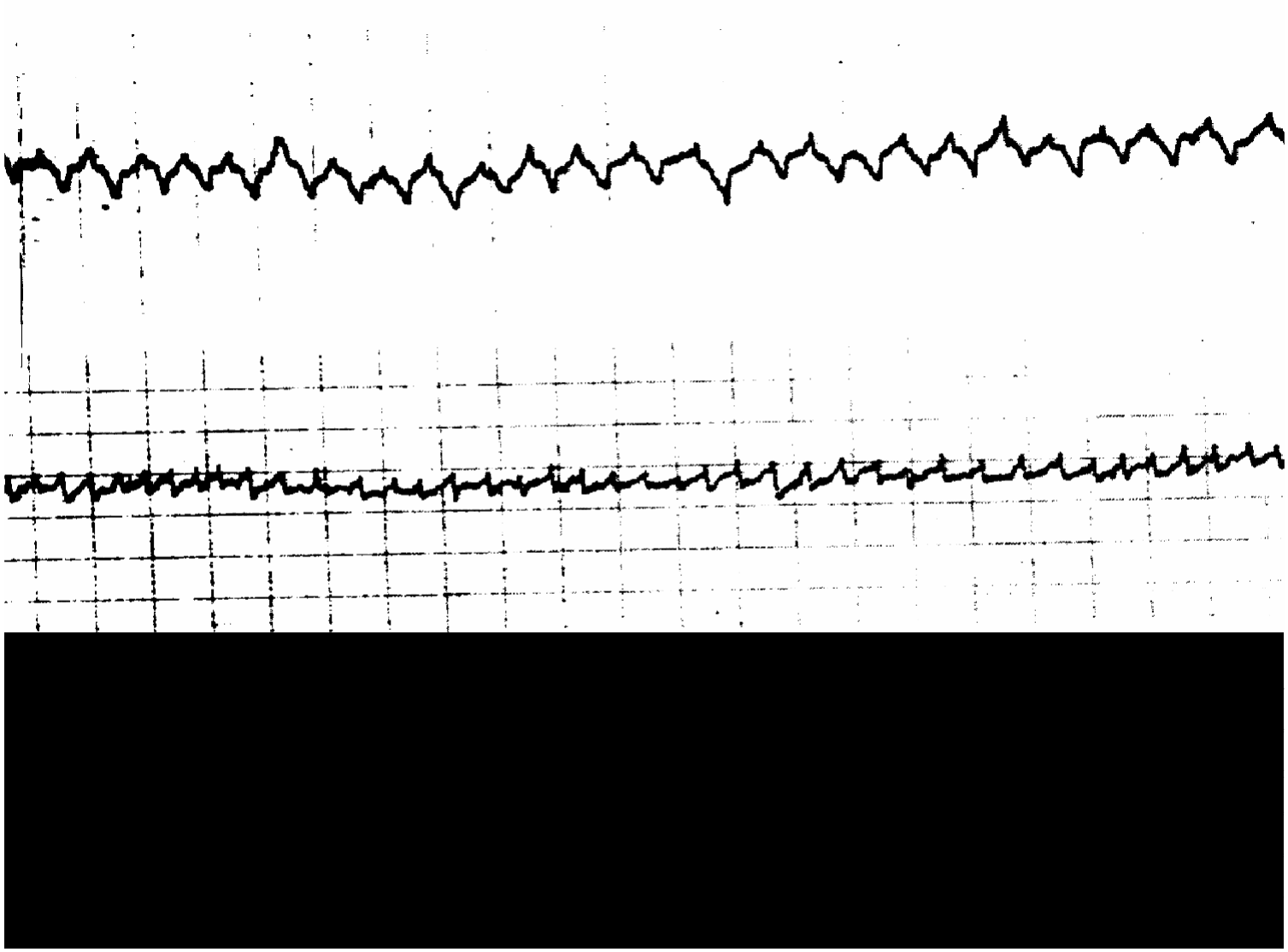
Fixation

- Congenital nystagmus
- Gaze-Evoked Nystagmus
- Rebound nystagmus
- Square-wave jerks

Congenital nystagmus

- Spiky appearance
- increases with lateral gaze.
- decrease in velocity or completely disappear with eyes closed

Congenital Gaze Findings



Gaze-Evoked Nystagmus

- Drift of the eye which is only present for certain directions of gaze
- EOG recordings, any persistent nystagmus for ocular displacements < 30 degrees is abnormal
- **Causes of Gaze-evoked nystagmus**
  - **Medication**
  - **Brainstem or cerebellar disorder**
  - **Normal variant**
  - **Ocular muscle fatigue**
  - **Congenital nystagmus**

Rebound nystagmus

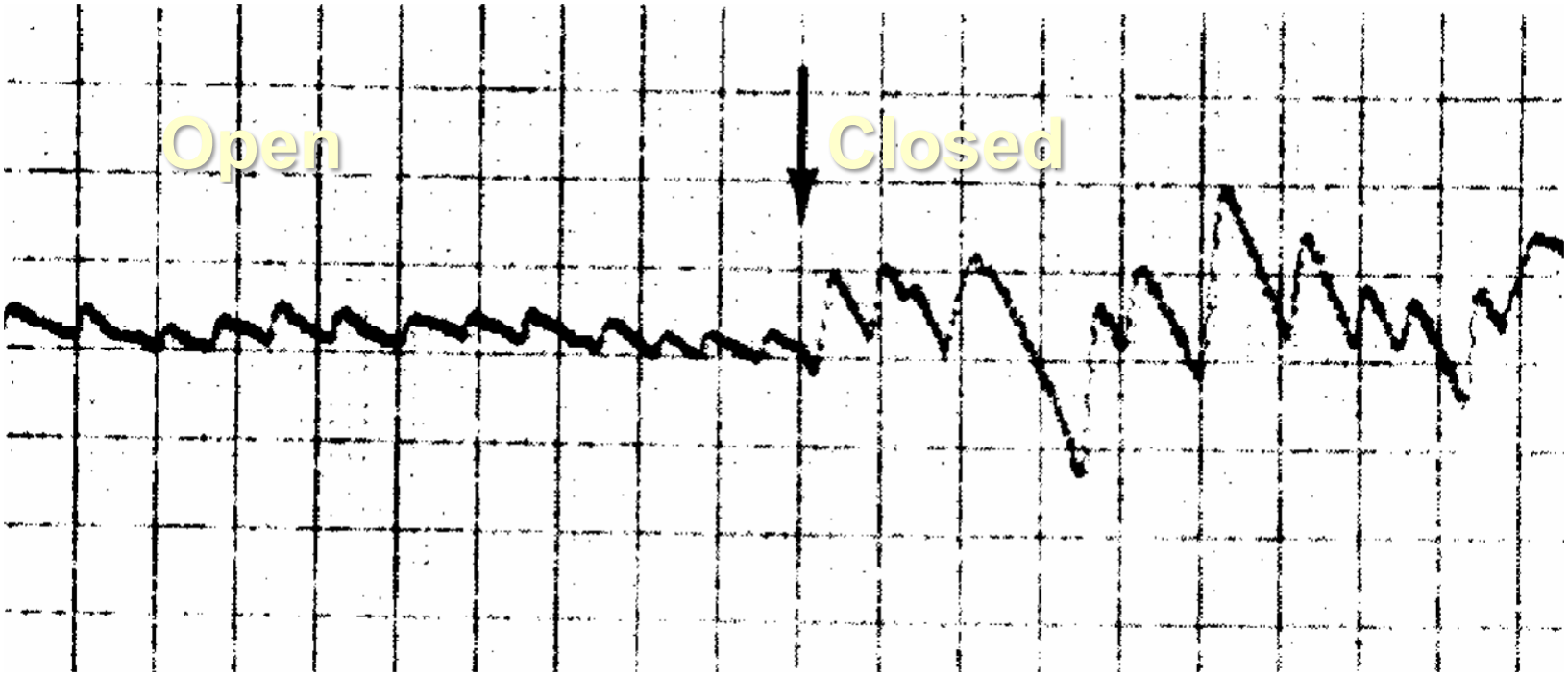
- Burst of nystagmus
- begins when the eyes are returned to center gaze.
- lasting 5 seconds
- brainstem or cerebellar lesions

- the most common abnormality with eyes closed.
- healthy patients
- increasing frequency with increasing age.
- abnormal if
  - In young patients
  - more frequently than 1 per second
  - eyes open.
- suggestive of a cerebellar disorder.

Fixation suppression

- For peripheral lesions, nystagmus that is evident with eyes closed or in the dark should be suppressed by visual fixation.
- If not CNS pathology is possible.

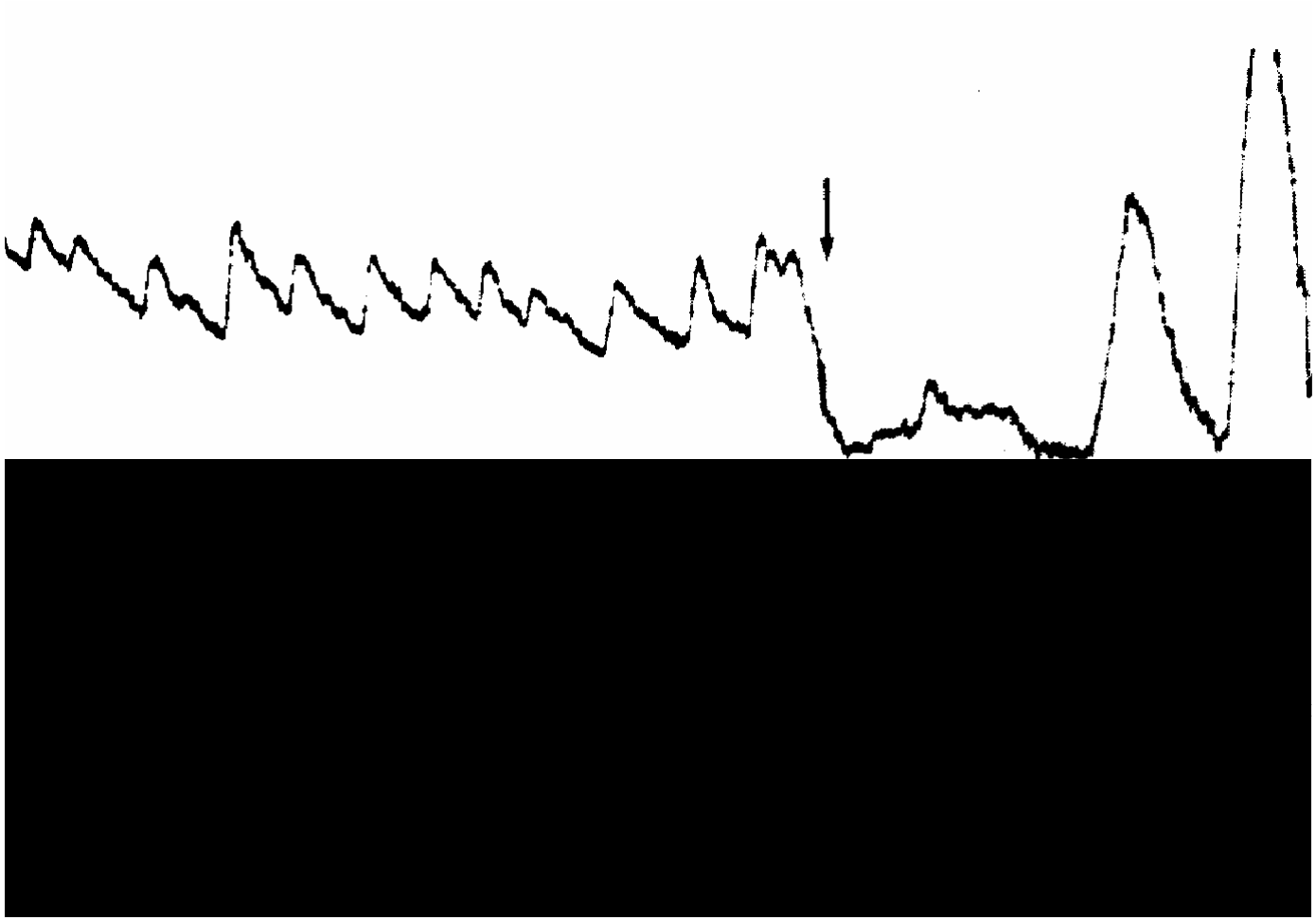
Peripheral Gaze Findings



Gaze Findings With CNS Lesion

- Nystagmus may be horizontal, vertical, rotatory
- May demonstate variation in amplitude
- If cause by a stable pathology, it declines slowly in time
- Enhanced by ocular fixation
- If horizontal, most often bilateral (bidirectional)

CNS Gaze Findings



Saccades Interpretation

- Accuracy
- Latency
- Velocity

Accuracy

- Normal or basal ganglia pathology
  - Hypometric – undershoots
- CNS pathology
  - Ocular flutter - spiky overshoot
- Cerebellum
  - Hypermetric overshoot then a correction.
  - Multistep saccades undershoots then multiple saccades
  - Postsaccadic drift (Glissade) eye drifting after saccade.
- PICA
  - Pulsion :pulling to left or right after vertical saccades.

Latency

- Short latency
  - artifact
  - patient anticipating the position of the target.
  - suggestive of CNS pathology.
- Asymmetrical latencies
  - occipital
  - parietal cortex.

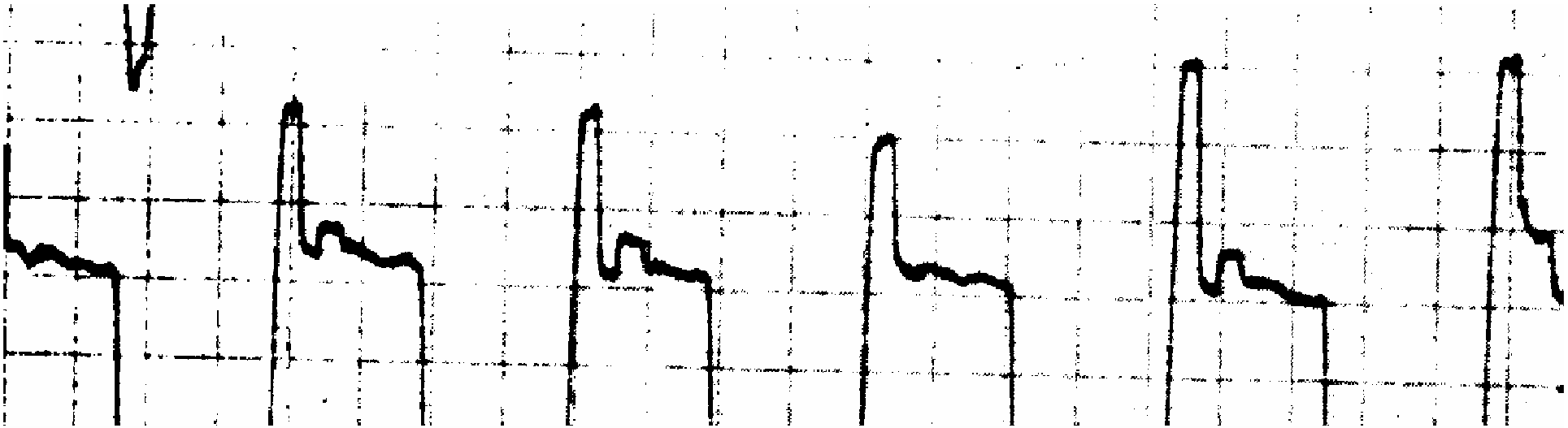
- Saccadic slowing
  - drug effects.
  - CNS degenerative conditions, basal ganglia pathology, and cerebellar disorders.
  - ocular disorders, including oculomotor weakness,

- Abnormally fast saccades
  - artifact and may be due to technical difficulties.
  - CNS
  - ocular pathology

- Asymmetrical velocity - between the eyes or between directions.
  - ocular nerve
  - muscle pathology (ie, lesions or palsies).
  - CNS pathology may also be indicated. A lesion in the MLF

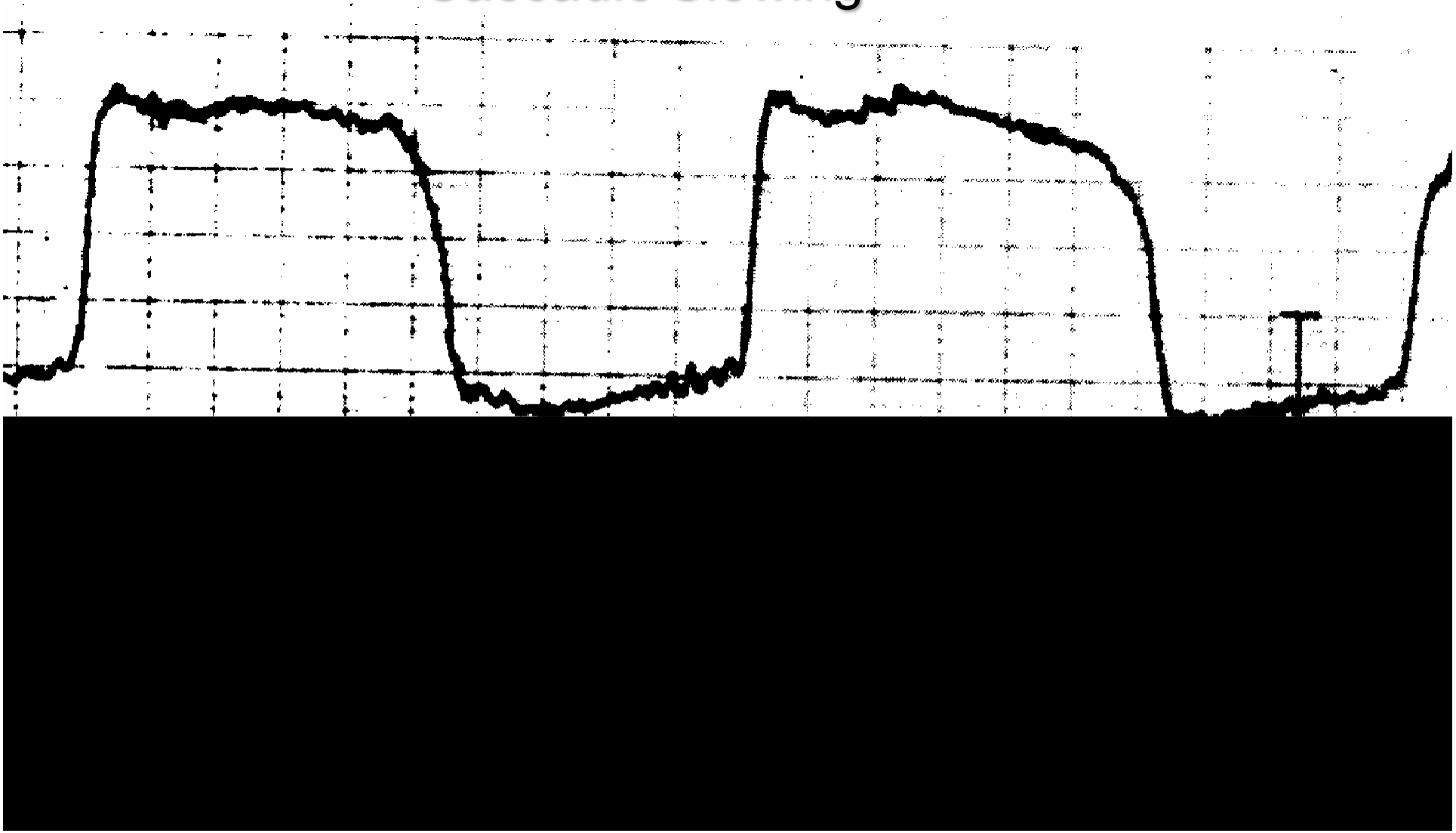
Saccadic Abnormalities

Overshoot



Saccadic Abnormalities

Saccadic Slowing



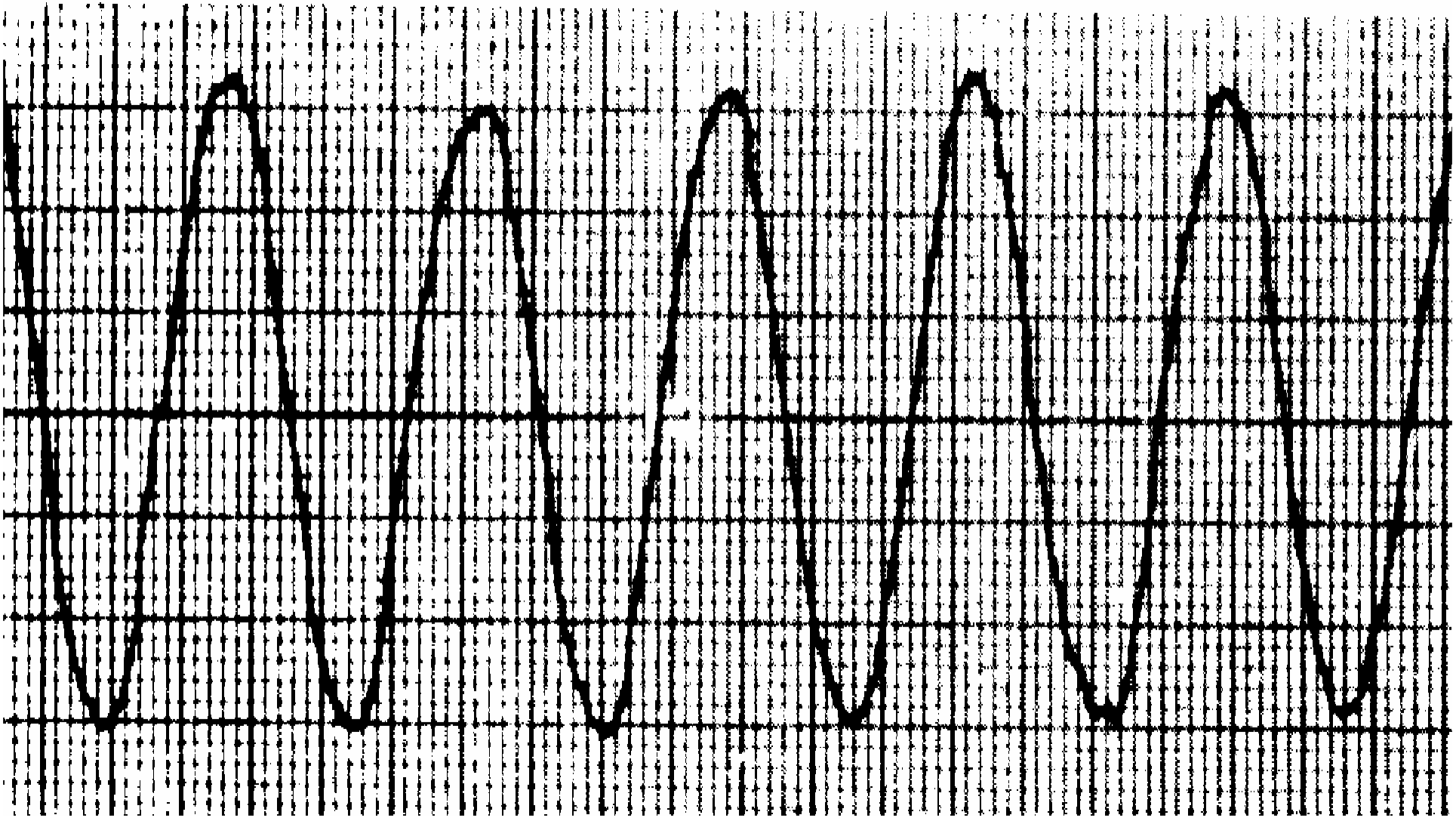
Smooth pursuit tracking

- follow a sinusoidal moving target with eyes only.
- Tracking targets within the visual field
- interpreting with care in geriatric and pediatric
- affected by attention and patient cooperation.

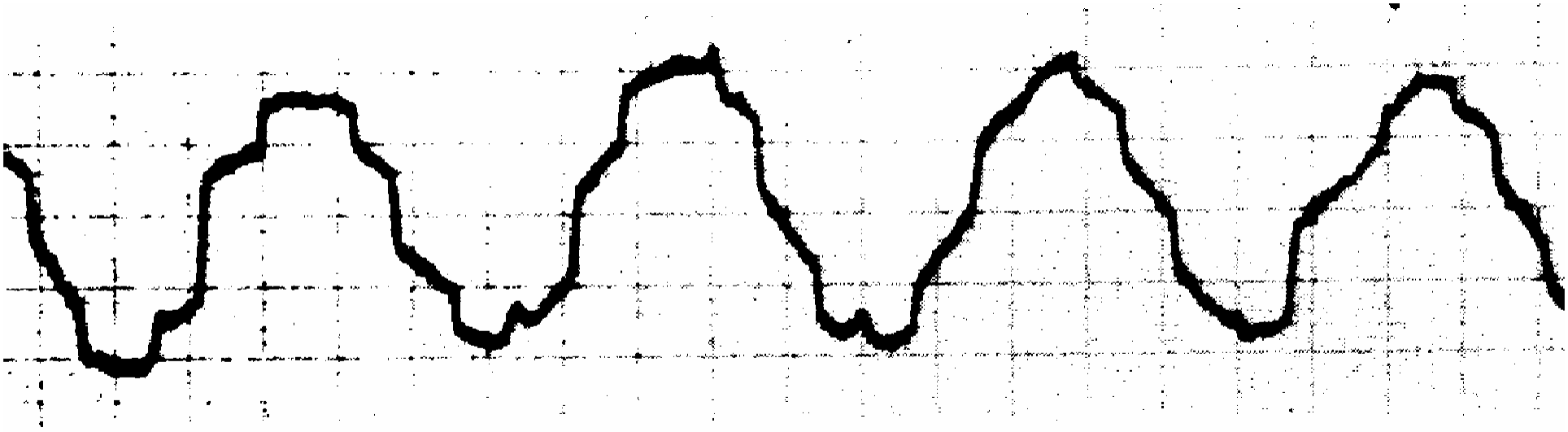
Interpretation

- results should resemble a smooth sinusoid.
- Breakup of movement ® CNS pathology.

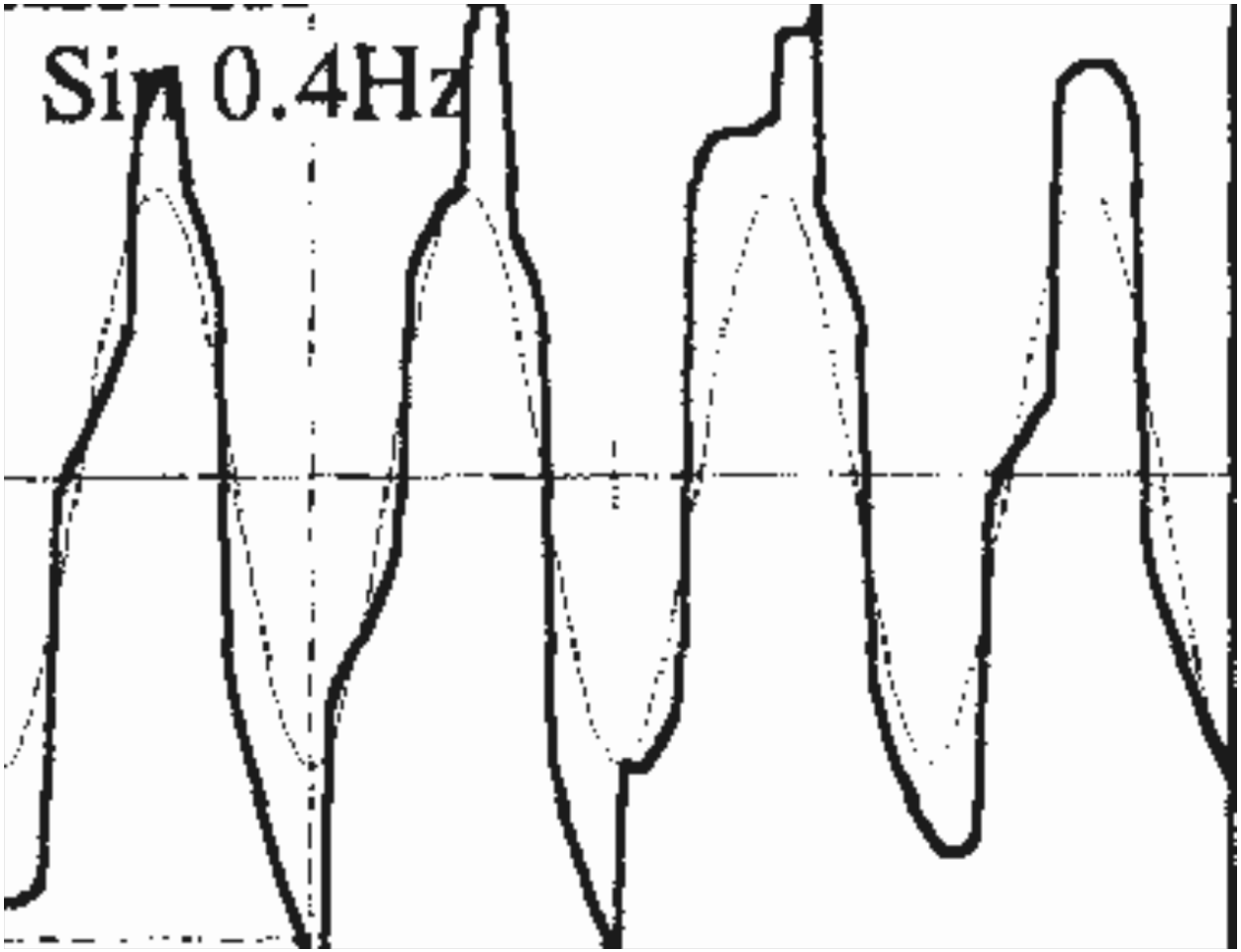
Tracking Test: Normal



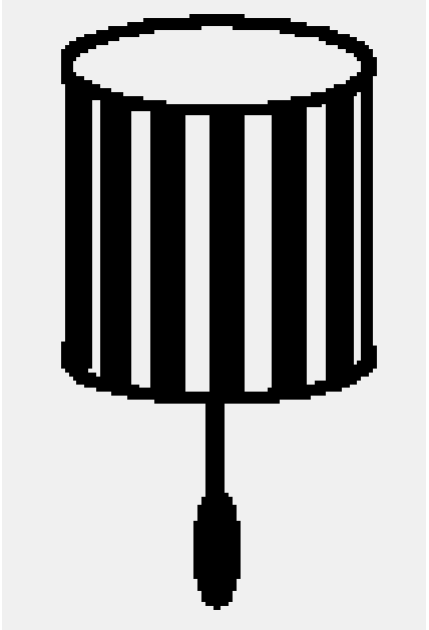
Tracking Test: Abnormal



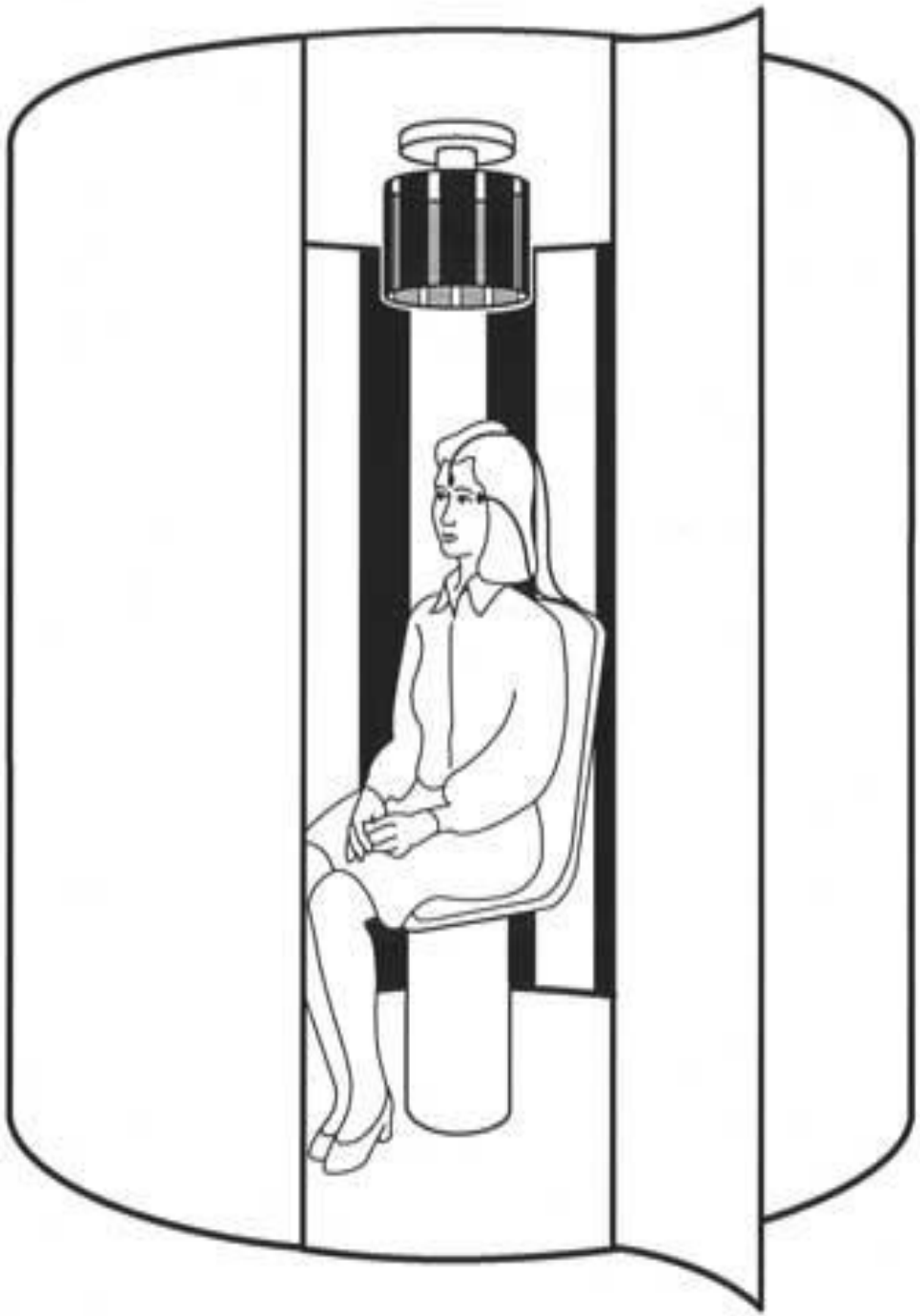
impaired pursuit in patient with a cerebellar lesion



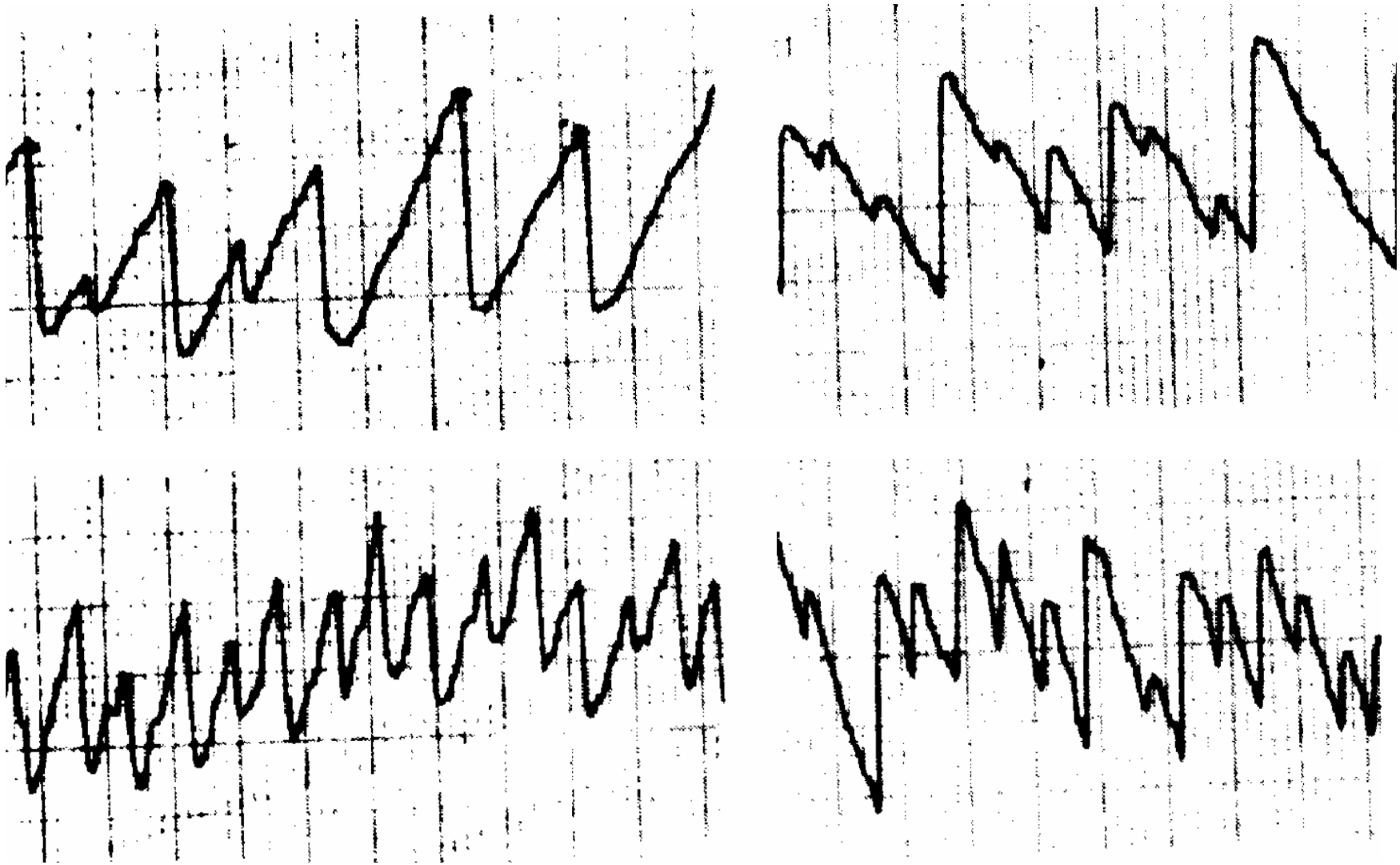
Optokinetic



- tracks multiple stimuli.
  - stripes on a rotating drum
  - stream of lighted dots across a light bar
  - full field array of moving stars or trees.
- moved at 300, 400, or 600 per second
- asymmetrical responses ®CNS pathology



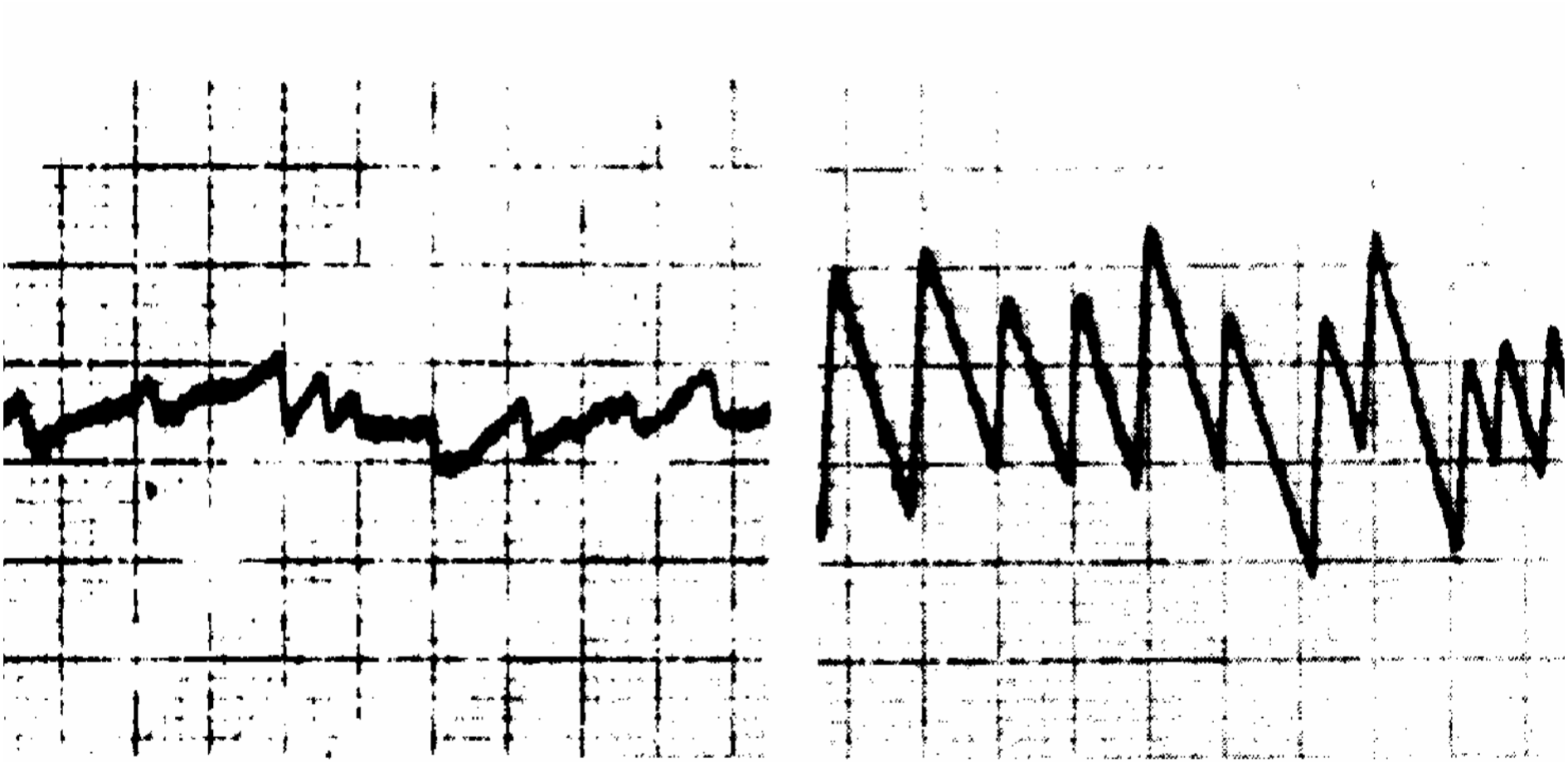
symmetry



Test: Abnormal

Opokinetic

Asymmetry



Opokinetic

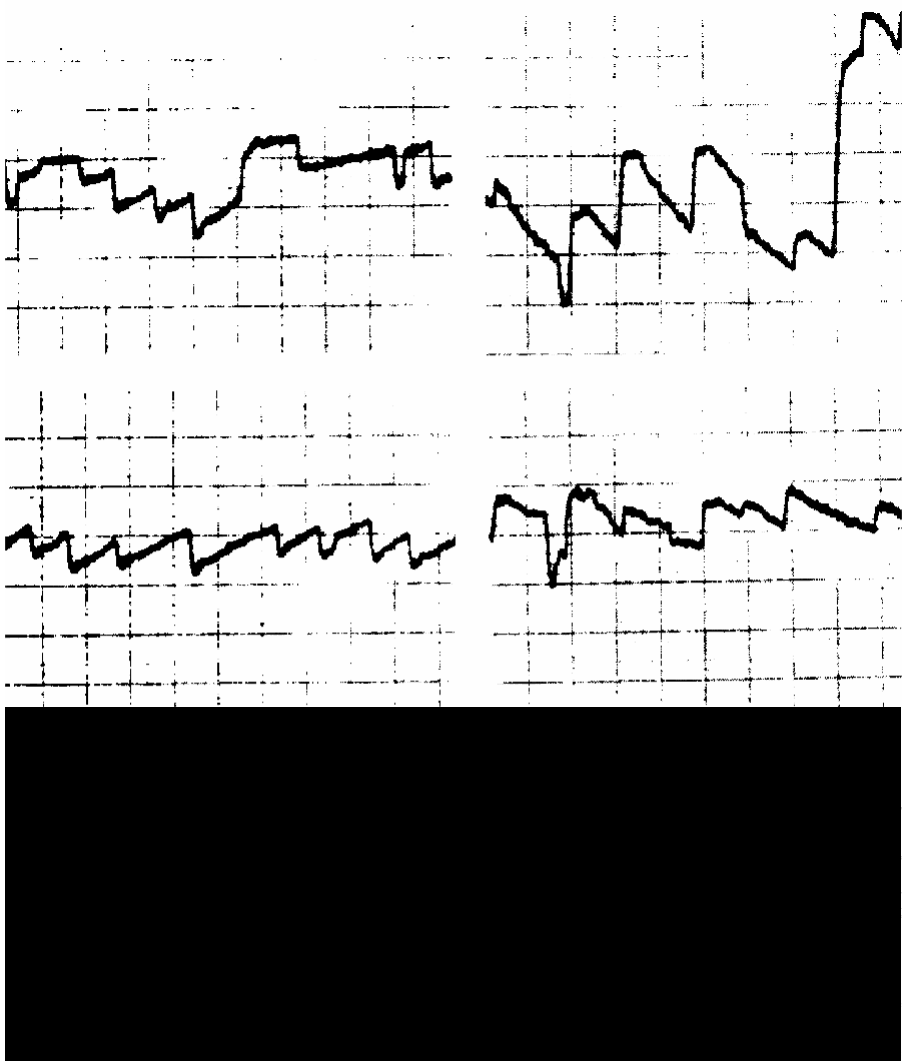
Test: Abnormal

Declining Response Intensity

20/s

60/s

100/s



Dix-Hallpike maneuver

- should be completed prior to any other positional testing.
- Delayed onset - observe patient for at least 20 seconds
- Transient burst of nystagmus - Lasts about 10-15 seconds
- Subjective report of vertigo
- Fatigability

Positional tests

- minimum of 20-30 seconds
- Mental tasking infrared goggles or with the patient's eyes closed with electrodes
  - Head hanging
  - Supine
  - Supine, head right
  - Supine, head left
  - Lateral right
  - Lateral left
- considered abnormal
  - exceed 60 per second
  - change direction in any 1 position
  - persist in at least 3 different positions
  - intermittent in all positions

Positional tests

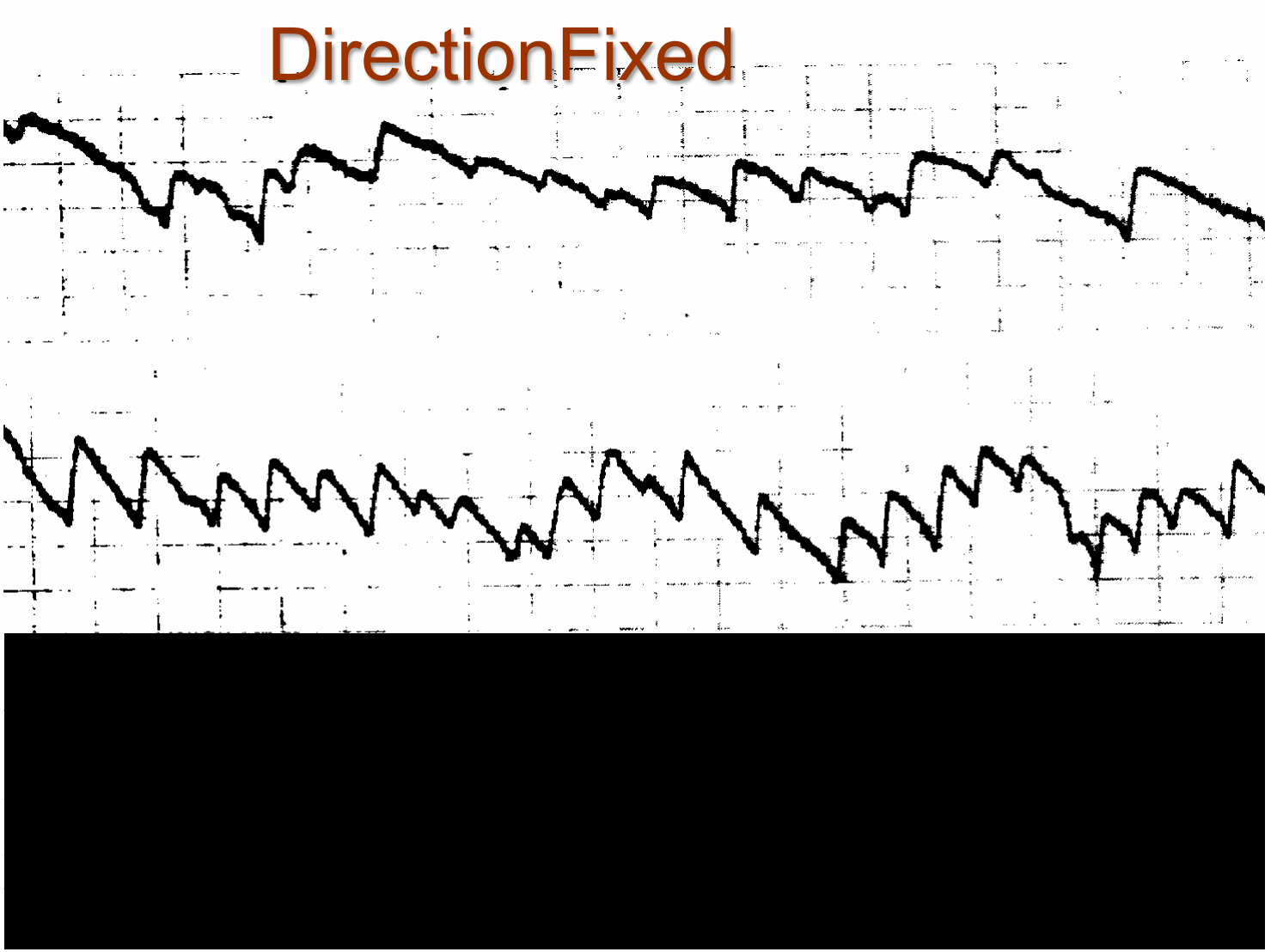
- Peripheral indicators include the following:
  - Direction-fixed
  - geotropic direction changing in different positions, *horizontal SCC variant of BPPV*
  - Latency of onset
  - Fatigable
- Central indicators include the following:
  - ageotropic direction changing in different positions,
  - Direction changing in a single position,
  - Immediate onset
  - Not fatigable

Positional Test: Abnormal Peripheral

RL

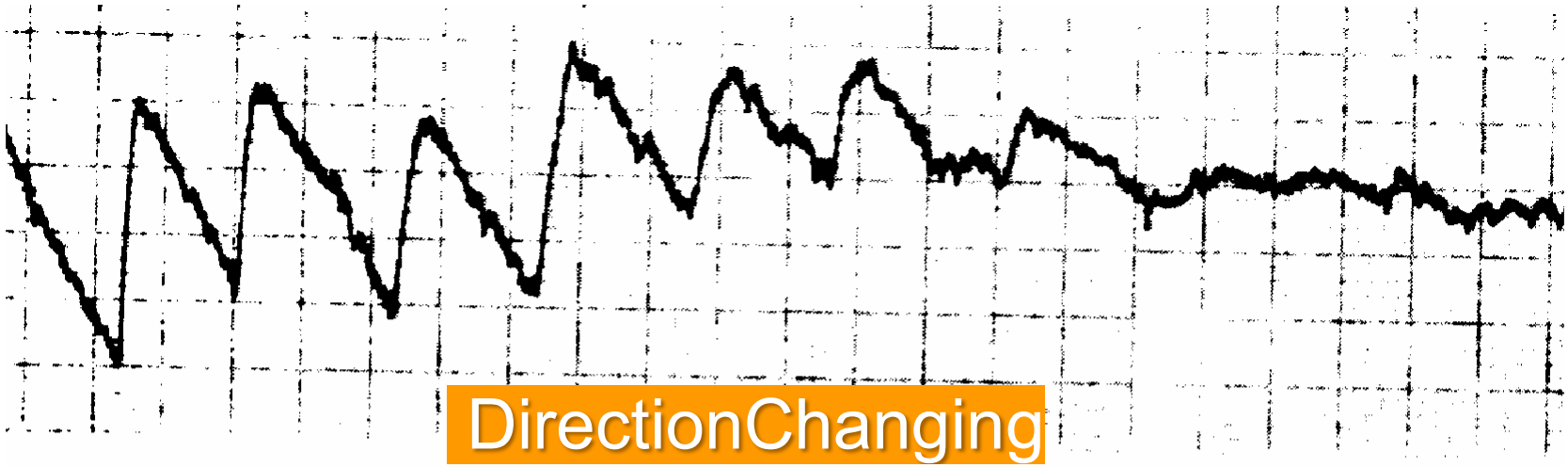
LL

E



Positional Test: Abnormal Most Often CNS

RL



LL



Caloric stimulation

- The most informative ENG subtest
- water, air, and closed-loop cuff
- Water calorics provide a strong stimulus
- air, and closed-loop cuff used with PET or perforation of TM
- cool = 30 C warm = 44 C
- Response pattern follows the form of COWS

Caloric test disadvantage

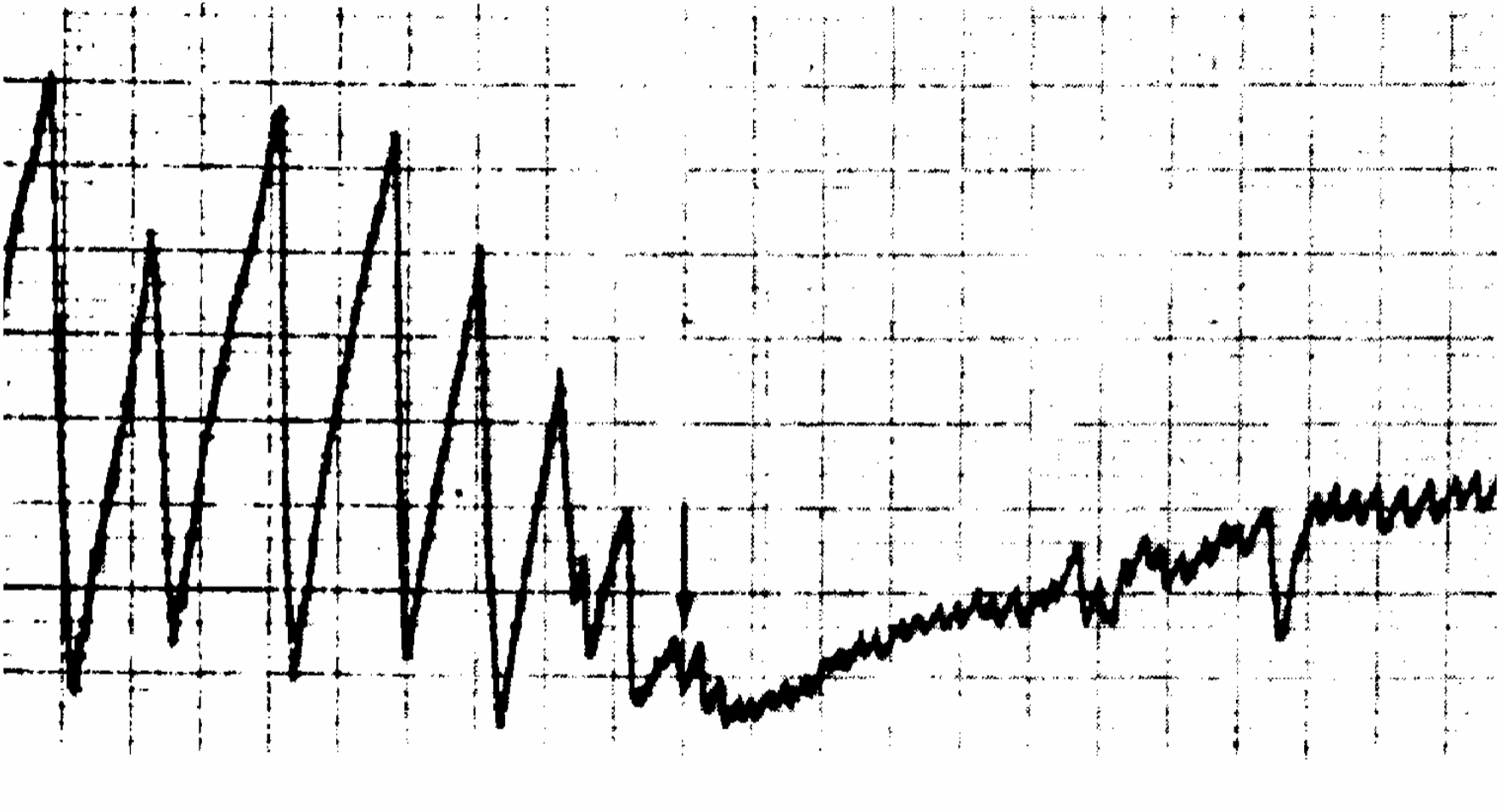
- Low frequency(0.003 Hz)* = PTA @125Hz
- Indirect (depend on heat transferring capacity of EE+ME)
- Lateral SCC
- LOC

Caloric stimulation

- head at an angle of 30°
- LSCC in the vertical plane
- spontaneous nystagmus is evaluated 1st
- Bilateral weakness
  - Average responses of <60/s
  - bilateral peripheral or central
  - drug effects should be excluded
- Fixation after each test
  - R/O CNS No reduce nystagmus
  - Fast recovery .
- no response© Ice water for residual

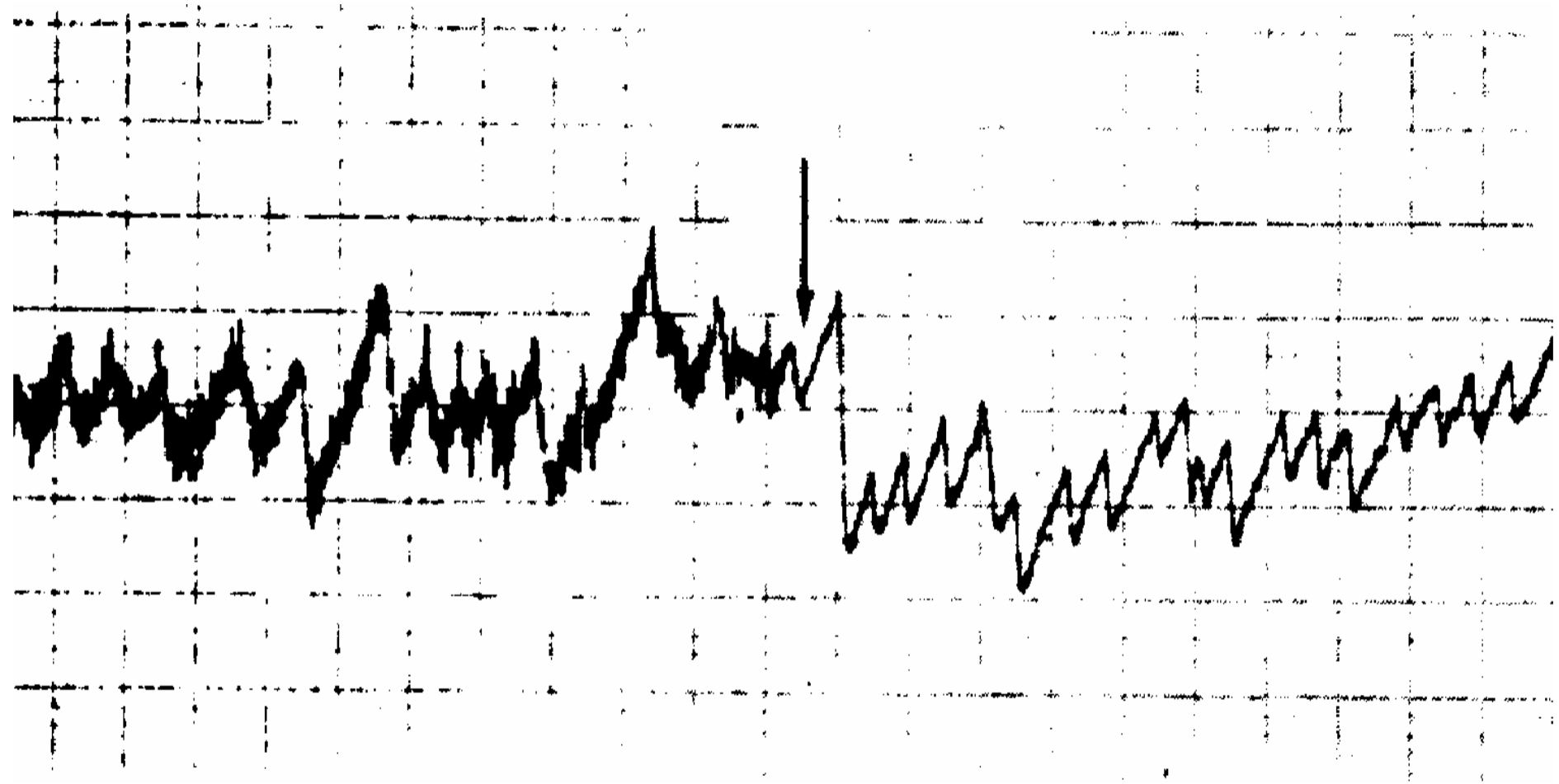
Caloric Test: Normal

Fixation Suppression



Caloric Test

Failure of Fixation Suppression

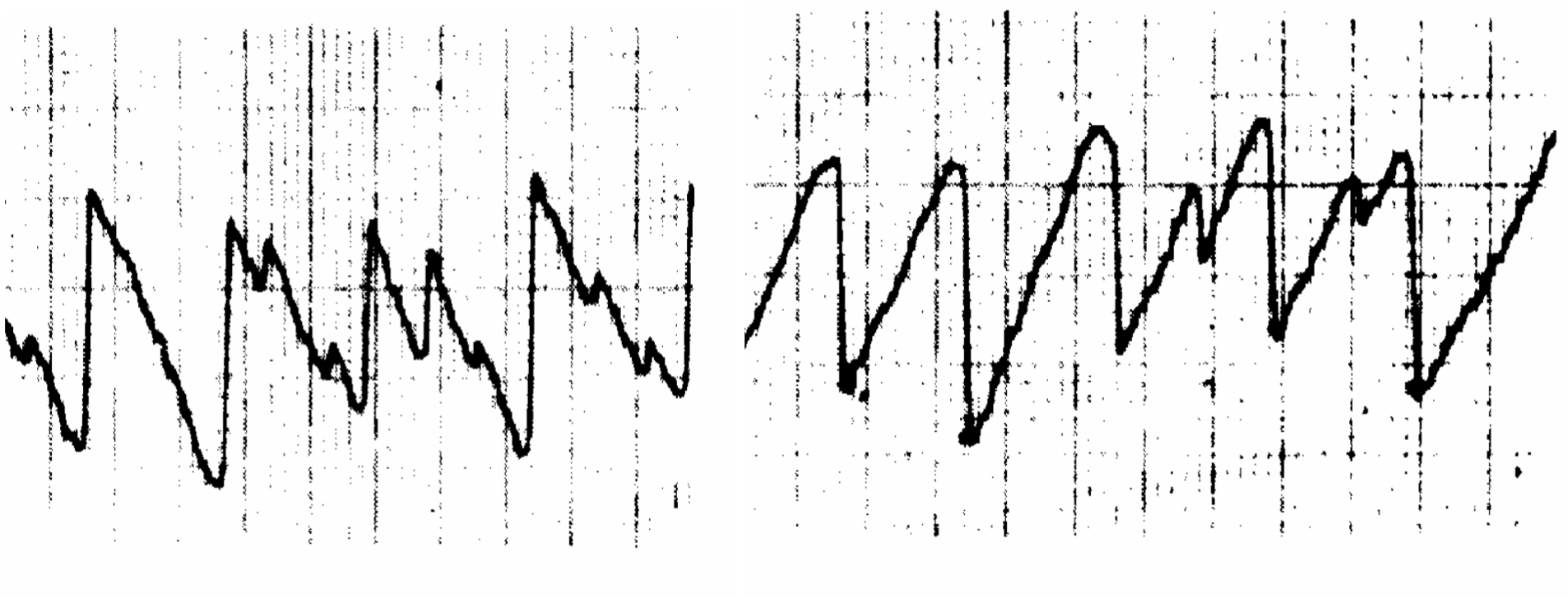


Caloric stimulation

- Unilateral weakness (UW) *Labrynthine preponderance (LP)*
  - evaluate symmetry
  - > 25% is significant.
    - = [(RC + RW - LC + LW)/(RC + RW + LC + LW)] X 100.
  - peripheral lesion (nerve or end-organ)
  - lesion in the side of the weakness.

- Directional preponderance (DP)
  - with spontaneous nystagmus
  - >20-30% is considered significant.
    - = [(LC + RW - RC + LW)/(RC + RW + LC + LW)] X 100

Which direction?









Annexure 2
Bharath Institute of Higher Education and Research
SLIMS

1	U16MB289	EDA SAI VENKATA TEJA
2	U16MB290	GAURAV KUMAR
3	U16MB291	GOKUL SRIRAM .D
4	U16MB292	GOLLA SRUTHI
5	U16MB293	GOMATHI .M
6	U16MB294	GRACELIN RINI .J
7	U16MB295	GUNASUNDARI .M
8	U16MB296	GUNTI YAGNA NARAYAN
9	U16MB297	HANEESHA PALETI
10	U16MB298	HARIHARAN .J.K
11	U16MB299	HARIPRIYA .T
12	U16MB300	HARISHKA.S
13	U16MB301	HARITHA SHREE
14	U16MB302	HARSHITHA CHOWDARY
15	U16MB303	HEMAPRIYA .G
16	U16MB304	JADHAV MAHESH MOHANRAO

ANNEXURE 3

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

PUDUCHERRY

TOPIC: Electronystagmography (**ENT11)**
STUDENT NAME:
UNIVERSITY NO:

1. A 34 years old patient complains of sudden attacks of loss of balance lasting for hours. He has the sensation that the surrounding environment is spinning. His loss of balance associated with nausea and vomiting. Nothing unusual is observed in his physical examination.This sensation is called:
a. Vertigo. b. Dizziness
c. Disequilibrium. d. Unsteadiness.

2. A 56 years old female wakes up in the morning with severe vertigo lasting for seconds that returns frequently with any head movement. Her cranial nerves and ear examinations are normal. The maneuver that is used to confirm the diagnosis called:
a. Epley'sManeuver. b. Dix-Hallpike.
c. Hallpike d. Epley-Dix-Hallpike

3. A 78 years old diabetic and hypertensive female suffers severe headache, loss of consciousness and dizziness. In the emergency room, she has the following vital signs: BP 190\120, pulse: 97 and GCS 12. Which of the following is least likely in the deferential diagnosis?
a. Migraine b. Transient ischemic attack
c. BPPV d. Cerebrovascular accident

4. A 66 years old Saudi patient complains of left ear hearing loss, fullness, tinnitus, headache and drainage for one year. These symptoms are concurrent most of the time. The ear exam reveals left eardrum perforation. The weber test lateralizes to the left ear, and the Rinne test is negative in the left ear and positive in the right ear. Your working diagnosis is peripheral vestibular system disease. All of the following symptoms support your diagnosis except:
a. Hearing loss b. Tinnitus
c. Headache d. Ear fullness

5. A 24-year-old female has episodes of ear fullness and increasingly severe vertigo. Her tympanogram was normal and an audiogram revealed low-frequency hearing loss. Which one of the following is the most likely diagnosis?
a. Otosclerosis b. Tympanosclerosis
c. Meniere's disease d. Migraine

6. A 24-year-old male with vertigo and tinnitus has Meniere's disease. He has fallen many times and injured his body. He refused operative intervention, but agrees to a trial of medication. During the trial phase, his peptic ulcer worsened. Which one of the following substances is most likely to be prescribed?
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c. Lasix d. Valium

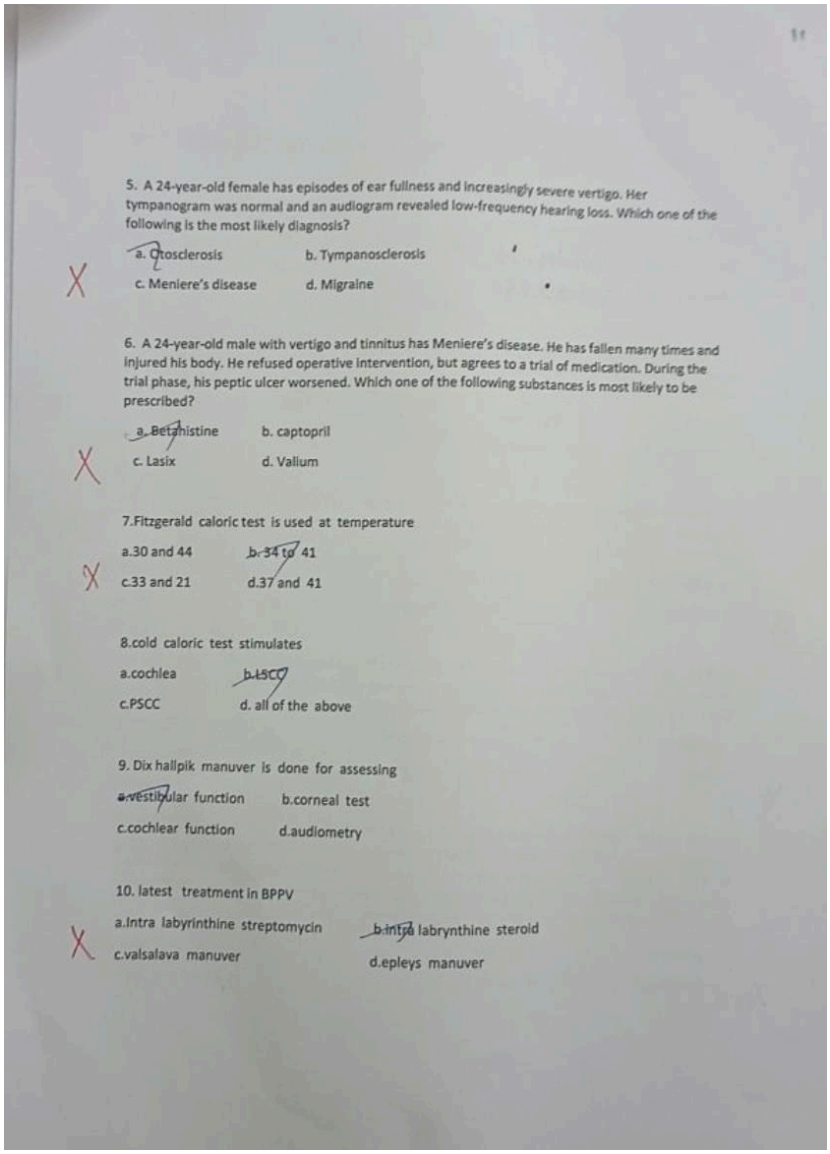
7.Fitzgerald caloric test is used at temperature
a.30 and 44 b. 34 to 41
c.33 and 21 d.37 and 41

8.cold caloric test stimulates
a.cochlea b.LSCC
c.PSCC d. all of the above

9. Dix hallpik manuver is done for assessing
a.vestibular function b.corneal test
c.cochlear function d.audiometry

10. latest treatment in BPPV
a.Intra labyrinthine streptomycin b.intra labrynthine steroid
c.valsalava manuver d.epleys manuver

PRE TEST



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ANNEXURE 3

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

PUDUCHERRY

TOPIC: Electronystagmography (**ENT11**)

STUDENT NAME: Gomathi. M

UNIVERSITY NO: U16MB293

3

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SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

PUDUCHERRY

3

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STUDENT NAME: Haripriya.T

UNIVERSITY NO: U16MB299.

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POST TEST

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PUDUCHERRY

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10

ANNEXURE 3

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

PUDUCHERRY

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ANNEXURE 4

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that _____ has actively participated in the Value Added Course on **ENG-An mordern era for vertigo evaluation- A value added course** held during Sep 2019 – Dec 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. R.Venkataramanan
RESOURCE PERSON

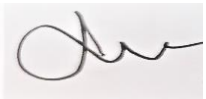
Dr.R.Nithish Timothy
COORDINATOR

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that Dr.Harishka.S (U16MB300) has actively participated in the Value Added Course on **ENG-An mordern era for vertigo evaluation- A value added course** held during Sep 2019 – Dec 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.



Dr. R.Venkataramanan
RESOURCE PERSON



Dr.R.Nithish Timothy
COORDINATOR

Annexure 5
Course/Training Feedback Form
Student Feedback Form

Course Name: Preventing Medical Errors in Audiology

Subject Code: **ENT11**

Name of Student: _____ Roll No.: _____

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear					
2	Course contents met with your expectations					
3	Lecturer sequence was well planned					
4	Lectures were clear and easy to understand					
5	Teaching aids were effective					
6	Instructors encourage interaction and were helpful					
7	The level of the course					
8	Overall rating of the course	1	2	3	4	5

**** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory***

Suggestions if any:

Annexure 5

Course/Training Feedback Form

Student Feedback Form

Course Name: Preventing Medical Errors in Audiology

Subject Code: **ENT11**

Name of Student: Gracelin Rani Roll No.: U16NB294

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear				✓	
2	Course contents met with your expectations			✓		
3	Lecturer sequence was well planned				✓	
4	Lectures were clear and easy to understand				✓	
5	Teaching aids were effective				✓	
6	Instructors encourage interaction and were helpful		✓			
7	The level of the course			✓		
8	Overall rating of the course	1	2	3	✓	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

Very good course

Annexure 5

Course/Training Feedback Form

Student Feedback Form

Course Name: Preventing Medical Errors in Audiology

Subject Code: **ENT11**

Name of Student: Harishra . S Roll No.: U16MB300

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Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear				✓	
2	Course contents met with your expectations					✓
3	Lecturer sequence was well planned			✓		
4	Lectures were clear and easy to understand					
5	Teaching aids were effective		✓			
6	Instructors encourage interaction and were helpful				✓	
7	The level of the course			✓		
8	Overall rating of the course	1	2	3	4	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

Course was very useful

ANNEXURE 6

Date : 15/12/2019

From
Dr.Venkataramanan. K
Dept of Otorhinolaryngology,
SLIMS
Bharath Institute of Higher Education and Research,
Puducherry.

Through Proper Channel

To
The Dean,
SLIMS,
Bharath Institute of Higher Education and Research,
Puducherry.

Sub: Completion of value-added course: ENG-An mordern era for vertigo evaluation reg.

Dear Sir,

With reference to the subject mentioned above, the department has conducted thevalue-added course titled:**ENG-Anmordern era for vertigo evaluation**on Sep 2019 to Dec 2019. We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards
Dr.Venkataramanan.K





SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

Osudu, Agaram Village, Koodapakkam post, Puducherry - 605502

Date:12.08.2019

From
Dr.G.Somasundaram
Professor and Head,
Department of Pharmacology
Sri Lakshmi Narayana Institute of Medical sciences
Pondicherry

To
The Dean,
Sri Lakshmi Narayana Institute of Medical sciences
Pondicherry

Sub: Permission to conduct value-added course: Medical writing

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **Medical writing** on **Sep 2019 to jan 2020**. We solicit your kind permission for the same.

Kind Regards

Dr.G.Somasundaram

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: Dr.Balagurunathan HOD: Dr.G.Somasundaram Expert: Dr.Jaikumar,Dr.Santhanalakshmi

The committee has discussed about the course and is approved.

Dean Subject Expert HOD

DEAN
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
OSUDU, AGARAM VILLAGE,
KOODAPAKKAM POST,
PUDUCHERRY - 605 502

PROFESSOR & HOD
DEPARTMENT OF PHARMACOLOGY
Sri Lakshmi Narayana Institute of Medical Sciences
PONDICHERRY - 605 502

OFFICE OF THE DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affliated to Bharath University, Chennai - TN]

Circular

Date: **13.08.2019**

Sub: Organising Value-added Course: Medical writing

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical sciences is organizing **"Medical writing" Sep 2019 to Jan 2020**. The course content is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before **31/08/2019**
Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

DEAN
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
OSUDU, AGARAM VILLAGE,
KOODAPAKKAM POST,
PUDUCHERRY - 605 502

Encl: Copy of Course content

– Course Proposal

Course Title: Medical writing

Course Objective:

1. Introduction to Medical writing
2. To provide an overview of the process of medical writing
3. Why We Write and Why We Don't Write
4. Medical Writing as Storytelling
5. Writing Topics and Your Career
6. Important Components of a standard original research article
7. Drug Reference Program
8. Important Steps In Writing A Manuscript Including Plagiarism
9. Process Of Manuscript Preparation For Final Submission

Course Outcome: At the end of this course the student must able to write a Reseach paper and they must able to publish. they must know about clinical research documents, content for healthcare websites, health magazines, journals and news. ... This includes clinical trial data, regulatory submission documents, post approval documents, etc..

Course Audience: 2nd Year MBBS Students

Course Coordinator: Dr.G.Somasundaram,

Course Faculties with Qualification and Designation:

Dr.Jaikumar,Asso Prof, Dept of Pharmacology

Dr.Santhanalakshmi Asst Prof, Dept of Pharmacology

Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Time	Hours	FACULTY
1.	03.09.2019	Introduction to Medical writing	4-7 PM	3	Dr.Jaikumar
2	17.09.2019	To provide an overview of the process of medical writing	4-7 PM	3	
3	08.10.2019	Why We Write and Why We Don't Write	4-7 PM	3	
4	22.10.2019	Medical Writing as Storytelling	4-7 PM	3	
5	12.11.2019	Writing Topics and Your Career	4-7 PM	3	
6	19.11.2019	Important components of a standard original research article	4-7 PM	3	Dr.Santhanalakshmi
7	10.12.2019	Drug Reference Program	4-7 PM	3	
8	17.12.2019	Important steps in writing a manuscript including plagiarism	4-7 PM	3	
9	23.12.2019	Process of manuscript preparation for final submission	4-7 PM	3	
10	07.01.2020	Practical	4-7 PM	3	
			Total Hours	30	

REFERENCE BOOKS: (Minimum 2)

- The Complete Guide to Article Writing: How to Write Successful Articles for Online and Print Markets.Naveed Saleh
- How to Write Better Medical Papers. Michael Hanna

VALUE ADDED COURSE

1. Name of the programme & Code

MEDICAL WRITING

2. Duration & Period

30 hrs & **Sep 2019 to jan 2020**

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Short answers *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

Sep 2019 to jan 2020

8. Year of discontinuation: 2020

9. Summary report of each program year-wise

Value Added Course- Sep 2019 to jan 2020					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	PH09	**MEDICAL WRITING**	Dr.Jaikumar, Dr.Santhanalakshmi	2nd MBBS	**20&Sep 2019 to jan 2020**

10. Course Feed Back

Enclosed as Annexure- V

RESOURCE PERSON **COORDINATOR**

PROFESSOR & HOD
DEPARTMENT OF PHARMACOLOGY
Sri Lakshmi Narayana Institute Of Medical Sciences
PONDICHERRY - 605 502

MEDICAL WRITING
PARTICIPANT HAND BOOK

COURSE DETAILS

Particulars	Description
Course Title	**Medical Writing**
Course Code	PHA09
Objective	Introduction to Medical writing To provide an overview of the process of medical writing Why We Write and Why We Don't Write Medical Writing as Storytelling Writing Topics and Your Career Important components of a standard original research article Drug Reference Program Important steps in writing a manuscript including plagiarism Process of manuscript preparation for final submission
Key Competencies	At the end of this course the student must able to write a Reseach paper and they must able to publish. they must know about clinical research documents, content for healthcare websites, health magazines, journals and news. ... This includes clinical trial data, regulatory submission documents, post approval documents, etc.
Target Student	II MBBS Students

Duration	30hrs Every January 2020 -May 2020
Theory Session	10hrs
Practical Session	20hrs
Assessment Procedure	Short notes

Medical Writing

Medical writing involves communicating composite data and ideas in a clear, brief, plausible, absolute, and convincing manner. It's all about developing materials about medicine and health by collecting, organizing, interpreting, and presenting information in a manner appropriate for the target audience.

Life sciences graduates can deem medical writing as a valuable career choice as the demand for medical writing professionals is growing progressively in pharmaceutical and healthcare industries. In these days, there is a rapid addition of new information and knowledge related to the field of sciences and medicines in the form of research articles, clinical papers or studies or data.

Ayurveda, the oldest medical writing of Hindus, is a part of the least ancient Veda-Atharva Veda. Also, there are several other examples of ancient medical writing concepts, which include Hippocratic writings, Aristotle, Diocles, among others. They wrote about the definitions of the different diseases, their clinical symptoms, diagnosis and differential analysis. Firstly, these topics were described and then followed by a debate of the hypotheses on aetiology and pathogenesis.

Medical writing can be of several types like research writing, product related promotional writing, educational materials for patients or researchers or physicians, manuscripts, abstracts, health related news articles, regulatory, websites of healthcare or pharmaceutical companies and many others. These medical or scientific information documents should be written according to the type of target audiences like patients, doctors or physicians, general public or the regulatory officials.

A **medical writer** is a person who applies the principles of clinical research in developing clinical trial documents that effectively and clearly describe research results, product use, and other medical information. The Medical writers develops any of the five modules of the Common Technical Document. The medical writers also ensure that their documents comply with regulatory, journal, or other guidelines in terms of content, format, and structure.

Medical writing as a function became established in the pharmaceutical and contract research organization industry because the industry recognized that it requires special skill to produce well-structured documents that present information clearly and concisely. All new drugs go through the increasingly complex process of clinical trials and regulatory procedures that lead to market approval. This demand for the clear articulation of medical science, drives the demand for well written, standards-compliant documents that medical professionals can easily and quickly read and understand. Similarly, medical institutions engage in translational research, and some medical writers have experience offering writing support to the principal investigators for grant applications and specialized publications.[1][2][3]

Medical writing for the pharmaceutical industry can be classified as either *regulatory medical writing* or *educational medical writing*.

Regulatory medical writing means creating the documentation that regulatory agencies require in the approval process for drugs, devices and biologics. Regulatory documents can be huge and are formulaic. They include clinical study protocols, clinical study reports, patient informed consent forms, investigator brochures and summary documents (e.g. in Common Technical Document [CTD] format) that summarize and discuss the data a company gathers in the course of developing a medical product.

Educational medical writing means writing documents about drugs, devices and biologics for general audiences, and for specific audiences such as health care professionals. These include sales literature for newly launched drugs, data presentations for medical conferences, medical journal articles for nurses, physicians and pharmacists, consumer education and programs and enduring materials for continuing education (CE) or continuing medical education (CME). It plays a very important role in promotion of various pharmaceutical brands both to the HCPs and the consumers. Different types of communication use different media to present the writings.

Other types of medical writing include journalism and marketing, both of which can have a medical writing focus.

Regardless of the type of medical writing, companies either assign it to an *in-house* writer, or "*outsource*" it to a freelance or contract medical writer.

These organizations provide a forum where medical writers meet and share knowledge and experience. They promote professional development and standards of documentation excellence, and help writers find career opportunities. All these organizations offer fundamental medical writing training.

Where Do I Start If I Have Never Been Published? The Medical Writer's Three Questions In Puccini's opera Turandot, Princess Turandot asks Prince Calef three questions, framed as riddles. If the lovestruck prince answers the three queries correctly, he gets the princess's hand in marriage. If he fails, an early death will be the result. For medical writers, also, there are the three key questions, mentioned in the Preface to this book, that must be answered when considering a project: So what? Who cares? Where will my article be published? For the medical writer—whether neophyte or seasoned— these questions are vital. If you answer the three questions clearly, you have the best chance of success. On the other hand, if you fail to provide a convincing answer to one or more of the questions, you won't exactly lose your head, but the success of your paper is definitely in

jeopardy. So What? The medical landscape is littered with published papers that, like discarded fast-food wrappers along a country lane, have accomplished little more than adding a few lines to the Table 1.3 Some topics discussed in the ICMJE Recommendations Authorship and contributorship Editorship Peer review Conflicts of interest Confidentiality Protection of research participants Copyright Overlapping publications Fees Electronic publishing Clinical trial registration Where Do I Start If I Have Never Been Published? 26 author's curriculum vitae. If you aspire to add to the medical literature (or litter-ature), I urge you to be thoughtful in considering the "So what?" question. This question aims to determine the significance of your work. After all, undertaking a writing project is going to take you away from your patients, your family, your hobbies, or whatever else you might otherwise be doing with your time. And you are asking your audience also to commit time to reading it. So be sure the effort is worthwhile. The "So what?" questions asks: Is what I am writing about something that hasn't been said already and perhaps said better than I will say it? Am I saying anything new? Let's assume that you are a surgeon writing for a surgical journal. If you are writing an article titled "Surgical Treatment of Acute Appendicitis: A Report of 100 Cases," my first thought is that this topic may be important, but what can you say that hasn't already been said? But if your topic is "A New Surgical Technique for Appendectomy in the Patient with Acute Retrocecal Appendicitis," then you have my attention. Here is another example. One could study and report the diagnoses of the next 1000 patients seen in your office. But so what? On the other hand, if you studied the next 1000 patients seen with a presenting complaint of pelvic pain and followed them to the definitive diagnoses, then most generalists and gynecologists would be interested.

Where Will My Article Be Published? Getting an article published requires two consenting adults—an author and an editor. Of course, for refereed publications there are peer reviewers who must also nod approval. Even book publishers often have proposals reviewed by experts in the field. When you write an innovative, relevant article, you must seek the best journal for your work. Ideally you begin with a specific publication in mind, your "target journal," and then drop back to your second and third choices only if you are not successful with your first choice. Be careful with your target journal.

Some journals have such a low acceptance rate that rejection is almost guaranteed. On the other end of the spectrum, the advertiser-sponsored publications (discussed below), while lacking the cachet of the New England Journal of Medicine, need a steady supply of innovative articles and offer good opportunities for the neophyte author. Some articles, by the nature of their content, are best suited for refereed journals that publish research reports; others—such as "how-to" and "five-ways-to" Where Do I Start If I Have Never Been Published? 28 articles—are generally inappropriate for such journals, and sending them in is a waste of time. There is also the "gray literature," describing works presented at scientific meetings or as conference posters and thus being "published" as abstracts of the scientific congresses. Some Early Steps Writing Models for Beginners As a beginning author, it would be quite difficult to write a publishable report of original research on your first or second attempt. First, you need research data, which you are unlikely to have. Second, the report of original research is the most demanding of all publication models and faces the greatest competition in the publication sweepstakes. There is, however, one way that you, the relative neophyte, can actually succeed in having your name on a research report. That occurs when you are the junior member of a research team and you participate in all phases of the project, including writing the report. This approach works even better if the team includes a senior mentor, who can guide you through the process. In the absence of a research team, a seasoned mentor, and a pile of research data, what is the aspiring author to do? Plan to start with a writing model that offers the best chance of getting in print with the least need for expertise and the least risk to your ego. No, such a publication won't get you tenure or assure a lifelong career, but it will get you going. Also, it just might help you settle on a topic area that you can pursue in future writing. The leading models appropriate for neophyte writers are review articles, case reports, editorials, letters to the editor, and book reviews. All are covered in depth in later chapters of this book. The review article is appealing because advertisersupported publications, sometimes called "throwaways," have a constant appetite for content. Examples of such publications are Postgraduate Medicine, Consultant, and Hospital Practice. All have web sites for those who want to learn more. 1. Getting Started in

Medical Writing 29 Case reports are tempting and are sometimes a good way to get started as a writer. Be sure of two things: One is that you have a point to make about the case—the "So what?" question again. The second is to be sure that your target journal(s) actually publishes case reports; not all journals do so. That is the "Where will my article be published?" question once more. Editorials allow you to express opinions, and you may be an especially appropriate author for an editorial if you hold a position that gives you some expertise in the topic. For example, if you direct a pain clinic, you are qualified to write about narcotic abuse or regarding analgesic under-prescribing for patients with pain. Letters to the editor are a quick and easy way to get in print. Generally a letter to the editor comments on a published paper. What you have to say must offer new insights, and it must connect with the readers. Often such letters disagree with conclusions of the paper, and that is okay. Letters to the editor should be short and to the point. Book reviews are another opportunity for publication. Never send in an unsolicited book review. On the other hand, you can write to your favorite journal and volunteer to be a book reviewer. If added to the reviewer list, you will receive a book to review. Your job will be to write the review, as described in Chap. 7. You keep the book as payment. Book chapters are almost always invited by book editors, who try to choose prospective chapter authors from those already writing on the topic needed for the book. You may be invited to write a book chapter after publishing a few articles on your new focus area, but book chapters are usually not where a new writer begins. The same holds for writing a book. A few will succeed, but for most this is not where to start. Mistakes We Make When Getting Started • Trying to do it alone: If at all possible, work with someone more experienced. Your colleague may be a coauthor or someone who reads your work and offers comments. Where Do I Start If I Have Never Been Published? 30 • Trying to run before you can walk: Do not attempt to write the definitive treatise on a topic or the grand epic in your specialty. Aim early to learn the writing and publication process by getting something written and in print, however humble your early pieces may seem. In my early days, I wrote for Medical Economics and Physician's Management on topics such as "Having Regular Meetings with Your Office Staff" and "How to See Patients More Efficiently in Your Office." I

don't write on practice management subjects anymore, but these articles helped me learn how to write and get published. • Starting to write without preparation: It is a big mistake to begin writing until you have selected and refined your topic, figured out how you will structure your article, done your research, and assembled your writing tools. Without being prepared, inspiration won't carry you very far beyond page 1. Starting off unprepared will almost surely lead to an uneven product, and you will spend a lot of time doing remedial work. It is much better to be ready when you start and know where you are going.

Mistakes We Make When Writing Review Articles

We go wrong writing review articles in predictable ways. Since the review article is the first project many beginning medical writers undertake, I think it is useful to summarize some of the mistakes we make as neophytes. In thinking about it, some of us more experienced authors continue to make some of these errors: • Unimportant topic: Do not waste effort writing a review article on a topic that no one cares about. Field-test your idea with colleagues in the office or hospital. If you are planning to write a How to do it article on a new way to recognize borderline personality disorder or a procedure to trim hypertrophic toenails, ask several colleagues whether they might be interested in reading such an article. • Stale rehash: Be sure that you are saying something new about the topic. Step 1 is a literature search. Step 2 is a talk with a few experienceed clinicians, asking if what you propose to write about is new to them. Step 3 is a call to a journal editor. Take these steps to avoid writing an article that is not publishable because it tells nothing new. • A timely topic but already perhaps too timely: As you do your literature search, you come across an article on your topic that uses the approach you planned. You may change your approach or pick another topic. Certainly you have gained useful information. • Getting lost along the way: Make an outline with major headings, and stick to it. Don't wander off the path into irrelevant territory. • Article too long: Some editors say that this is one of the most common problems in medical writing. Why is it, with writing being such hard work, that we often overwrite? Review articles should generally be about 16–20 doublespaced manuscript pages, including references. State-ofthe-art literature reviews are

the exception and may be longer. Mistakes We Make When Writing Review Articles 170 • Too many or too few references: Avoid this mistake by studying similar articles published in your target journal. • Submission to the wrong journal: Don't waste your time— and compromise the timeliness of your article—by submitting to journals that don't publish review articles or that are likely to accept only articles written by the internationally known expert in the field.

Format for a research protocol: an expanded list of possible elements

Project title Primary investigator (PI) and coinvestigators and their institutions

Project summary: A short overview to orient the reader

Background and rationale: Analogous to the Introduction in a research report Study goals and objectives: What do you hope to accomplish?

Study design: What type of study is proposed?

Study description and methods: Who will be the subjects and what will you do to them? Safety considerations: What are the risks to subjects and what will you do about these risks?

Follow-up: What happens after the study is complete?

Data management: How will you deal with the data obtained?

Quality assurance: How will you assure that what is done reflects high standards? Expected outcomes: What do you think might be found, and why might it matter?

Dissemination of results: Who will be told about your findings?

Duration of the project: How long is each phase of the study expected to take?

Problems that may occur: What are potential difficulties and possible solutions?

Project management: In this project, who is in charge of what?

Ethical considerations: What might be ethical concerns and how will subjects be informed of these issues?

References: What are prior studies that are pertinent to this project?

Budget: What funding will be needed and how will it be used?

Informed consent forms: Forms to be read and signed by research subjects. Other support: Are there any funding sources that should be disclosed?

Collaborations planned: Will you be working with colleagues outside your designated team?

Links to other projects: Is this proposal the next step in a series of investigations?

Curriculum vitae of investigators Other research activity of investigators

Clinical trial registration status.

Project Title After deciding on a research topic/question/hypothesis, most investigators turn their attention to the project title. This is not a trivial consideration given that, when the final report is eventually published, most readers will scan the titles in the journal table of contents and use this first impression to decide whether or not to read the abstract or even the entire article. For our study, a reasonable draft title might be: "The Incidence of Low Serum Copper Levels after Gastric Surgery." Or alternatively: "Hypocupremia after Gastric Surgery." The former title tells what I wish to study and is "outcome-neutral." The latter title presumes that the outcome will be lower copper levels in gastric surgery patients and, while this may be the title of the final paper, would be presumptive as a title of a research protocol unless a question mark is added: "Hypocupremia after Gastric Surgery?" To get started I prefer the first title described. For the record, Prodan et al. titled their final, published report "Copper Deficiency After Gastric Surgery: A Reason For Caution." Acronym-named randomized trials are quite fashionable today. Clinical investigators, whimsical imps that they are, are fond of dreaming up colorful—if sometimes tortured—acro9. How to Write a Research Protocol 245 nyms, perhaps over a bottle of wine. Here is an example: "The Effect of Hydrocortisone on Development of Shock Among Patients with Severe Sepsis: The HYPRESS Randomized Clinical Trial" (Keh D et al. JAMA. 2016;316:1775). Stanbrook et al. reviewed acronym-

named clinical research trials and what happened to the reports of these studies [4]. They examined 173 consecutive randomized trials reviewed by the Cochrane Heart Group. Of these 173 studies, 59 (34%) had acronymic titles and exhibited the following characteristics: • Of these 59 studies, 61% were published in just three journals: The New England Journal of Medicine, Circulation, and The Lancet. (Recall that these were heart-diseaserelated studies). • Methodologic quality scores were higher than in studies with non-acronymic titles. • These studies enrolled five times as many patients but had shorter follow-up periods. • They were no more likely than non-acronymic-titled studies to report positive results. • They were four times as likely to have pharmaceutical financial support and eight times as likely to have industry-employed authors. I considered creating an acronym for our modest (and hypothetical) study of serum copper levels in gastric surgery patients. Thus the first title considered, "The Incidence of Low Serum Copper Levels after Gastric Surgery," would yield the acronym ILSCLAGS. Not compelling. The second choice title, "Hypocupremia after Gastric Surgery," results in HAGS. Even worse. I decided against the use of an acronymic title. When crafting a title, it is helpful to append a descriptor telling the method used, such as randomized controlled trial, case-control, cross-sectional study, or meta-analysis. Our study compares two groups, those who had weight-loss gastric surgery and those who did not. Thus our working title will be "The Incidence of Low Serum Copper Levels after Gastric Surgery: A Case Control Study." Elements of a Research Protocol 246 Primary Investigator (PI) and Coinvestigators Clearly identify the PI and all coinvestigators. Be sure to include—especially for the PI—titles, institutional affiliation, mailing addresses, telephone numbers, fax numbers, and e-mail addresses. Contact information is important, because someone may want to get in touch with you about collaboration in this study or the next or may even want to send you grant support. Project Summary Here is where you should explicitly state your research question or hypothesis. Be sure that anyone reading this paragraph has a clear idea of what you hope to learn. A good research question is short, focused, and unequivocal. Most research questions describe something that can be answered with quantitative data, although there are an increasing number of reports of qualitative research, related to topics that defy

quantification. A useful model for stating a research question is the PICO model [5]. Here is how it works and how it might apply to our study of serum copper levels: P = Population or patients: Patients who had weight-loss gastric surgery I = Indicator or intervention: Serum copper levels C = Comparator or control: Patients who did not have gastric surgery O = Outcome: Differences in serum copper levels Careful wordsmithing is vital here. Bordage and Dawson describe the research question as the "keystone of the entire enterprise," adding that, "Everything hinges on the quality of the research question, hence its crucial importance" [6]. Many RFPs specify the maximum number of pages permitted, and even if length is not prescribed, keep the Project Summary short—250 words or less and not more than one page in length. Start by using the study title, and follow by 9. How to Write a Research Protocol 247 briefly telling the rationale and objectives for the project, the research question, the methods and subjects, the duration of the study, and the anticipated outcome. Use language that would make sense to a reader who is not fully familiar with your area of inquiry. This summary page, arguably the most important page of the protocol, must give a crisp and memorable overview, and it must stand on its own, without sending the reader to search items, such as abbreviations, found later in the document. Background and Rationale This section, not unlike the Introduction section in a research report (see Chap. 11), tells why the proposed research is pertinent in the context of current knowledge. This section may cover: • The importance of the topic in the context of current knowledge • An overview of your approach to the question • Any results you have already obtained that indicate that the question can be answered by your approach • How your study will advance medical practice and the health of humankind Our serum copper level after gastric surgery study is pertinent to medical knowledge because undetected and uncorrected hypocupremia can cause health problems including anemia, neutropenia, optic neuropathy, myopathy, and myelopathy with a spastic gait [3]. You may list current references here or, alternatively, in a separate section (below). Study Goals and Objectives The WHO Recommended Format for a Research Proposal describes, "Goals are broad statements of what the proposal hopes to accomplish. They create a setting for the proposal. Elements of a Research Protocol 248 Specific

objectives are statements of the research question(s). Objectives should be simple (not complex), specific (not vague), and stated in advance (not after the research is done)" [2]. Singh et al. advise that objectives should be specific, measurable, achievable, relevant, and time based, offering the catchy acronym SMART objectives [7]. The objective of our example study might be to determine if patients who have received weight-loss gastric surgery are more likely later to have lower serum copper levels than persons who have not had gastric surgery. Study Design Describe your choice of study design—randomized trial, case-control, cohort study, cross-sectional study, or other approach—and why the study design proposed is the best way to answer the research question. For my study of serum copper levels in post-gastric surgery patients, I chose a case control study model. This and various other study design models are described in Appendix D. Study Description Here I will begin with a few linguistic tips: First of all, I recommend that you use active voice and future tense. Active voice ("We will draw blood samples" vs. "Blood samples will be drawn") is simply stronger prose. And you should use the future tense because you are describing something to be done, not something being done now or accomplished in the past. Secondly, describe persons in the study as subjects, not patients. You are not typically in a traditional physician– patient relationship with these individuals. This section of the protocol often begins by describing the subjects to be in the study and control groups. What will be your sample size? Who will be included and who will be excluded and why (think about the possibility of exclusion bias)? How did you decide on the number of subjects in each 9. How to Write a Research Protocol 249 group? A too-small sample size may not yield a statistically satisfying answer to your research question, and your study will be criticized as "underpowered." How will subjects be found? Will you use a newspaper advertisement, search existing hospital records, or use some other method? Then once you have your subjects, what will you do to them? Describe each step of the study, beginning with enrollment. If subjects are to be randomized, tell the method to be used. Continue to describe what will happen, step by step, all the way through the last follow-up event. Name the specific statistical tests that will be used to answer your research question(s) or test your hypotheses. In the case of interventional studies, it may be

useful here to identify dependent and independent variables. There are a number of statistical tests that can be used, according to the design of your study. In their published study of copper deficiency after gastric surgery, Prodan et al. used independent t tests and Fisher exact tests for comparison of continuous and categorical variables, respectively [3]. In my opinion, the diversity and complexity of the statistical tests that might be used just serve to emphasize the importance of a research team member with statistical expertise. And here is a sobering thought that will be pertinent when you write the final report of your study: According to Bordage, the most common reason manuscripts are rejected by peer-reviewed scientific journals is incomplete or inappropriate statistics [8]. Safety Considerations This section is about risks to the subjects, especially pertinent when patients will take drugs or undergo procedures. Tell the risks, including possible drug side effects, allergic reactions, or procedural complications. Then describe what you will do to reduce risk and what will happen if adverse events occur. Rid et al. have proposed a framework for assessing the risks associated with a research project [9]. They call this Elements of a Research Protocol 250 method the systematic evaluation of research risks (SERR) and base the method on four steps: 1. Identifying potential harms associated with the project 2. Categorizing the magnitude of the potential harms described 3. Quantifying or estimating the likelihood of each potential harm occurring 4. Comparing the likelihood of each potential interventionrelated harm with what might occur with a comparable activity For my study involving determining serum copper levels in study and control group subjects, I believe that the chief risks are those associated with obtaining blood samples. In the study cohort, the surgery is completed before the study begins. Follow-Up Here you should tell what, if anything, will happen to subjects after the research study is completed. In my study, patients found to have significant hypocupremia will be referred to their personal physicians for further evaluation and management. Data Management As things move along, you will accumulate data—information about subjects, consent forms, laboratory reports, tables of results, and so forth. How will these data be coded and entered into computer files? How will you assure that data are both accurate and complete? Especially when your study involves human subjects, you should tell how you will

maintain security of these data. Identify who will do these tasks, ideally the project manager on your team. 9. How to Write a Research Protocol 251 Quality Assurance You should tell how you will pay attention to the fundamentals of good clinical practice, especially important when human subjects are involved. How will you determine best practice in the conduct of the study? Will there be an independent oversight committee? Expected Outcomes The ideal clinical study will have an impact on some segment of the population. In the case of my small study on the risks of copper deficiency following gastric surgery, the results will either be helpful in alerting physicians to a potential adverse outcome of an increasingly common procedure or serve to be cautionary to patients considering gastric surgery for weight control or for other reasons. Duration of the Project Here is where you should present a timeline, which may help you identify possible bottlenecks, such as the possibility that you may not find as many qualifying subjects as anticipated. The timeline also may be useful later when writing a grant application.

ANNEXURE-II

VALUE ADDED COURSE

Participant list of Value added course: Medical Writing Course code: 09

Sl. No	Name of the Student	Register No	Signature
1	NIRMAL KUMAR B	U19MB331	
2	NISHANTHI V	U19MB332	
3	NITIN NARAYAN M	U19MB333	
4	NIVASINY P S	U19MB334	
5	NUKUVOLU NIENU	U19MB335	
6	PADMAJA T	U19MB336	
7	PAVAN KALYAN POTLURI	U19MB337	
8	PAVITHRA T	U19MB338	
9	PRABHU MANIKANDAN V S	U19MB339	
10	PRADHEEP K	U19MB340	
11	PRAKHAR GAUTAM	U19MB341	
12	PRIYADHARSHINI A	U19MB342	
13	PRIYADHARSHINI M	U19MB343	
14	PRIYANSHU KESHARI	U19MB344	
15	PULAK ACHARYA	U19MB345	
16	RAAJ SETHU VINAYACK R	U19MB346	
17	RABYA TABASUM	U19MB347	
18	RAHUL MAHESHVAR M G	U19MB348	
19	RAHUL RAJ	U19MB349	
20	RAJAGOPAL R	U19MB350	

PROFESSOR & HOD
DEPARTMENT OF PHARMACOLOGY
Sri Lakshmi Narayana Institute Of Medical Sciences
PONDICHERRY - 605 502.

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATION AND RESEARCH

Medical writing

Annexure - IV

Short - questions

Course Code: PH09

1. Competent of medical writer should have following qualities

good understanding of scientific pharmaceutical

terminology - language

→ drug composition

medical terminologies

2. Scope of medical writing and areas of where medical writing is mandatory.

life sciences like microbiology

biochemistry

biotechnology

environmental biology.

→ medicine

→ pharmacy

→ nutrition and dietetics.

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that PADMAJA Thas actively participated in the Value Added Course on **Medical Writing** held during **Sep2019 – Jan 2020** Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. S.Jaikumar
Dr.J.Jayasheela
Dr.P.Santhanalakshmi
RESOURCE PERSON

Dr. Somasundaram.G
COORDINATOR

Student Feedback Form

Course Name: MEDICAL WRITING

Subject Code: **PH 09**

Name of Student: Nishanth. V Roll No.: U19MB332

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear					✓
2	Course contents met with your expectations					✓
3	Lecturer sequence was well planned					✓
4	Lectures were clear and easy to understand				✓	
5	Teaching aids were effective					✓
6	Instructors encourage interaction and were helpful				✓	
7	The level of the course					✓
8	Overall rating of the course	1	2	3	4	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

SRI LAKSHMI NARAYANA INSTITUE OF MEDICAL SCIENCES AND HOSPITAL, PUDUCHERR

Date: 09.01.2020

From
Dr.G.Somasundaram
Professor and Head,
Department of Pharmacology
Sri Lakshmi Narayana Institute of Medical sciences
Pondicherry

To
The Dean,
Sri Lakshmi Narayana Institute of Medical sciences
Pondicherry.

Sub: Completion of value-added course: Medical Writing

Dear Sir,

With reference to the subject mentioned above, the department has conducted thevalue-added course titled: **Medical Writing** on **September 2019– January 2020**. We solicit your kind action to send certificates for the participants that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards

Dr.G.Somasundaram

PROFESSOR & HOD
DEPARTMENT OF PHARMACOLOGY
Sri Lakshmi Narayana Institute Of Medical Sciences
PONDICHERRY - 605 502



Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,

PUDUCHERRY – 605 502

Date: 02.08.2019

From
Dr.Rajini
Professor and Head,
Department of Community Medicine,
Sri Lakshmi Narayana Institute of Medical Sciences,
Bharath Institute of Higher Education and Research,
Puducherry.

To
The Dean,
Sri Lakshmi Narayana Institute Of Medical Sciences,
Bharath Institute of Higher Education and Research,
Puducherry.

Sub: Permission to conduct value-added course: Women empowerment

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **WOMEN EMPOWERMENT** from September 2019- February 2020. We solicit your kind permission for the same.

Kind Regards

Rajini S
PROFESSOR & HOD
DEPARTMENT OF COMMUNITY MEDICINE
Sri Lakshmi Narayana Institute Of Medical Sciences
PONDICHERRY - 605 502.

HOD

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,

PUDUCHERRY – 605 502

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating :

Dean: Dr.K.Balagurunathan

The HOD: Dr.S.Rajini

The Expert: Dr.J.Barathalakshmi, Associate Professor

The committee has discussed about the course and is approved.

PROFESSOR & HOD
DEPARTMENT OF COMMUNITY MEDICINE
Sri Lakshmi Narayana Institute Of Medical Sciences
PONDICHERRY - 605 502.

Head of the Department

Resource Person

DEAN
Prof.K.BALAGURUNATHAN M.S
(General surgeon)
SRI LAKSHMI NARAYANA
INSTITUTE OF MEDICAL SCIENCES
OSUDU PONDICHERRY

Dean

Sri Lakshmi Nrayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,

PUDUCHERRY – 605 502

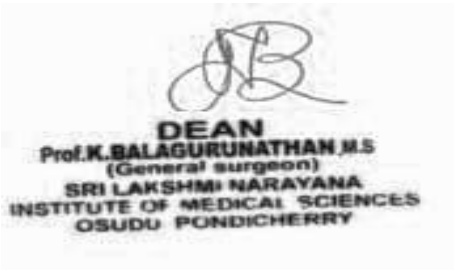
Circular

05.08.2019

Sub: Organising Value-added Course: WOMEN EMPOWERMENT

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research**, is organising a value added Programme on **"WOMEN EMPOWERMENT "** on September 11th, 2019.

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before **30 AUGUST 2019** . Applications received after the mentioned date shall not be entertained under any circumstances.



Dean

VALUE ADDED COURSE

1. Name of the programme & Code

Women empowerment and PSM02

2. Duration & Period

30 hrs & Sept 2019 – Feb 2020

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Multiple choice questions- *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year: 1

8. Year of discontinuation: - 2021

9. Summary report of each program year-wise

Value Added Course- Sept 2019 – Feb 2020					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	PSM02	Women empowerment	Dr.Rajini.S Dr. Barathalakshmi.J	IIIrd MBBS	14 (Sept 19 – Feb 20)

10. Course Feed Back Enclosed as *Annexure V*

PROFESSOR & HOD
DEPARTMENT OF COMMUNITY MEDICINE
Sri Lakshmi Narayana Institute Of Medical Sciences
PONDICHERRY - 605 502.

RESOURCE PERSON **COORDINATOR**

Annexure 1 – Course Proposal

Course Title: **WOMEN EMPOWERMENT**

Course Objective:

1.Introduction to team management & leadership
2.Overview
3.Types
4.Methods
5.Participation
6.summary

CourseOutcome: Improvement in the knowledge of Women empowerment
Course Audience: Pre-Final year students
Course Coordinator: Dr.S.Rajini
Course Faculties with Qualification and Designation:
1.Dr.S.Rajini, Professor & HOD
2.Dr.J.Barathalakshmi, Associate Professor
3. Dr.K.Kannan , Associate Professor

Course Curriculum/Topics with schedule (Min of 30 hours)

s.no	Date	Topic	Faculties	Time	Hrs
1	11.09.19	Introduction	Dr.J.Barathalakshmi	4-6 pm	2
2	18.09.19	Overview	Dr.S.Rajini	4-6 pm	2
3	25.09.19	Origin	Dr.K.Kannan	4-6 pm	2
4	02.10.19	Social empowerment	Dr.J.Barathalakshmi	4-6 pm	2
5	09.10.19	Educational empowerment	Dr.K.Kannan	4-6 pm	2
6	16.10.19	Economic empowerment	Dr.S.Rajini	4-6 pm	2
7	23.10.19	Political empowerment	Dr.J.Barathalakshmi	4-6 pm	2
8	13.11.19	Psychological empowerment	Dr.S.Rajini	4-6 pm	2
9	20.11.19	Method a of empowerment	Dr.K.Kannan	4-6 pm	2
10	05.12.19	Condition for empowerment	Dr.S.Rajini	4-6 pm	2
11	18.12.19	Participation	Dr.K.Kannan	4-6 pm	2
12	28.12.19	Practical difficulties	Dr.J.Barathalakshmi	4-6 pm	2
13	08.01.20	Career guidelines	Dr.K.Kannan	4-6 pm	2
14	22.01.20	Conclusion	Dr.S.Rajini	4-6 pm	2
15	05.02.20	Summary	Dr.K.Kannan	4-6 pm	2
					30 hrs

REFERENCE BOOKS:

1.Duflo E. Women empowerment and economic development. Journal of Economic literature. 2012 Dec;50(4):1051-79.
2. Mandal KC. Concept and Types of Women Empowerment. InInternational Forum of Teaching & Studies 2013 May 1 (Vol. 9, No. 2**).**

WOMEN EMPOWERMENT

BROUCHERE

Women's empowerment is the process of empowering women. Empowerment can be defined in many ways, however, when talking about women's empowerment, empowerment means accepting and allowing people (women) who are on the outside of the decision-making process into it. Women's empowerment is the most crucial point to be noted for the overall development of a country. Many celebrities are all for girl power such as Liza Koshy and Lilly Singh (who has her own late night show and has won many awards and also raised money for #girllove and other charities) "This puts a strong emphasis on participation in political structures and formal decision-*making and, in the economic sphere, on the ability to* obtain an income that enables participation in economic decision-making." Empowerment is the process that creates power in individuals over their own lives, society, and in their communities. People are empowered if they have an access to opportunities without any limitations or restrictions such as in education, profession and in their way of life. Feeling entitled to make your own decisions creates a sense of empowerment. Empowerment includes the action of raising the status of women through education, raising awareness, literacy, and training and also give training related to defence ourself . Women's empowerment is all about equipping and allowing women to make life-determining decisions through the different problems in society.

Former First Lady Michelle Obama greets students during a Room to Read event with First Lady Bun Rany of Cambodia in support of the Let Girls Learn initiative, at Hun Sunni Prasat Bakong High School in Siem Reap, Cambodia, March 21, 2015.

Alternatively, it is the process for women to redefine gender roles that allows them to acquire the ability to choose between known alternatives whom have otherwise been restricted from such an ability. There are several principles defining women's empowerment such as, for one to be empowered, they must come from a position of disempowerment. For example: A stripper no longer has to

take off her clothes to get money and now is a receptionist for a respectable company. Empowerment stems from self respect. Furthermore, one must acquire empowerment themselves rather than have it given to them by an external party. Other studies have found that empowerment definitions entail people having the capability to make important decisions in their lives while also being able to act on them. Lastly, empowerment and disempowerment is relative to other at a previous time; therefore, empowerment is a process, not a product.

Women empowerment has become a significant topic of discussion in development and economics. It can also point to the approaches regarding other trivialized genders *in a particular political or social context.*

Women's economic empowerment refers to the ability for women to enjoy their right to control and benefit from the resources, assets, income and their own time, as well as the ability to manage risk and improve their economic status and well being.

While often interchangeably used, the more comprehensive concept of gender empowerment refers to people of any gender, stressing the distinction between biological and gender as a role.

businesswoman Ivanka Trump (right) and Japanese PM Shinzo Abe attending the World Assembly for Women in Tokyo to speak on women's rights and empowerment, 2017 .*Entire nations, businesses, communities and groups can* benefit from the implementation of programs and policies that adopt the notion of women empowerment.

Empowerment of women is a necessity for the very development of a society, since it enhances both the quality and the quantity of human resources available for development.[8] Empowerment is one of the main procedural concerns when addressing human rights and development. *Women's empowerment and achieving gender equality is* essential for our society to ensure the sustainable development of a country. Many world leaders and scholars have argued that sustainable development is impossible without gender equality and

women's empowerment. Sustainable development accepts environmental protection, social and economic development, including women's empowerment. In the context of women and development, empowerment must include more choices for women to make on their own.

Methods

Scholars have identified two forms of empowerment, economic empowerment and political empowerment

Economic empowerment

Economic empowerment increases women's agency, access to formal government programs, mobility outside the home, economic independence, and purchasing power. Policy makers are suggested to support job training to aid in entrance in the formal markets. One recommendation is to provide more formal education opportunities for women that would allow for higher bargaining power in the home.

They would have more access to higher wages outside the home; and as a result, make it easier for women to get a job in the market.

Strengthening women's access to property inheritance and

land rights is another method used to economically empower women. This would allow them better means of asset accumulation, capital, and bargaining power needed to address gender inequalities. Often, women in developing and underdeveloped countries are legally restricted from their land on the sole basis of gender.

Having a right to their land gives women a sort of bargaining power that they wouldn't normally have; in turn, they gain more opportunities for economic independence and formal financial institutions.

Race has a huge impact on women's empowerment in areas such as employment. Employment can help create empowerment for women. Many scholars suggest that

when we discuss women's empowerment, discussing the different barriers that underprivileged women face, which makes it more difficult for them to obtain empowerment in society, is important when examining the impact of race in connection to employment. Significantly examining how opportunities are structured by gender, race, and class can transpire social change. Work opportunities and the work environment can create empowerment for women.

Empowerment in the workplace can positively affect job satisfaction and performance, having equality in the work place can greatly increase the sense of empowerment.

However, women of color do not have the same accessibility and privileges in work settings. They(Women of color) are faced with more disadvantages in the work place. Patricia Parker argues that African American *women's empowerment is their resistance to control,* standing up for themselves and not conforming to societal norms and expectations. In connection to power, feminist perspectives look at empowerment as a form of resistance within systems of unequal power relations.

Within the societal setting of race, gender, and class politics, African American women's empowerment in work environment "can be seen as resistance to attempts to fix meanings of appropriate identity and behavior, where such meanings are interpreted as controlling, exploitative, and other- wise oppressive to African American women." When talking about women's empowerment, many scholars suggest examining the social injustices on women in everyday organizational life that are influenced by race, class, and gender.

Another popular methodology for women's economic empowerment also includes microcredit. Microfinance institutions aim to empower women in their community by giving them access to loans that have low interest rates without the requirement of collateral. More specifically, they(microfinance institutions) aim to give microcredit to women who want to be entrepreneurs. The success and efficiency of microcredit and microloans is controversial and constantly debated. Some critiques claim that microcredit alone doesn't guarantee women have control over the way the loan is used. Microfinance institutions don't address cultural barriers that allow men to still control household finances; as a result, microcredit may simply be transferred to the husband. Micro credit doesn't *relieve women of household obligations, and even if* women have credit, they don't have the time to be as active in the market as men.

Political empowerment

Political empowerment supports creating policies that would best support gender equality and agency for women in both the public and private spheres. Methods that have been suggested are to create affirmative action policies that have a quota for the number of women in policy making and parliament positions. As of 2017, the global average of women who hold lower and single house parliament positions is 23.6 percent. Further recommendations have been to increase women's rights

to vote, voice opinions, and the ability to run for office with a fair chance of being elected. Because women are typically associated with child care and domestic responsibilities in the home, they have less time dedicated to entering the labour market and running their business.

Policies that increase their bargaining power in the household would include policies that account for cases of divorce, policies for better welfare for women, and policies that give women control over resources (such as property rights). However, participation is not limited to the realm of politics. It can include participation in the household, in schools, and the ability to make choices for oneself. Some theorists believe that bargaining power and agency in the household must be achieved before one can move onto broader political participation.

Digital skills enhance political empowerment Main article: Gender digital divide

Digital skills can facilitate women's engagement with local government and increase their decision-making power in their communities. The Women-gov project in Brazil and India, for instance, has helped women improve their understanding of and communication with local government via ICTs. In Brazil, the project trained female community leaders to access and utilize online data on government health services to better respond to public health concerns in their communities. In India, the project worked with women's collectives to establish women-run, internet-connected community information centres to *facilitate applications for government assistance* (including welfare and entitlements), which in turn improved linkages between the collectives, local authorities and public institutions.

Women with digital skills are better able to make their voices heard on local issues and influence the outcome of decisions that affect themselves and their communities.

Digital skills can also empower women to participate in political movements. For instance, the

anonymity of ICTs may allow some women to avoid limitations on freedom of speech in repressive societies, while collective mobilization through online networks can enable women to campaign on gender-based issues. Studies show an *Iraqi women's group used a multimedia campaign,* including an online component, to successfully lobby the Kurdish regional government to outlaw the practice of female genital mutilation. Images taken on mobile phones and distributed via social media have called attention to domestic violence in China and influenced media treatment of court cases on forced abortion.

Measurements And Assessment **Barriers**

Many of the barriers to women's empowerment and equity lie ingrained in cultural norms. Many women feel these pressures, while others have become accustomed to *being treated inferior to men. Even if legislators, NGOs, etc. are aware of the benefits women's empowerment and* participation can have, many are scared of disrupting the status of the women and continue to let societal norms get in the way of development.

Research shows that the increasing access to the internet can also result in an increased exploitation of women.

Releasing personal information on websites has put some women's personal safety at risk. In 2010, Working to Halt Online Abuse stated that 73% of women were victimized through such sites. Types of victimization include cyber stalking, harassment, online pornography, and flaming. *Sexual harassment in particular is a large barrier for* women in the workplace. It appears in almost all *industries, but is most notable in the following: business,* trade, banking and finance, sales and marketing, hospitality, civil service, and education, lecturing and teaching. According to the International Labour Organisation (ILO), sexual harassment is a clear form of gender discrimination based on sex, a manifestation of unequal power relations between men and women.

Furthermore, the UN Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW) is urging for increased measures of protection for women against sexual harassment and violence in the workplace. 54% (272) had experienced some form of workplace sexual harassment. 79% of the victims are women; 21% were men.

Recent studies also show that women face more barriers in the workplace than do men. Gender-related barriers involve sexual harassment, unfair hiring practices, career progression, and unequal pay where women are paid less than men are for performing the same job. When taking the median earnings of men and women who worked full- time, year-round, government data from 2014 showed that women made $0.79 for every dollar a man earned. The average earnings for working mothers came out to even less—$0.71 for every dollar a father made, according to a 2014 study conducted by the National Partnership for Women and Children. While much of the public discussion of the "wage gap" has focused around women getting equal pay for the same work as their male peers, many women struggle with what is called the "pregnancy

penalty". The main problem is that it is difficult to measure, but some experts say that the possibility of having a baby can be enough for employers to push women back from their line.[33] Therefore, women are put in a position where they need to make the decision of whether to maintain in the workforce or have children. This problem has sparked the debate over maternity leave in the United States and many other countries in the world.

However, despite the struggle for equal pay, in Nepal the tech industry [clarification needed] has made progress in helping to encourage equal pay across gender. In March 2016, tech career website Dice released a study of more than 16,000 tech professionals that found that when you *compare equivalent education, experience and position,* there is no pay gap—and hasn't been for the last six years. However, this industry also struggles to employ women in executive positions. This is partially due to the barrier of sexual harassment and pregnancy that was aforementioned. *Such barriers make it difficult for women to advance in* their workplace or receive fair compensation for the work they provide.

Role of education

It is said that education increases "people's self- confidence and also enables them to find better jobs and they can work shoulder to shoulder with men".[citation needed] They engage in public debate and make demands on government for health care, social security and other

entitlements". In particular, education empowers women to make choices that improve their children'shealth,their well-being, and chances of acquiring survival skills.
Education informs others of preventing and containing the disease, and it is an essential element of efforts to reduce malnutrition. Furthermore, it empowers women to make choices that can improvetheirwelfare,including marrying *beyond childhood and having fewer children. Crucially*, education can increase women's awareness of their rights, boost their self-esteem, and provide them the opportunity to assert their rights.

Despite significant improvements in recent decades, education is not universally available and gender inequalities persist. A major concern in many countries is not only the limited numbers of girls going to school but also the limited educational pathways for those that step into the classroom. More specifically, there should be more efforts to address the lower participation and learning achievement of girls in science, technology, engineering and mathematics (STEM) education *India. The class and caste structure inadvertently put poor* women from lower class and tribal communities at the most risk of violence. Class and caste divisions also create grave challenges to poor, lower caste, and tribal women in accessing justice and retribution as victims and survivors of violence. Women and girls in urban India are also at high risk of gender-based violence. In Delhi, the country's capital, a scan of daily newspapers reveals shocking numbers of cases of violence against women.
The National Crime Bureau claims that a woman is raped every 29 minutes in Delhi. Street violenceinurbancentres is a growing concern for young women and girls, who are increasingly moving away from rural areas for economic opportunities and higher education. Particularly women andgirlsfromthenortheastregionofIndialivinginurban

centres such as Delhi have reported experiencing social discrimination and marginalization, and many times physical violence. In 2005, according to the North East Support Centre, among the 100,000 people from the northeast living in Delhi 86% had reported racial discrimination and 41% of cases were sexual abuse cases. The northeast states of India are a volatile region, with a number of active insurgencies. The Government has continuously deployed state troops to fight the insurgents, who predominantly follow the Maoist ideology. This region, because of its physical

and cultural proximity to Myanmar, China, and Bhutan, has for the most part been ignored by the central government, thereby fuelling the insurgents' demand for development and autonomy. In the northeast (as in most conflict-ridden regions) women bear the brunt *of war from both sides. There have been numerous* instances of violence perpetrated by state security forces against local and tribal women.

33% reservation for women in all levels of Indian politics, took 14 years after its introduction to finally pass by the Rajya Sabha (the upper house of parliament). It is yet to be passed by the Lok Sabha (the lower house of parliament). The reservation bill will ensure 181 out of the 543 seats at the Parliament level, and 1,370 seats out of the 4,109 seats at the State Assembly level.44 This is a historic move in the Indian political *landscape, as currently women occupy less than 10% of* seats in the national Parliament. The Women's Bill will also significantly change the demographics of class and caste *among women politicians in leadership positions in the* Indian political structure. It will create a path for women from lower classes and castes (who are currently confined to local-level governance) to enter state and national level governments. In addition to the existing reservations for scheduled castes and scheduled tribes, one third of the SC and ST candidates must be women. Other Backward Class (OBC) members are not included in the reservation due to the wide disagreement about who constitutes OBC and a lack of existing data on the OBC population. The two main arguments against the bill are that it will only benefit elite women (particularly in national level politics) and that there should be reservations for Dalit, minorities (particularly Muslim women), and OBCs. However, supporters of the bill do not agree with creating quotas *within the existing 33% women quota in parliament, as SC* and ST quotas already exist. The bill mandates that all political parties reserve one third of their electoral ticket for women including in the already mandated reservations for SC and STs. This will inadvertently create spaces for lower caste and class women to enter state and national level politics. The passage and implementation of the Women's Bill, and its impact on the existing gender, class, and caste barriers, is yet to be realized, but one thing is clear: India's politics is moving closer to equitable inclusion than ever before.

WOMEN'S ECONOMIC OPPORTUNITIES IN INDIA

India is one of the world's fastest growing economies, with women mainly from the middle class ncreasingly entering the workforce. Urban centres like Delhi and Bangalore have seen an influx of young women from semi-urban and rural parts of the country, living alone and redefining themselves. However, the story of economic empowerment for women is not a singular narrative; rather it is located in a complex set of caste, class, religious, and ethnic identities.

The Global Gender Gap Report by the World Economic Forum in 2009 ranked India 114th out of 134 countries for inequality between men and women in the economy, politics, health, and education. On equal economic opportunities and women's participation in the labour force, India ranked 127th and 122nd respectively.27 The number of women in the workforce varies greatly from *state to state: 21% in Delhi; 23% in Punjab; 65% in Manipur;* 71% Chhattisgarh;

76% in Arunachal Pradesh.28 The diversity of women's economic opportunities between states is

due to the cultural, religious, and ethnic diversity of each state. Northern states like Delhi and Punjab lag far behind on gender equality measures, including the alarming sex ratio between men and women (due to son preference and sex-selective abortion), low female literacy levels, and high rates of gender-basedviolence.

In rural India, women's economic opportunities remain restricted by social, cultural, and

religious barriers. Most notably inheritance laws embedded in Hindu and Shariat civil codes continue to marginalize women in the household and the larger *community. Rural women, particularly of lower caste and* class, have the lowest literacy rates, and therefore do not have the capacity to negotiate pay or contracts and most often engage in the unorganized sector, selfemployment, or in small scale industry. Self-help groups (SHGs) are a widely practiced model for social and economic mobility by NGOs and the government. SHGs provide women with the opportunity to manage loans and savings that can be used by members for varying needs. SHGs also are used to promote social change among the members and the community at large.

Members of SHGs have used their experiences as leverage to enter other local institutions such

as the PanchayatKhap.

Rural, low caste, and tribal women also make up 70% of domestic workers in India, a sector which is largely unregulated and unorganized. India's growing economy has allowed for many upper and middle-class women to enter the workforce, and while poor rural women have little access to education and training, there is a high demand for domestic workers in urban hubs. Domestic workers are mostly illiterate, with little or no negotiating power for wage equity, and *are highly vulnerable to exploitation and sexual and* physical abuse.

There is a movement at the policy level to organize domestic workers and to create laws to *regulate minimum wage, working hours, and other* measures such as life and health insurance.

Currently a national-level Taskforce on Domestic Workers has been formed that will present recommendations to the central government on better enforcement of rights for the many undocumented domestic workers in India.

Women are also very visible in the construction sector in India, and like domestic workers are largely unorganized and rely on daily wagers. Women construction workers are mostly poor and illiterate and have little negotiating power. This sector is also unregulated and highly vulnerable to exploitation. Women workers also earn significantly less than men, although women are the ones who do most of the backbreaking work like carrying bricks and other heavy materials on site. On the other end of the spectrum, while India has one of the highest percentages of professional women in the world, those who occupy managerial positions are under 3%. Most women work in low *administrative positions, and many of the young women* migrating to urban centres mostly work in service and retail industries, although more and more women are entering the IT and other technical sectors.

The movement to assure women's economic, social, and cultural rights (ESCR) as basic human rights is just emerging in India. The movement aims to locate women's rights within the larger human rights framework, and by doing so moves away from looking at women's issues only within the framework of violence against women and reproductive rights. ESCR attempts to look at the broader issues facing women, namely poverty, housing, unemployment, education, water,

food security, trade, etc. While the human rights movement on ESCR is largely contained at the international policy level, there are *emerging social movements around the world. In the* Indian context, projects like the Programme on Women's Economic, Social, and Cultural Rights (PWESCR), for example, is creating linkages between the international human rights movement and the local articulation of women's rights.

PWESCR aims to build a women's rights movement in India that creates equality in all spheres of women's lives. By empowering women economically and socially, ESCR provides for a broader discourse on rights that moves women's rights from a victim centered approach to one that cuts across other fundamental human rights issues.

Women's economic opportunity in India is a rapidly changing landscape. Women are increasingly entering the workforce—particularly women professionals—and are creating change, but there remains *a large number of invisible women workers in unorganized* and volatile sectors. However, organizing at the local level, albeit small, is widespread. Implementation of national and state level policies lags behind in ensuring that women workers have equal pay and are free from exploitation.

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

TOPIC: WOMEN EMPOWERMENT

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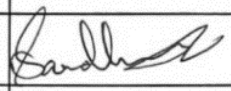
1	SANDHYA	
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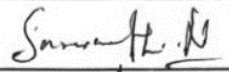
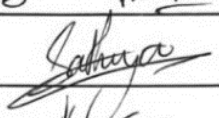
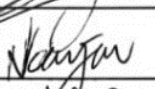
3	SARASWATHI .N	
4	SATHYA VIJAYENDRAN P.U	
5	SHAIKH IMRAN SHAIKH NAJIR	
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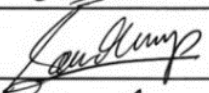
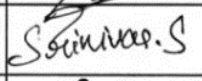
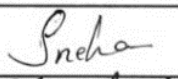
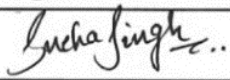
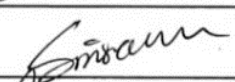
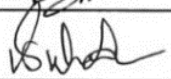
7	SINGAMSETTY SANDEEP	
8	SINGAMSETTY SRINIVAS	
9	SNEHA	
10	SNEHA SINGH	
11	SRIRAM .S	
12	SUBALAKSHMI .D	
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14	SURENDAR RAJ .S	

Annexure – III

WOMAN EMPOWERMENT
MULTIPLE CHOICE QUESTIONS

Course Code: PSM02

I. ANSWER ALL THE QUESTIONS

1. Name the online platform launched by the Ministry of Women and Child Development to support women entrepreneurs?
   A.Digital India
   B.Mahila E-haat
   C.One Stop Centre Scheme
   D.None of the above

2. The Central Social Welfare Board was established in....
   A. 1950
   B. 1951
   C. 1952
   D. 1953

3. Women Helpline Scheme was launched in...
   A. 2012
   B. 2015
   C. 2017
   D. 2018

4. Which of the following scheme provide education to girls and their welfare?
   A.One Stop Centre Scheme
   B.UJJAWALA
   C.SWADHAR Scheme
   D.Beti Bachao Beti Padhao

5. Which scheme helps in the prevention of trafficking and provide support for rescue, rehabilitation, reintegration and repatriation of women?
   A.Ujjawala scheme
   B.STEP scheme
   C.Priyadasrshini Scheme

D.DWCRA

6. Support to Training and Employment Programme for Women scheme is....
   A.SWADHAR
   B.STEP
   C.Nari Shakti Puraskar
   D.RMK
7. Priyadarshini scheme provides:
   A.Women Empowerment
   B.Livelihood in Mid-Gangetic plains
   C.Empower to address women legal, political and health problems
   D.All the above are correct.

8. Indira Gandhi Matritva Sahyog Yojana was launched in...
   A. 2008
   B. 2010
   C. 2012
   D. 2015

9. National Mission for Empowerment of Women was launched on:
   A.15 August, 2010
   B.15 August, 2011
   C.15 October, 2010
   D.15 October, 2011

10. Which scheme promotes community participation through involvement of Students Volunteers for empowerment of rural women?
    A.NAND-GHAR YOJANA
    B.eSamvad Portal
    C.Pradhan Mantri Mahila Shakti Kendra scheme
    D.She-Box Portal

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - IV

WOMAN EMPOWERMENT
MULTIPLE CHOICE QUESTIONS

Course Code: PSM02

I. ANSWER ALL THE QUESTIONS

1. Name the online platform launched by the Ministry of Women and Child Development to support women entrepreneurs?
A.Digital India
B.Mahila E-haat
C.One Stop Centre Scheme
D.None of the above

2. The Central Social Welfare Board was established in....
A. 1950
B. 1951
C. 1952
D. 1953

3. Women Helpline Scheme was launched in...
A. 2012
B. 2015
C. 2017
D. 2018

4. Which of the following scheme provide education to girls and their welfare?
A.One Stop Centre Scheme
B.UJJAWALA
C.SWADHAR Scheme
D.Beti Bachao Beti Padhao

5. Which scheme helps in the prevention of trafficking and provide support for rescue, rehabilitation, reintegration and repatriation of women?
A.Ujjawala scheme
B.STEP scheme
C.Priyadasrshini Scheme
D.IWCRA

6. Support to Training and Employment Programme for Women scheme is....
A.SWADHAR
B.STEP
C.Nari Shakti Puraskar
D.RMK

7. Priyadarshini scheme provides:
A. Women Empowerment
B. Livelihood in Mid-Gangetic plains
C. Empower to address women legal, political and health problems
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8. Indira Gandhi Matritva Sahyog Yojana was launched in...
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A. 15 August. 2010
B. 15 August, 2011
C. 15 October, 2010
D. 15 October, 2011

10. Which scheme promotes community participation through involvement of Students Volunteers for empowerment of rural women?
A. NAND-GHAR YOJANA
B. eSamvad Portal
C. Pradhan Mantri Mahila Shakti Kendra scheme
D. She-Box Portal

Annexure – IV



Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that SARA.R has actively participated in the Value Added Course on **WOMAN EMPOWERMENT** held during Sept 2019 – Feb 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. J.Barathalakshmi, MD
Resource Person

Dr.Rajini.S.MD
Professor & HOD
Department of Community Medicine

Dr.K.Balagurunathan, MS
Dean, SLIMS

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that SARASWATHI.N has actively participated in the Value Added Course on **WOMAN EMPOWERMENT** held during Sept 2019 – Feb 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. J.Barathalakshmi, MD	Dr.Rajini.S.MD	Dr.K.Balagurunathan, MS
Resource Person	**Professor & HOD**	**Dean, SLIMS**
	Department of Community Medicine	

ANNEXURE V

Student Feedback Form

Course Name: **WOMEN EMPOWERMENT**

Subject Code: **PSM02**

Name of Student: _____ Roll No.: 2

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear				✓	
2	Course contents met with your expectations				✓	
3	Lecturer sequence was well planned				✓	
4	Lectures were clear and easy to understand				✓	
5	Teaching aids were effective				✓	
6	Instructors encourage interaction and were helpful				✓	
7	The level of the course				✓	
8	Overall rating of the course	1	2	3	✓	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

Nice.

Signature

Date: 22/01/2020

Student Feedback Form

Course Name: **WOMEN EMPOWERMENT**

Subject Code: **PSM02**

Name of Student: Sandhya. Roll No.: 1

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear				✓	
2	Course contents met with your expectations				✓	
3	Lecturer sequence was well planned			✓		
4	Lectures were clear and easy to understand				✓	
5	Teaching aids were effective				✓	
6	Instructors encourage interaction and were helpful				✓	
7	The level of the course				✓	
8	Overall rating of the course	1	2	3	4	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

Very. Good. :)

Date: 22/01/2020

Signature

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,

PUDUCHERRY – 605 502

5.02.2020

From
Dr.S.Rajini
Professor and Head,
Department of Community Medicine,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Puducherry

Through Proper Channel

To
The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Puducherry

Sub: Completion of value-added course: Women Empowerment

Respected Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: Women Empowerment from September 2019- February 2020 for Pre-final year students . We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards,

PROFESSOR & HOD
DEPARTMENT OF COMMUNITY MEDICINE
Sri Lakshmi Narayana Institute Of Medical Sciences
PONDICHERRY - 605 502.





Sri Lakshmi Narayana Institute of Medical Sciences

Osudu, Puducherry-605502

Date:07/05/19

From
V.Senthil kumar
Professor and Head,
Dept.of physiology
SLIMS,
Bharath Institute of Higher Education and Research,
Chennai.

To
The Dean,
SLIMS
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: Certificate course in oxidative stress, antioxidants and its mechanism

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: Certificate course in oxidative stress, antioxidants and its mechanism on Sep 2019– Oct 2019. We solicit your kind permission for the same.

Kind Regards

DR.V.Senthil kumar

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: DR.Jeyalakshmi

The HOD: DR.V.Senthil kumar

The Expert: DR.S.Latha

The committee has discussed about the course and is approved.

Dean

DEAN
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
OSUDU, AGARAM VILLAGE,
KOODAPAKKAM POST,
PUDUCHERRY - 605 502

S. Latha
Subject Expert

V.S.K
HOD

PROFESSOR & HOD
DEPARTMENT OF PHYSIOLOGY
Sri Lakshmi Narayana Institute Of Medical Sciences
PONDICHERRY - 605 502.

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affiliated to Bharath University, Chennai - TN]

Circular

Date : 02/08/19

Sub: Organising Value-added Course: Certificate course in oxidative stress, antioxidants and its mechanism - **reg**

With reference to the above mentioned subject, it is to bring to your notice that **SLIMS, Bharath Institute of Higher Education and Research**, is organizing "oxidative stress, antioxidants and its mechanism ". The course content is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before 15th Aug 2019. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

DEAN
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
OSUDU, AGARAM VILLAGE,
KOODAPAKKAM POST,
PUDUCHERRY - 605 502

Encl: Copy of Course content and Registration form.

VALUE ADDED COURSE

1. Name of the programme & Code

Certificate course in oxidative stress, antioxidants and its mechanism, PHYC12

2. Duration & Period

30 hrs & Sep 2019– Oct 2019

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Descriptive questions- *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

1 Sep 2019– Oct 2019

8. Year of discontinuation: 2019

9. Summary report of each program year-wise

Value Added Course Aug 2019– Oct 2019					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	PHYC12	Certificate course in oxidative stress, antioxidants and its mechanism	Dr. S.Latha	1st MBBS	20 (Sep 2019– Oct 2019)

10. Course Feed Back

Enclosed as Annexure- V

S. Latha

RESOURCE PERSON

VSK

COORDINATOR

PROFESSOR & HOD
DEPARTMENT OF PHYSIOLOGY
Sri Lakshmi Narayana Institute Of Medical Sciences
PONDICHERRY - 605 502.

Annexure -I

COURSE PROPOSAL

Course Title: Certificate course in oxidative stress, antioxidants and its mechanism

Course Objective: The main objective of the course is to enable the students to understand the oxidative stress, antioxidants, types of antioxidants and mechanism of antioxidants.

Course Outcome: On successful completion of the course the students will acquire adequate knowledge on oxidative stress and its complications, antioxidants, types and mechanism of antioxidants.

Course Audience: Ist MBBS students

Course Coordinator: DR.V.Senthil kumar

Course Faculties with Qualification and Designation:

1. **DR.S.Latha, Ph.D, Assoc. Professor**
2. **DR.Premaraja, MD, Assistant professor**
3. **DR.B.Deivanayagame, MD, Assistant professor**

Course Curriculum/Topics with schedule (Min of 30 hours)

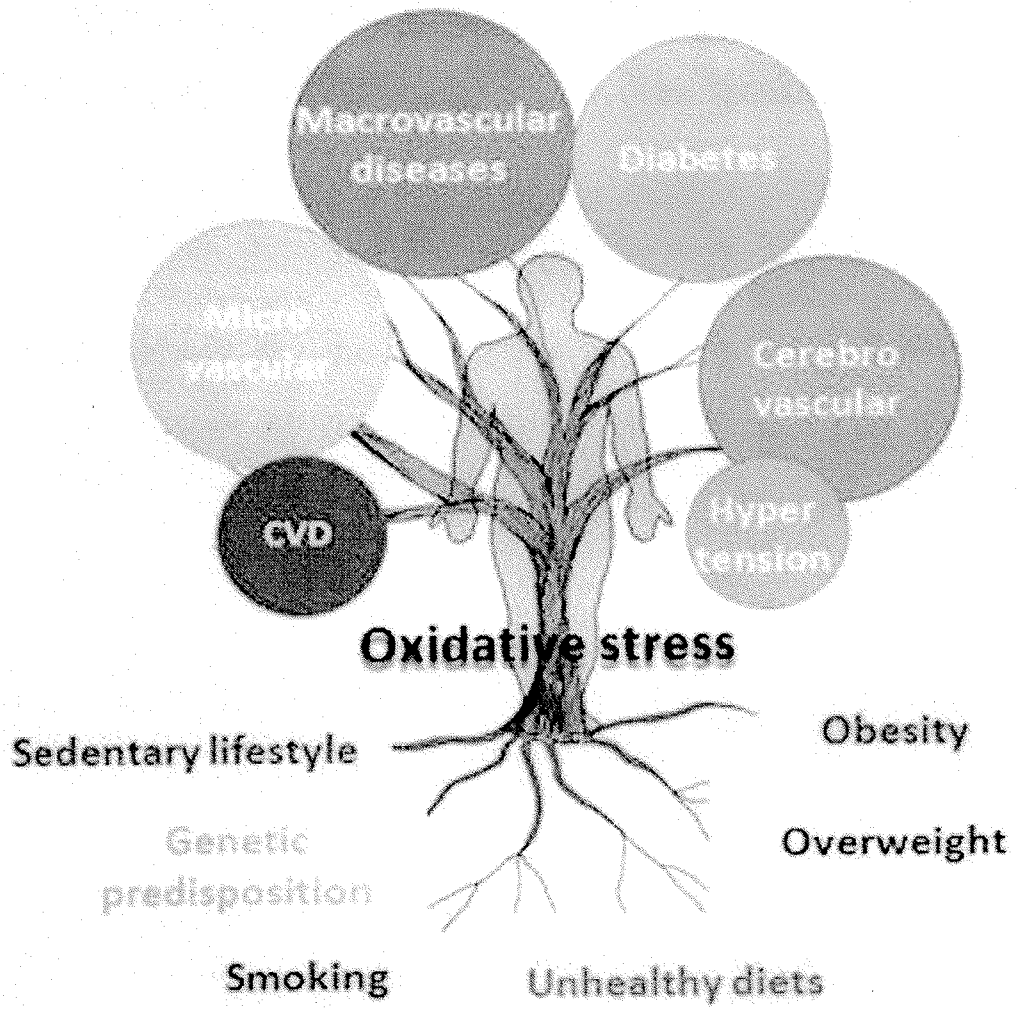
S. No	Date	Topic	Time	Hours
1.	07/09/19	Oxidative stress and Risk factors of oxidative stress	2-5pm	3
2	14/09/19	Free radicals- Formation, Adverse effects	2-5pm	3
3	21/09/19	Antioxidants and its classification	2-5pm	3
4	28/09/19	Food antioxidants and its mechanism	2-5pm	3

5	05/10/19	Antioxidants in our body	2-5pm	3
6	12/10/19	Structure and chemistry of antioxidants	2-5pm	3
7	15/10/19	Medicinal uses of antioxidants	4-7pm	3
8	17/10/19	Oxidative stress in diabetes mellitus	4-7pm	3
9	19/10/19	Managing and preventing oxidative stress	4-7pm	3
10	26/10/19	Assessment	2-5pm	3
			Total Hours	30

REFERENCE BOOKS:

Oxidative Stress-Molecular Mechanisms and Biological Effects-edited by Volodymyr
Oxidative Stress in Health and Disease-Michael Breiten bach and Peter Eckl

CERTIFICATE COURSE IN OXIDATIVE STRESS, ANTIOXIDANTS AND ITS MECHANISM



PARTICIPANT HAND BOOK

COURSE DETAILS

Particulars	Description
Course Title	Certificate course in oxidative stress, antioxidants and its mechanism
Course Code	PHYC12
Key Competencies	1. Oxidative stress and Risk factors of oxidative stress 2. Free radicals- Formation, Adverse effects 3. Antioxidants and its classification 4. Food antioxidants and its mechanism 5. Antioxidants in our body 6. Structure and chemistry of antioxidants 7. Medicinal uses of antioxidants 8. Oxidative stress in diabetes mellitus 9.Managing and preventing oxidative stress
objectives	On successful completion of the course the students will acquire adequate knowledge on management of oxidative stress and its complications
Target Student	1st MBBS Students
Duration	30hrs, Sep 2019– Oct 2019
Assessment Procedure	Descriptive questions-based assessment

Introduction:

The oxidative stress

The oxidative stress means imbalance between the oxidants especially the reactive oxygen and nitrogen species and the level of the antioxidants. Oxidative stress caused by reactive oxygen species (ROS) that formed in excess or insufficient removal plays important role in the damage of cellular DNA, proteins, lipids and late diabetic complications. the proteins, lipids and the DNA make the large part of the body, the damage leads to

1. Diabetes mellitus
2. Atherosclerosis or hardening of the vessel
3. Inflammatory conditions
4. High blood pressure
5. Heart diseases
6. Neurodegenerative diseases such as Parkinson's and
7. Cancer

Risk factors of oxidative stress:

1. ozone
2. certain pesticides and cleaners
3. cigratte smoking
4. radiation
5. pollution
6. a diet high in sugar, fat and alcohol

FREE RADICALS DAMAGE AND DISEASES

Free radicals contribute to many different diseases. Chemically, a substance is oxidized when electrons are removed and reduced when electrons are added. All chemical reactions involve the transfer of electrons. The body generates energy by gradually oxidizing its food in a controlled manner and storing it in the form of chemical potential energy called ATP (Adenosinetriphosphate). Free radicals are generated largely during the production of ATP in the mitochondria. During this process, radicals coming out from the mitochondria from reactive oxygen species such as superioxide anion ($O2^{-}$) and hydroxyl radicals (HO .) and other reactive oxygen species such as singlet oxygen (O2 1), destroy the body system especially the site where the free radicals is been generated. The ultraviolet light that penetrate the skin and the air pollutant that is high in smog which we inhale generates free radicals too. Food, like lipid in the presence of (Fe 3 , Fe 2) lead to the production of hydrogen peroxide from which further hydroxyl radicals are generated in a reaction that appear to depend on the presence of iron ions. The acceleration of hydroperoxide decomposition to form peroxyl radicals and alkoxyl radical.

$Fe^{3+} + ROOH \rightarrow Fe^{2+} + ROO^{\cdot} + H^{+}$ $Fe^{2+} + ROOH \rightarrow Fe^{3+} + RO^{\cdot} + OH^{-}$

Formations of alkyl free radicals by direct reaction with fats and oils.

$Fe^{3+} + RH \rightarrow Fe^{2+} + R^{\cdot} + H^{+}$

Activation of molecular oxygen for singlet oxygen formation

$Fe^{2+} + O_2 \rightarrow Fe^{3+} + O_2^{-}$

ANTIOXIDANTS :

Antioxidants are substances that may protect cells from the damage caused by unstable molecules known as free radicals. Antioxidants interact with and stabilize free radicals and may prevent some of the damage free radicals might otherwise cause. Free radical damage may lead to cancer. Examples of antioxidants include beta-carotene, lycopene, vitamins C, E, A and other substances. An antioxidant is a molecule capable of slowing or preventing the oxidation of other molecules. Oxidation is a chemical reaction that transfers electrons from a substance to an oxidizing agent. Oxidation reactions can produce free radicals, which start chain reactions that damage cells. Antioxidants terminate these chain reactions by removing free radical intermediates and inhibit other oxidation reactions by being oxidized themselves.. Plants and animals are the abundant source of naturally producing antioxidants. Alternately, antioxidants can also be synthesized by chemical process as well as from the different kinds of agro-related wastes using biological process. Based on their solubility, antioxidants are broadly categorized into two groups: water soluble and lipid soluble. In general, water-soluble antioxidants, such as ascorbic acid, glutathione, and uric acid, have functions in the cell cytosol and the blood plasma. Ascorbic acid is a redox catalyst which reduces and neutralizes the reactive oxygen species (ROS), glutathione has antioxidant properties as reducing agent and can be reversibly oxidized and reduced, while α-tocopherol, carotenoid, and ubiquinol are the examples of lipid-soluble antioxidants and protect the cell membranes from lipid peroxidation. Another commonly used classification is on the basis of their mechanism of action, i.e., primary or chain-breaking antioxidants and secondary or preventive antioxidants. Antioxidants can also act as prooxidants when these are not present at the right place at the right concentration at the right time. The relative importance of the antioxidant and prooxidant activities of an antioxidant is an area of current research. This chapter discusses the types, sources, synthesis, uses, and protective efficacy of various antioxidants.

CLASSIFICATION OF ANTIOXIDANTS

Antioxidants are grouped into two namely; Primary or natural antioxidants. Secondary or synthetic antioxidants.

Primary or natural antioxidants They are the chain breaking antioxidants which react with lipid radicals and convert them into more stable products. Antioxidants of this group are mainly phenolic in structures and include the following Antioxidants minerals - These are co factor of antioxidants enzymes. Their absence will definitely affect metabolism of many macromolecules such as carbohydrates. Examples include selenium,

copper, iron, zinc and manganese. Anti oxidants vitamins – It is needed for most body metabolic functions. They include-vitamin C , vitamin E, vitamin B. Phytochemicals - These are phenolic compounds that are neither vitamins nor minerals. These include: Flavonoids: These are phenolic compounds that give vegetables fruits, grains, seeds leaves, flowers and bark their colours. Catechins are the most active antioxidants in green and black tea and sesamol. Carotenoids are fat soluble colour in fruits and vegetables. Beta carotene, which is rich in carrot and converted to vitamin A when the body lacks enough of the vitamin. Lycopene, high in tomatoes and zeaxantin is high in spinach and other dark greens. Herbs and spices-source include Diterpene, rosmariquinone, thyme, nutmeg, clove, black pepper, ginger, garlic and curcumin and derivatives.

Secondary or synthetic antioxidants These are phenolic compounds that perform the function of capturing free radicals and stopping the chain reactions, the compound include : i. Butylated hydroxyl anisole (BHA). ii. Butylated hydroxyrotoluene (BHT). iii. Propyl gallate (PG) and metal chelating agent (EDTA). iv. Tertiary butyl hydroquinone (TBHQ). v. Nordihydro guaretic acid (NDGA). Ascorbic acid Ascorbic acid or "vitamin C" is a monosaccharide antioxidant found in both animals and plants. As one of the enzymes needed to make ascorbic acid has been lost by mutation during human evolution, it must be obtained from the diet and is a vitamin. Most other animals are able to produce this compound in their bodies and do not require it in their diets. In cells, it is maintained in its reduced form by reaction with glutathione, which can be catalyzed by protein disulfide isomerase and glutaredoxins. Ascorbic acid is a reducing agent and can reduce and thereby neutralize, reactive oxygen species such as hydrogen peroxide . Glutathione The free radical mechanism of lipid peroxidation: Glutathione is a cysteine-containing peptide found in most forms of aerobic life. It is not required in the diet and is instead synthesized in cells from its constituent amino acids. Glutathione has antioxidant properties since the thiol group in its cysteine moiety is a reducing agent and can be reversibly oxidized and reduced. In cells, glutathione is maintained in the reduced form by the enzyme glutathione reductase and in turn reduces other metabolites and enzyme systems, such as ascorbate in the glutathione-ascorbate cycle, glutathione peroxidases and glutaredoxins, as well as reacting directly with oxidants. Due to its high concentration and its central role in maintaining the cell's redox state, glutathione is one of the most important cellular antioxidants. In some organisms glutathione is replaced by other thiols, such as mycothiol in the Actinomycetes, or by trypanothione in the Kinetoplastids . Melatonin Melatonin is a powerful antioxidant that can easily cross cell membranes and the blood-brain barrier. Unlike other antioxidants, melatonin does not undergo redox cycling, which is the ability of a molecule to undergo repeated reduction and oxidation. Redox cycling may allow other antioxidants (such as vitamin C) to act as pro-oxidants and promote free radical formation. Melatonin, once oxidized, cannot be reduced to its former state because it forms several stable end-products upon reacting with free radicals. Therefore, it has been referred to as a terminal (or suicidal) antioxidant Tocopherols and tocotrienols (vitamin E) Vitamin E is the collective name for a set of eight related tocopherols and tocotrienols, which are fat-soluble vitamins with antioxidant properties. Of these, - tocopherol (Figure 1) has been most

studied as it has the highest bioavailability, with the body preferentially absorbing and metabolizing this form . It has been claimed that the -tocopherol form is the most important lipid-soluble antioxidant and that it protects membranes from oxidation by reacting with lipid radicals produced in the lipid peroxidation chain reaction. This removes the free radical intermediates and prevents the propagation reaction from continuing. This reaction produces oxidized -tocopheroxyl radicals that can be recycled back to the active reduced form through reduction by other antioxidants, such as ascorbate, retinol. This is in line with findings showing that -tocopherol, but not water-soluble antioxidants, efficiently protects glutathione peroxidase (GPX4)-deficient cells from cell death. GPX4 is the only known enzyme that efficiently reduces lipid-hydro peroxides within biological membranes

FOOD ANTIOXIDANTS AND REACTION MECHANISMS

Food antioxidants include substances that keep edible fats and oils from becoming rancid and prevent fruit and vegetables from turning brown. Examples include butylated hydroxyanisole (BHA) and butylated hydrogenoxytoluene (BHT) , ascorbic acid (Vit.C), -tocophenol (Vit. E) (Figure 1). Hence, vitamins containing aromatic ring which reacts and destroys the most reactive forms of oxygen radicals, protecting the most unsaturated fatty acids from oxidation and preventing oxidative damage to the membrane . It is very stable even when it loses its H + from OH - group to the free radicals in PUFA and hence become oxidized. The antioxidant activity of flavonoid has been received by many scientists. They concluded that food possesses the potential to scavenge and quench various reactive oxygen species (ROS). This antioxidant reacts with lipid (fats and oil) and prevents lipid peroxidation that usually occurs in fatty foods at the initial stage by free radical scavengers. The chain breaking antioxidant action of flavonoid (FL-OH) can be represented as shown below: $LOO^{\cdot}$ + FL - OH LOOH + FL - $O^{\cdot}$ Flavonoid phenonyl radical Termination of lipid radical ($L^{\cdot}$), lipid peroxy radical ($LOO^{\cdot}$) and alkoxyl radicals ($RO^{\cdot}$) formed by re-initiation of lipid peroxidation induced by metal ions by flavonoids is shown below: $LOO^{\cdot}/L^{\cdot}/LO^{\cdot}$ + FL – OH LOOH/LH/LOH = FL - $O^{\cdot}$ Flavonoid protects the memberane phospholipids PUFA by donating the hydrogen atom (H) to quench lipid peroxyl radicals generated as s result of hydroxyl radical attack on the unsaturated carbon chain of PUFA (poly unsaturated fatty acids).

ANTIOXIDANTS SYSTEM IN OUR BODY

The body has developed several endogenous antioxidant systems to deal with the production of ROI. These systems can be divided into enzymatic and nonenzymatic groups. The enzymatic antioxidants include superoxide dismutase (SOD), which catalyses the conversion of O2˙O to H2O2 and H2O; Catalyse, which then conver H2O and O2; and glutathione peroxidase, which reduces H2O2 to H2O. The non-enzymatic antioxidants include the lipidsoluble vitamins, vitamin E and vitamin A or provitamin A (beta-carotene) and the water-soluble vitamin C. Vitamin E has been described as the major chain-breaking antioxidant in humans. It is located within the membranes, where it interrupts lipid peroxidation and may play a role in modulating intracellular signaling pathways that rely on ROI. Vitamin E can also directly quench. The present study

assessed the antioxidant properties of -tocopherol, -tocotrienol, which contained 45% tocopherols and 55% tocotrienols. When Vitamin E-deficient rats were fed either -tocopherol- or -tocotrienol-enrich diets, -tocotrienol accumulated in the hearts and liver more slowly than -tocopherol. The rate of lipid peroxidation induced in vitro in heart homogenate from rats supplemented with -tocotrienol was approximately two-thirds as high as that of -tocopherol. Thus palm oil vitamin E may be more efficient than –tocopherol alone in protecting the heart against injury from ischaemia and reperfusion. In addition, supplementation with –tocopherol or -tocotrienol protects skeletal muscles against exercise induced increases in protein oxidation thus palm oil vitamin E protects against biological systems against both lipid and protein oxidation. The pathogenesis of many diseases can involve free radical-medicated lipid peroxidation in biological membranes. Vitamin E is the major chain- breaking antioxidant in membrane; although it is present in extremely low concentration, it is very efficient in inhibiting the development of conditions such as heart disease, cancer, cataracts, neuropathies and myopathies and other related diseases. The consumption of berries has been implicated with diverse health benefits such as prevention of stroke, of age-related degenerative diseases and cancer. Some berry constituents have cancer suppressive effects in these were attributed to certain berry phytochemicals with high antioxidative potentials that could contribute to, or enhance by induction, the endogenous antioxidant properties of living cells or organisms.

THE CHEMISTRY OF ANTIOXIDANTS

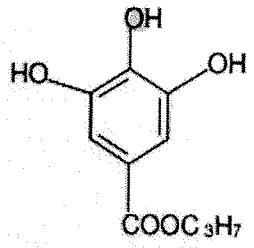
It involves the mechanism of action of antioxidant. Two principle mechanisms of action have been proposed for antioxidants. The first is a chain-breaking mechanism by which the primary antioxidants donate electrons to the free radicals present in the system, example lipid radicals. The second mechanism involves removal of ROS (reactive oxygen species) and RNS (reactive nitrogen species) initiator by quenching chain initiator catalyst.

Chain reactions of free radicals Initiation stage (1) RH R˙+ H˙ (2) R˙ R˙ + O2 ROO˙ (3) 2ROOH ROO˙ + RO˙ + H2O

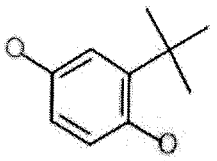
Propagation stage (1) R˙ + O2 ROO˙ (2) ROO˙ + RH ROOH + R˙ (3) RO˙ + RH ROH + R˙

Termination stage (1) R˙ + R˙ R – R (2) R˙ + ROO˙ ROOR (3) ROO˙ + ROO˙ ROOR + O2 (4) Antioxidants + O2 oxidized antioxidants

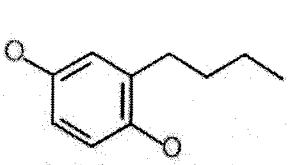
STRUCTURES OF ANTI OXIDANTS:



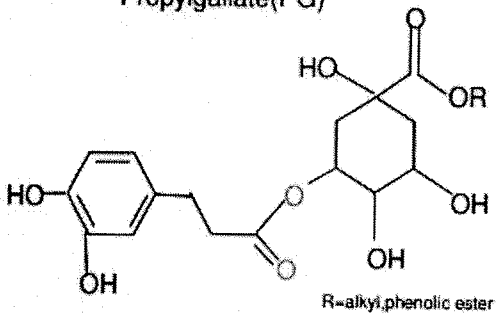
Propylgallate(PG)



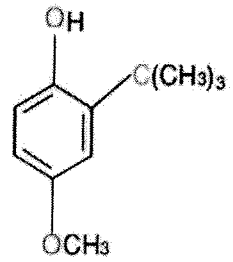
t-butylhydroquinone



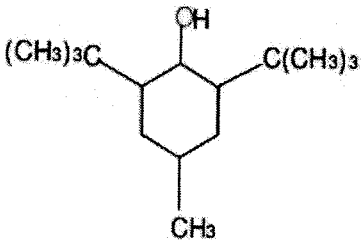
butylhydroquinone



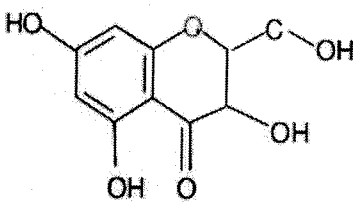
Phenolic acid and ester



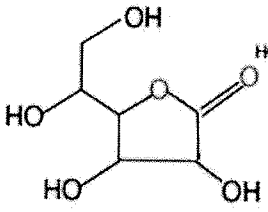
Phenolic acid



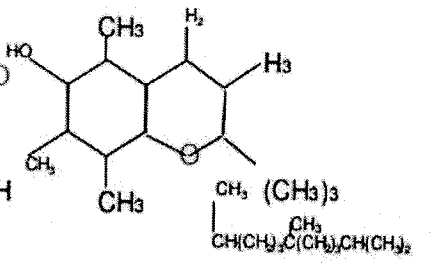
Butylated hydroxytoluene(BHT



Flavonoids



Ascorbate



α-tocopherol(Vit. E)

THE MEDICINAL EFFICACY OF ANTIOXIDANTS

Some tumour cells can actually use antioxidants to protect themselves from natural cellular defense mechanisms, enabling them to survive and proliferate. The study provides insight into altered metabolism of tumour forming cells and could help improve current treatments. Joan brugge and her group from Harvard Medical School in Boston, US were investigating changes in breast cancer cells that allow them to survive without being attached to the normal extracellular matrix. They found that treating cells with vitamin E like antioxidants blocked the usual programmed cell death cycles, allowing the cells to survive free from their usual scaffolding by switching their metabolism to use fatty acids rather than glucose as fuel. Normal cells need to be attached to a matrix to function properly and even survive. They went further that as a potential tumour cells start to proliferate rapidly and they quickly run of space to stay attached to the matrix, so have to find ways to dodge the normal mechanisms by which detached cells programme to die. One of the most common mechanism of cell death is apoptosis (a kind of programmed cell suicide), but the team found that when they blocked the apoptosis pathways, the detached cells still died, which hinted at a major change in the metabolism of cells. They found that there was several reduction in ATP [adenosine triphosphate] in cells within 24 h of attachment. Cell use ATP as an energy source, so it seemed that part of the reason detached cells is metabolism of glucose and the teams found that detached cell lose the ability to transport glucose through their cell membranes. 'We found that expressing a cancer-causing gene called ErbB2, which is altered in many human tumor, allows the cells to transport glucose even when they are not attached'(Rietveld and Wiseman, 2003). Glucose is not just used for energy

generation; it is also the source of natural cellular antioxidants. When they looked at detached cells, they found raised levels of highly oxidising reactive oxygen species, which they reasoned could be a second line of defence against tumour generation in detached cells. 'We were curious what would happen if we neutralised the reactive oxygen species [without using ErbB2 to restore glucose transport], and that is when we got this really surprising result.' The researchers checked to see if the antioxidants were also promoting glucose uptake, but they were not, so the team reasoned that the cells must be getting energy from another source. 'Other labs have shown that matrix-attached cells can use fatty acid oxidation as a source of energy when they are deprived of glucose. That suggested that perhaps the detached cells were not able to exploit that pathway because the

Diabetes mellitus and oxidative stress

The enzymatic and non enzymatic antioxidants protect our body cells from oxidative stress. In the case of any pathological conditions that cause excess formation of free radicals, the level of the both enzymatic and non enzymatic antioxidants has been altered. Hence the level of the antioxidants in the body provide useful index of the oxidative stress.

The impaired metabolic events and sustained hyperglycemia in the diabetes mellitus are the main cause of oxidative stress. It is believed that the negative regulation on insulin signaling and interpretation caused by ROS and RNS will be the main reason to develop insulin resistance in Type II diabetes mellitus The evidences showed that the decreased insulin level in diabetic rats increases the activity of the enzymes like fatty acyl coenzyme A which initiates auto oxidation of fatty acids and generate oxygen free radical. and lipid peroxidation. The increased lipid level in the diabetes mellitus also causes the cells more susceptible to lipid peroxidation. This affects the membrane function by altering the membrane fluidity and changing the activity of membrane bound enzymes. The enzymatic and non enzymatic antioxidants which includes, SOD, CAT GPx, GST, GSH, Vitamin C and Vitamin E are fight against. ROS. The suproxide dismutase catalyses the suproxide ions into molecular oxygen and peroxide and play first line of defence in the free radical mediated cell injury.26 The catalase which acts on hydrogen peroxide and converted into water and oxygen thus neutralizes it. The vitamins C and E are act as antioxidants by detoxifying the free radicals and these vitamins levels were altered in oxidative stress. The enzymes Glutathione Peroxidase and Glutathione Reductase present in the cell metabolizes peroxide to water. The alterations in these enzymatic and non enzymatic antioxidant level in the diabetes mellitus are the important biomarkers of oxidative stress.

Managing and preventing oxidative stress:

It is impossible to completely eliminate the oxidative stress and free radical exposure but we can minimize the effects by increasing the antioxidant level in our body. eating fruits and vegetables increases the anti oxidant levels

Fruits and vegetables:

Berries

Cherries

Citrus fruits

Broccoli,

green leafy vegetables

carrot

olive

other antioxidants:

fish and nuts

vitamin E

vitamin C

turmeric

green tea

onion

garlic

cinnamon

life style choices that prevent oxidative stress

regular moderate exercise

avoid smoking

avoid over eating

use of sunscreen

decrease alcohol intake

get plenty of sleep

Assessment Procedure

Descriptive questions-based assessment after successful completion of theory sessions

Bharath Institute of Higher Education and Research

Annexure -II

SLIMS Participant list of Value-added course: Certificate course in oxidative stress, antioxidants and its mechanism

Sep 2019– Oct 2019

Sl.No	Reg.No	Name of the candidate	Signature
1	U19MB311	KARTHIKA M	
2	U19MB312	KAVYA RADHAKRISHNAN	
3	U19MB313	KEERTHANA S	
4	U19MB314	KENDRE LAXMIKANT BALAJI	
5	U19MB315	KIRAN S	
6	U19MB316	KIRUTHI NITHIN N	
7	U19MB317	KUMAVAT AKSHADA SHRIKRISHNA	
8	U19MB318	LASYA S M	
9	U19MB319	LOKESH R	
10	U19MB320	MADHUMITHA S	
11	U19MB321	MALAVIKA NAIR	
12	U19MB322	MALAY KUMAR BEHERA	
13	U19MB323	MANISHA R	
14	U19MB324	MANOJ BALA B	
15	U19MB325	MARIA VENNILA A	
16	U19MB326	MATLI KAREEM KHAN	
17	U19MB327	MINU VASANTHINI P S	
18	U19MB328	MOHAMED MUZZAMIL T	
19	U19MB329	MOHAN PRASATH L	
20	U19MB330	MONICA K	

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure -III

Certificate course in Certificate course in oxidative stress, antioxidants and its mechanism

DESCRIPTIVE QUESTIONS

Course Code: PHYC12

ANSWER ALL THE QUESTIONS **10x5=50**

1. Define oxidative stress
2. What are the risk factors of oxidative stress
3. write a note on antioxidants
4. Write the classification of antioxidants
5. Whart are the food antioxidants
6. Draw the structure of flavonoids, BHT and ascorbic acid
7. Suggest the life style modifications that prevent oxidative stress
8. Mention the method of managing and preventing oxidative stress
9. Give a note on diabetes mellitus and oxidative stress
10. Give the medicinal uses of antioxidants

Annexure -V

Course/Training Feedback Form

Course: Certificate course in oxidative stress, antioxidants and its mechanism

Date: Sep 2019– Oct 2019
Name: MANISHA R
Reg NO. U19MB323
Department: Physiology

Q 1: Please rate your overall satisfaction with the format of the course:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 2: Please rate course notes:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 3: The lecture sequence was well planned

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 4: The lectures were clear and easy to understand

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 5: Please rate the quality of pre-course administration and information:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 6: Any other suggestions:

Comments:

Thank you for taking the time to complete this survey, your comments are much appreciated.

***OPTIONAL Section*:** Name _____
Signature Manisha R Date _____

Date:29-10-19

From
DR.V.Senthil kumar
Dept.of physiology
SLIMS
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To
The Dean,
SLIMS
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: Certificate course in oxidative stress, antioxidants and its mechanism

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: Certificate course in Oxidative stress-a secondary complication to diabetes mellitus on Sep 2019– Oct 2019. We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards

VSlc

DR.V.Senthil kumar

PROFESSOR & HOD
DEPARTMENT OF PHYSIOLOGY
Sri Lakshmi Narayana Institute Of Medical Sciences
PONDICHERRY - 605 502

Encl: Certificates

Photographs

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that MANISHA. R has actively participated in the Value Added Course on Certificate course in oxidative stress, antioxidants and its mechanism held during Sep 2019– Oct 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

S. Latha

Dr. S.Latha

RESOURCE PERSON

Dr. V.Senthil kumar

COORDINATOR

COURSE: CERTIFICATE COURSE IN OXIDATIVE STRESS, ANTIOXIDANTS AND ITS MECHANISM

CODE: PHYC12



D. NO.	

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Total Number of pages written including additional sheets

BHARATH UNIVERSITY

(Declared under Section 3 of the UGC Act 1956)

CHENNAI - 600 073

MAIN ANSWER BOOK

DEPARTMENT OF PHYSIOLOGY
Sri Lakshmi Narayana Institute of Medical Sciences
PONDICHERRY - 605 502.

NAME OF THE EXAMINATION : Value added Courses

SUBJECT OF THE EXAMINATION : VAC - Physiology

SECTION (Circle) : PHYC12

DATE OF THE EXAMINATION : 26/10/19

QUESTION NUMBERS / MARKS

Section						Sub Total
A	1	2				
B	a	b	c	d	e	
	4	3	4	4	4	20
	f	g	h	i	j	
	5	3	4	4	1	18
C	a	b	c	d	e	
	f	g	h	i	j	
					TOTAL	38

77/100

Total Marks in words ..... SEVENTY SEVEN .....

OFFICE USE

BUNDLE No.

Signature of the Examiner .....

CANDIDATES TO FILL THIS COLUMN CAREFULLY

REG NO.	V19MB323

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D. NO.	

PAGE No.

oxidative Stress

The oxidative stress means imbalance between the oxidants especially the reactive oxygen and nitrogen species and the level of antioxidants. oxidative stress caused by reactive oxygen species that formed in excess or insufficient removal plays important role in damage of cellular DNA, proteins lipids and diabetic complication The protein, lipids and DNA make the large part of the body. the damage leads to

1) Diabetes mellitus
2) Atherosclerosis
3) Inflammatory condition
4) High blood pressure
5) Heart disease

PAGE No.

6) Neurodegenerative diseases such as Parkinson's and

7) Cancer.

2) Risk factors of oxidative stress

→ Ozone
→ pesticids and cleaners
→ cigratte smoking
→ Radiation
→ pollution
→ a diet high in sugar, fat and alcohol.

Ozone:

Ozone is composed of O_3 molecules. protect the human from the harmful UV radiations. many pollutions such as air pollution caused due to the excess usage of the refrigerator

that releases the gas chlorofluoro carbon (CSF) that damages the oxone causes splitting of O_3 into O_2 and O, the O is the O_2 free radical that causes oxidative stress and cancer.

Radiation:

Certain radiations like uv rays than damages the oxone and releases the O_2 free radicals.

3) Antioxidants:

Antioxidants are substances that may protect cells from the damage caused by unstable molecules known as free radicals.

The antioxidants includes β carotene, lycopene, vit C and E and other substances

PAGE No.

Antioxidants terminate free radical formation reaction and inhibit further oxidation reaction.

plants and animals are the abundant source of naturally producing antioxidants.

There are two types of antioxidants.

(1) water soluble:

ascorbic acid, glutathione and uric acid

ascorbic acid is a redox catalyst which reduces and neutralizes the reactive oxygen species (ROS)

Glutathione has antioxidant propertie as reducing agent and can be reversibly oxidised and reduced.

2) lipid soluble antioxidants.

α tocopherol, carotenoid and ubiquinol

4) Classification of Antioxidants.

→ primary or Natural antioxidants

→ Secondary or synthetic antioxidants

Primary antioxidants

They are the chain breaking antioxidants which react with lipid radicals and convert them into stable products. Antioxidants of this group are mainly phenolic in structures that include the following.

eg: selenium, copper, iron, zinc and manganese and antioxidant- vitamins (vit C, E and vitamin B). Phytochemicals — Flavonoids These are phenolic compounds that give vegetables, fruits, grains, seeds leaves flower and bark. Catechin are the most active antioxidants in green and black tea.

PAGE No.

Secondary or synthetic antioxidants:

These are phenolic compounds that perform the function of capturing free radicals and stopping the chain reactions.

eg: Butylated hydroxy anisole (BH)

Butylated hydroxy toluene (BHT), propyl galla and metal chelating agent (EDTA)

Ascorbic acid is a monosaccharide antioxidant found in both animals and plants

Ascorbic acid is a reducing agent that reduce and neutralize reactive oxygen species such as hydrogen peroxide.

Melatonin is a powerful antioxidant that can easily cross cell membrane and the blood brain barrier.

Food antioxidants

Food antioxidants include substances that keep edible fats and oils from becoming rancid and prevent fruit and vegetables from turning brown.

eg: butylated hydroxy anisole (BHA) Butylated hydroxytoluene (BHT), ascorbic acid

The antioxidant activity of flavonoid has been received by many scientists. They concluded that food possess the potential to scavenge and quench various reactive oxygen species. The antioxidant reacts with lipids and prevent lipid peroxidation that usually occurs in fatty food at the initial stage by free radical scavengers. The chain breaking antioxidant action of flavonoid can be represented as shown below

$$COO^{\cdot} + FL\text{-}OH \longrightarrow COOH + FL\text{-}O^{\cdot}$$

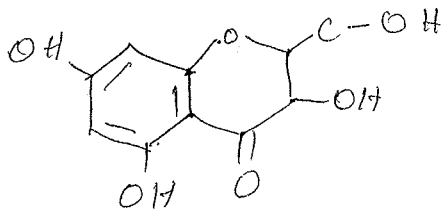
PAGE No.

Flavonoid phenonyl. radical Termination of lipid radical, lipid perexy radical (LOO·) and alkoxyl radical (RO·) formed by re initiation of lipid peroxidation induced by metal ions by flavoid.

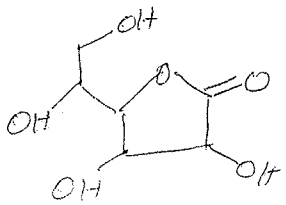
Flavonoid protects membrane phospho lepids PUFA by donating the hydrogen ion to quench lipid peroxy radical generated as a result of hydroxyl radic

b. Str. of flavonoids, BHT and ascorbate.

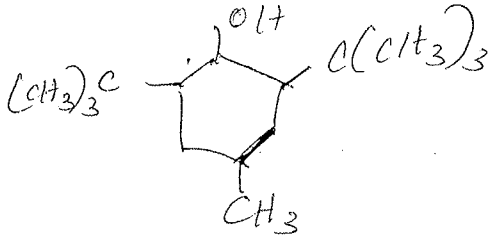
Flavonoids



Ascorbate



BHT



7. life style modification to prevent oxidative stress

The life style modifications that prevent oxidative stress are

→ regular moderate exercise
→ avoidance of smoking
→ avoidance of over eating
→ usage of sunscreen
→ Decrease alcohol intake
→ plenty of sleep

→ The regular moderate exercise is necessary to decrease the oxidative stress because it increase the breathing rate and heart rate. The feed heart rate increases the blood flow.

→ usage of sunscreen prevents the effect of uv radiation and

PAGE No.

Prevent- oxidative stress

→ increasing the duration of sleep decreases the oxidative stress and reduce free radical formation

8. Method of Managing and preventing oxida. stress.

Complete elimination of oxidative stress is not possible. We can minimize the effects by increasing the antioxidants level.

Many fruits and vegetables also contain many antioxidants that plays important role in managing and prevention of oxidative stress.

The fruits and vegetables that are rich in antioxidants are

→ Berries
→ cherries
→ citrus fruits
→ Broccoli

→ green leafy vegetables
→ carrot
→ olive.

The other antioxidants present in

→ fish and nuts
→ vitamin E and C

→ Turmeric
→ green tea
→ onion
→ garlic
→ cinnamon

9. Diabetes Mellitus and oxidative stress

The enzymatic and non enzymatic antioxidants protect our body cells from oxidative stress. In case of any pathological condition the level of antioxidants has been altered. Hence the level of antioxidants provide useful index of the oxidative stress.

The impaired metabolic events and sustained hyperglycemia in the diabetes Mellitus are the main cause of the oxidative stress. It is beleived that negative regulation on insulin signalling and interpretable caused by ROS and RNS will be main reason to develop insulin resistan in Type II diabetes Mellitus. Decreased insulin level in diabetes increases the activity of enzymes like fatty acyl coenzyme A which initiates auto oxidation of fatty acids and generate oxygen free radicals and lipid peroxida tion this affects the membrane function by altering the membrane fluidity and changing the activity of membrane bound enzyme.

10. Medicinal uses of Antioxidants:

→ Some tumour cells can actually use antioxidants to protect themselves from natural cellular defense mechanisms enabling them to survive and proliferate

SLIMS,PONDICHERRY

Date 09/05/2019

From

DR.R.CHIDHAMBARAM ,
Professor and Head,
Dept.of radio-diagnosis and Imaging Sciences ,
SLIMS,PONDICHERRY
Bharath Institute of Higher Education and Research,
Chennai.

To

The Dean,
SLIMS
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course:

CLINICO-RADIOLOGICAL CORRELATION IN CXR

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled **CLINICO-RADIOLOGICAL CORRELATION IN CXR** on 28/12/19. We solicit your kind permission for the same.

Kind Regards.

DR.R.CHIDHAMBARAM

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: Dr. K. Balagammathan

The HOD: Dr. R. Chidhambaram

The Expert: Dr. S. Visvasubramanyan.

The committee has discussed about the course and is approved.

Dean	Subject Expert	HOD
(Sign & Seal)	(Sign & Seal)	(Sign & Seal

DEAN
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
OSUDU, AGARAM VILLAGE,
KOODAPAKKAM POST,
PUDUCHERRY - 605 502

Dr.M. SIVASUBRAMANIYAN, DNB.,
Reg. No: 88846
Asst. Professor Radiology
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

DEPARTMENT OF RADIOLOGY
SRI LAKSHMINARAYANA
INSTITUTE OF MEDICAL SCIENCE
PUDUCHERRY - 605 002.

BIHER

SLIMS

Course Proposal

Course Title: CLINICO-RADIOLOGICAL CORRELATION IN CXR

CourseObjective: **TO DEMONSTRATE CLINICO-RADIOLOGICAL CORRELATION IN CXR**

CourseOutcome: **BETTER UNDERSTANDING OF CLINICO-RADIOLOGICAL CORRELATION IN CXR**

Course Audience: ANY MEDICAL STUDENT

Course Coordinator: PROF.DR.R.CHIDHAMBARAM,M.B.B.S.,MDRD.,

Course Faculties with Qualification and Designation:

1. **DR. R.CHIDHAMBARAM,MBBS,MDRD.PROF. AND HOD**
2. **DR.MOHAMAD HASSAN,MBBS,MDRD,ASST PROFESSOR**
3. **DR.JYOTI BASU,MBBS,DNB,SENIOR RESIDENT**

Course Curriculum/Topics with schedule (Min of 30 hours)-ENCLOSED

SlNo	Date	Topic	Time	Hours
1	21-09-2019	INTRO	2:00 PM	2 hours
2	22-09-2019	PRINCIPLES OF CXR INTERPRETATION	2:00 PM	2 hours
3	23-09-2019	BASIC PHYSICAL EXAMINATION-CHEST	2:00 PM	2 hours
4	24-09-2019	LUNG CONSOLIDATION RIGHT LUNG	2:00 PM	2 hours
5	25-09-2019	LUNG CONSOLIDATION LEFT LUNG	2:00 PM	2 hours
6	26-09-2019	LUNG COLLAPSE –RIGHT SIDE	2:00 PM	2 hours
7	27-09-2019	LUNG COLLAPSE – LEFT SIDE	2:00 PM	2 hours
8	28-09-2019	PULMONARY TUBERCULOSIS	2:00 PM	2 hours
9	29-09-2019	PLEURAL EFFUSION -MILD	2:00 PM	2 hours
10	30-09-2019	PNEUMOTHORAX	2:00 PM	2 hours
11	01-10-2019	HYDROPNEUMOTHORAX	2:00 PM	2 hours
12	02-10-2019	PLEURAL EFFUSION-MODERATE	2:00 PM	2 hours
13	03-10-2019	WHITE WASH ONE SIDE	2:00 PM	2 hours
14	04-10-2019	BRONCHIECTASIS	2:00 PM	2 hours
15	05-10-2019	QUIZ	2:00 PM	2 hours
			Total Hours	30

REFERENCE BOOKS: (Minimum 2)
1.CXR MADE EASY
2. MADE EASY

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affiliated to Bharath University, Chennai - TN]

Circular

21.05.2019

Sub: Organising Value-added Course: reg

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research** is organizing **"Clinical Radiological correlation of CXR"**. The course content and registration form is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before May to June 2019. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

DEAN
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
OSUDU, AGARAM VILLAGE,
KOODAPAKKAM POST,
PUDUCHERRY - 605 502

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VALUE ADDED COURSE

1. Name of the programme & Code :
Clinical correlation in chest xray
RAD 11

2. Duration & Period
30 hrs & September 2019– January 2020 & February20 – August 2020

3. Information Brochure and Course Content of Value Added Courses
Enclosed as Annexure- I

4. List of students enrolled
Enclosed as Annexure- II

5. Assessment procedures:
Multiple choice questions- *Enclosed as Annexure- III*

6. Certificate model
Enclosed as Annexure- IV

7. No. of times offered during the same year:
September 2019– January 2020 & February20 – August 2020

8. Year of discontinuation: 2020

9. Summary report of each program year-wise

Value Added Course- September 2019 - August 2020					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	**RAD 11-1**	**Clinical correlation in chest xray**	Dr.Jothibasu	MBBS	20 (Sep – Jan)
2	**RAD 11-2**	**Clinical correlation in chest xray**	Dr.Mohamed Hassan	MBBS	20 (Feb- Aug)

10. Course Feed Back

Enclosed as Annexure- V

RESOURCE PERSON

DEPARTMENT OF RADIOLOGY
SRI LAKSHMINARAYANA
INSTITUTE OF MEDICAL SCIENCE
PUDUCHERRY - 605 002.

COORDINATOR

DEPARTMENT OF RADIOLOGY
SRI LAKSHMINARAYANA
INSTITUTE OF MEDICAL SCIENCE
PUDUCHERRY - 605 002.

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that B.MOHAN has actively participated in the Value Added Course on **CLINICAL CORRELATION IN CHEST XRAY** held during **September 2019– January 2020** Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry-605 502, India.

Dr. Jothibasu
RESOURCE PERSON

Dr. Chidhambaram
COORDINATOR

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that MERLIN S has actively participated in the Value Added Course on **CLINICAL CORRELATION IN CHEST XRAY** held during **February20 – August 2020** Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. Mohamed Hassan
RESOURCE PERSON

Dr. Chidhambaram
COORDINATOR

VALUE ADDED COURSE

TOPIC:- Clinical Correlations in Chest - X ray

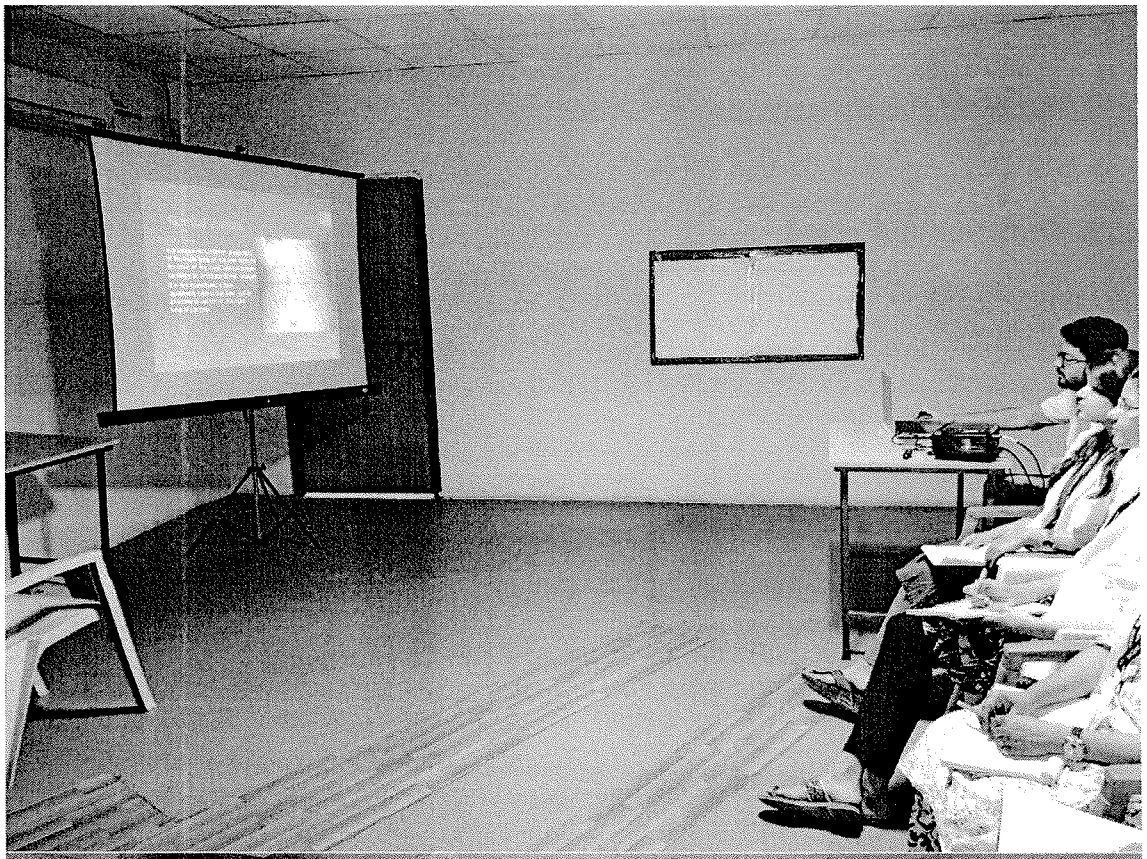
List of Students Enrolled:

IST YEAR MBBS STUDENTS			
Sl.NO.	NAME OF THE STUDENT	UNIVERSITY REG. NO.	signature
1	KAVITHA .M	U16MB311	
2	KAVIYA .K	U16MB312	
3	KEERTHANA .K	U16MB313	
4	KEERTHI K DAS	U16MB314	
5	KUNCHAL BALA VENKATA RAMANA RED	U16MB315	
6	LAKSHMIPURAM VEDA SREEVIDYA	U16MB316	
7	LOGESH BABU J.S	U16MB317	
8	LOKESHWARAN .M	U16MB318	
9	MADHUMITHA .R	U16MB319	
10	MADHUMITHA .S	U16MB320	
11	MANIMAARANE .R	U16MB321	
12	MATHIVAANANE .R	U16MB322	
13	MATHIVANAN .J	U16MB323	
14	MD ALTAF KHAN	U16MB324	
15	MEKALA CHARAN CHOWDARY	U16MB325	
16	MERLIN.S	U16MB326	
17	MERLINE SHEEBA .B	U16MB327	
18	MOHAN .B	U16MB328	
19	MOHIT BHARDWAJ	U16MB329	
20	MONISH PALEI PATRA	U16MB330	
21	MONISHA . S	U16MB331	
22	MONISHA .M	U16MB332	
23	MONISHDEVI .N	U16MB333	
24	MOUNIKA .A	U16MB334	
25	MOUNIKA.B	U16MB335	
26	MUHAMMAD SHEBIN	U16MB336	
27	MUSKAAN SHAMIM	U16MB337	
28	MUSULURI SHYAM SINDHU	U16MB338	
29	NAMITA YADAV	U16MB339	
30	NAMRATA GHORAI	U16MB340	

RESOURCE PERSON

COORDINATOR

Annexure/II





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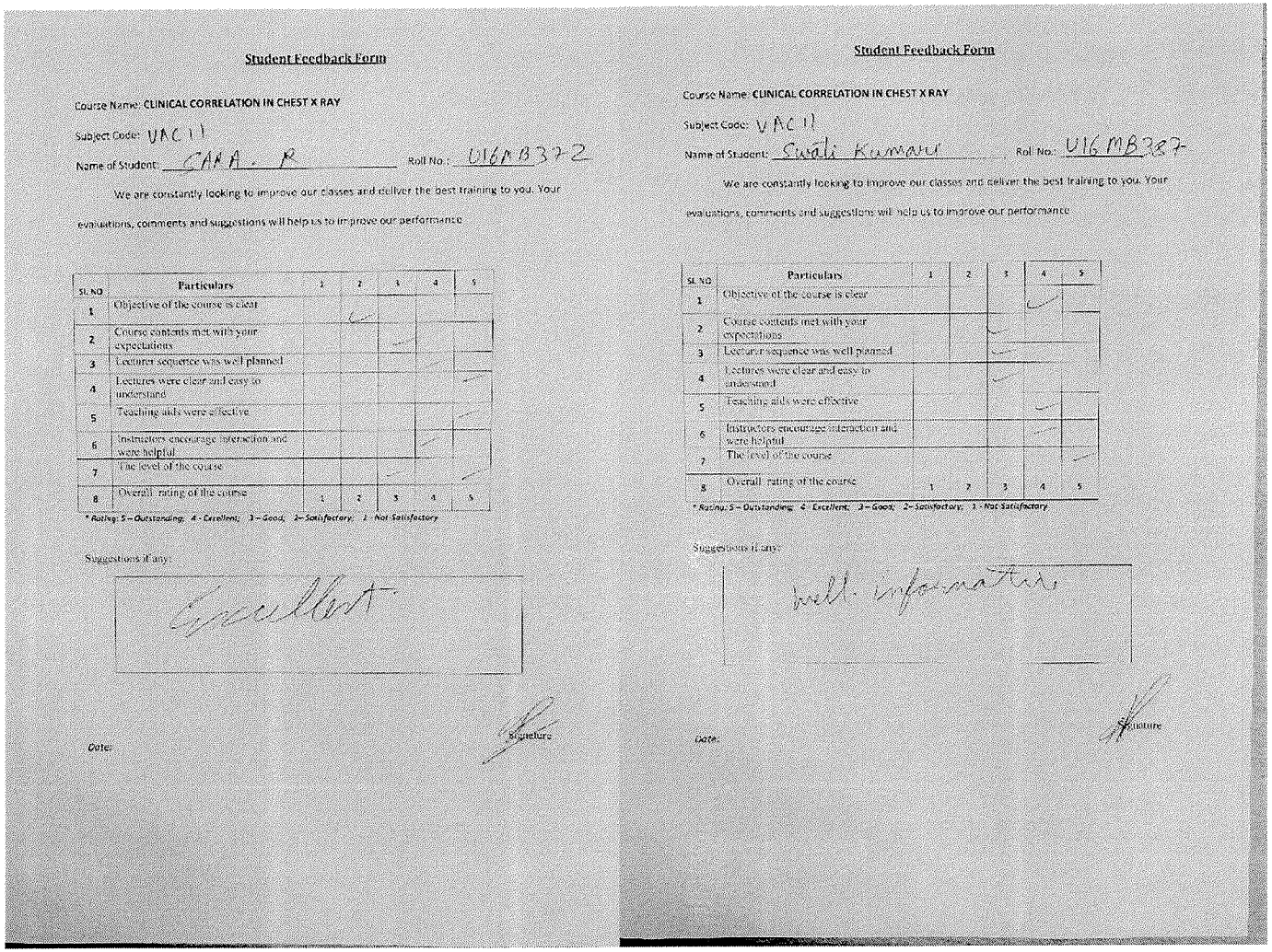


Student Feedback Form

Course Name: **CLINICAL CORRELATION IN CHEST X RAY**

Subject Code: VAC 11

Name of Student: CARA. R Roll No.: U16MB372

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

SL NO	Particulars	1	2	3	4	5
1	Objective of the course is clear		✓			
2	Course contents met with your expectations			✓		
3	Lecturer sequence was well planned					
4	Lectures were clear and easy to understand					✓
5	Teaching aids were effective					✓
6	Instructors encourage interaction and were helpful				✓	
7	The level of the course			✓		✓
8	Overall rating of the course	1	2	3	4	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not Satisfactory*

Suggestions if any:

Excellent

Date:

Signature

Student Feedback Form

Course Name: **CLINICAL CORRELATION IN CHEST X RAY**

Subject Code: VAC 11

Name of Student: Swati Kumari Roll No.: U16MB387

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

SL NO	Particulars	1	2	3	4	5
1	Objective of the course is clear				✓	
2	Course contents met with your expectations			✓		
3	Lecturer sequence was well planned			✓		
4	Lectures were clear and easy to understand			✓		
5	Teaching aids were effective				✓	
6	Instructors encourage interaction and were helpful				✓	
7	The level of the course					✓
8	Overall rating of the course	1	2	3	4	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not Satisfactory*

Suggestions if any:

well informative

Date:

Signature

SLIMS

BIHER

Amal Ashok U16MB259

CHEST QUESTIONS

1. Regarding the imaging modalities of the chest:
(a) High resolution computed tomography (HRCT) uses a slice thickness of 4–6 mm to identify mass lesions in the lung.
(b) Spiral CT ensures that no portion of the chest is missed due to variable inspiratory effort.
(c) MRI shows excellent detail of the lung anatomy.
(d) Bronchography is the technique of choice to visualize the bronchial tree.
(e) CT pulmonary angiography (CTPA) is performed using catheters placed in a femoral vein.

2. Regarding the development of the lung:
(a) The tracheobronchial groove appears on the ventral aspect of the caudal end of the pharynx.
(b) The primary bronchial buds develop from the tracheobronchial diverticulum.
(c) The epithelium lining the alveoli is the same before and after birth.
(d) A persistent tracheo-oesophageal fistula (TOF) is commonly associated with an atresia of the duodenum.
(e) Uni-lateral pulmonary hypoplasia is usually due to a congenital diaphragmatic hernia.

3. Regarding the blood supply to the chest wall:
(a) The posterior intercostal arteries supply the 11 intercostal spaces.
(b) The internal thoracic artery arises from the subclavian artery and supplies the upper six intercostal spaces.
(c) The neurovascular bundle passes around the chest wall in the subcostal groove deep to the internal intercostal muscle.
(d) The intercostal spaces are drained by two anterior veins and a single posterior intercostal vein.
(e) The posterior intercostal vein drains into the internal thoracic vein.

4. Regarding the azygos venous system:
(a) The azygos vein at the level of the fourth thoracic vertebra arches over the root of the right lung to end in the superior vena cava (SVC).
(b) About 10% of the population have an azygos lobe.
(c) The thoracic duct and aorta are to the right of the azygos vein.
(d) The second, third and fourth intercostal spaces on the right, drain via the right superior intercostal vein into the azygos vein.
(e) In congenital absence of IVC the azygos vein enlarges.

5. Regarding the hemiazygos and accessory hemiazygos venous systems:
(a) The hemiazygos vein at the level of the fourth thoracic vertebra crosses the vertebral column behind the aorta, oesophagus and thoracic duct.
(b) The ascending lumbar veins and the lower three posterior intercostal veins are the tributaries of the hemiazygos vein.
(c) The accessory hemiazygos vein receives the fourth to the eighth intercostal veins on the left.
(d) The accessory hemiazygos vein may drain into the left brachiocephalic vein.
(e) The first posterior intercostal vein may drain into the corresponding vertebral vein.

6. Regarding the airways:

(a) In adults the right main-stem bronchus is steeper than the left.

(b) The left main bronchus is about twice as long as the right.

(c) The bronchioles contain cartilage.

(d) Gas exchange takes place in the terminal bronchioles and acini.

(e) The bronchopulmonary segments are based on the pulmonary arterialsystem.

7. Regarding the secondary pulmonary lobule:

(a) It consists of approximately ten acini.

(b) The lobular vein follows the branches of the bronchioles.

(c) Lymph drainage is both interlobular and central along the arteries.

(d) Lobules are best demonstrated nearer to the hilum of the lung on CT.

(e) The interlobular septa are seen usually on conventional CT.

8. Regarding the pulmonary blood vessels:

(a) The bronchovascular bundle of the secondary pulmonary lobule is demonstrated as a rounded density about 1 cm away from the pleural border on axial CT.

(b) The inferior pulmonary veins draining the lower lobes are more vertical than the lower lobe arteries.

(c) The upper lobe veins lie lateral to the arteries.

(d) In a frontal chest radiograph the artery and bronchus of the anterior segment of the upper lobes are frequently seen end-on.

(e) The left pulmonary artery passes anterior to the left main bronchus.

9. Regarding the pleura:

(a) The parietal pleura is continuous with the visceral pleura at the hilum.

(b) On a PA radiograph the pleura is seen in the costophrenic sulcus.

(c) The parietal pleura is supplied by the pulmonary circulation.

(d) The fissures usually contain a layer of parietal and visceral pleura.

(e) The intercostal stripe is seen on axial CT as a linear opacity of soft tissue density at the intercostal space.

10. Regarding the fissures of the lung:

(a) Complete fissures may be crossed by small bronchovascular structures seen on HRCT.

(b) The oblique fissure separates the upper and lower lobes from the middle lobe on the right.

(c) The lateral and medial portion of the oblique fissure are equidistant from the anterior chest wall.

(d) The major fissures appear as a soft tissue linear density from the hilum to the chest wall on standard 10 mm thick CT sections.

(e) The minor fissure separates the right middle lobe from the right lower lobe.

Date: 09/05/2019

From

Dr.R.Chidhambaram
Professor and Head,
Department of Radiology,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To

The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: CLINICO-RADIOLOGICAL CORRELATION IN CXR

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: : CLINICO-RADIOLOGICAL CORRELATION IN CXR for 20 medical student (batch 2) .

We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards,

Dr.R.CHIDHAMBARAM

DEPARTMENT OF RADIOLOGY
SRI LAKSHMINARAYANA
INSTITUTE OF MEDICAL SCIENCE
PUDUCHERRY - 605 002.

Encl: Certificates

Photographs

SRI LAKSHMI NARAYANA

INSTITUTE OF MEDICAL SCIENCES

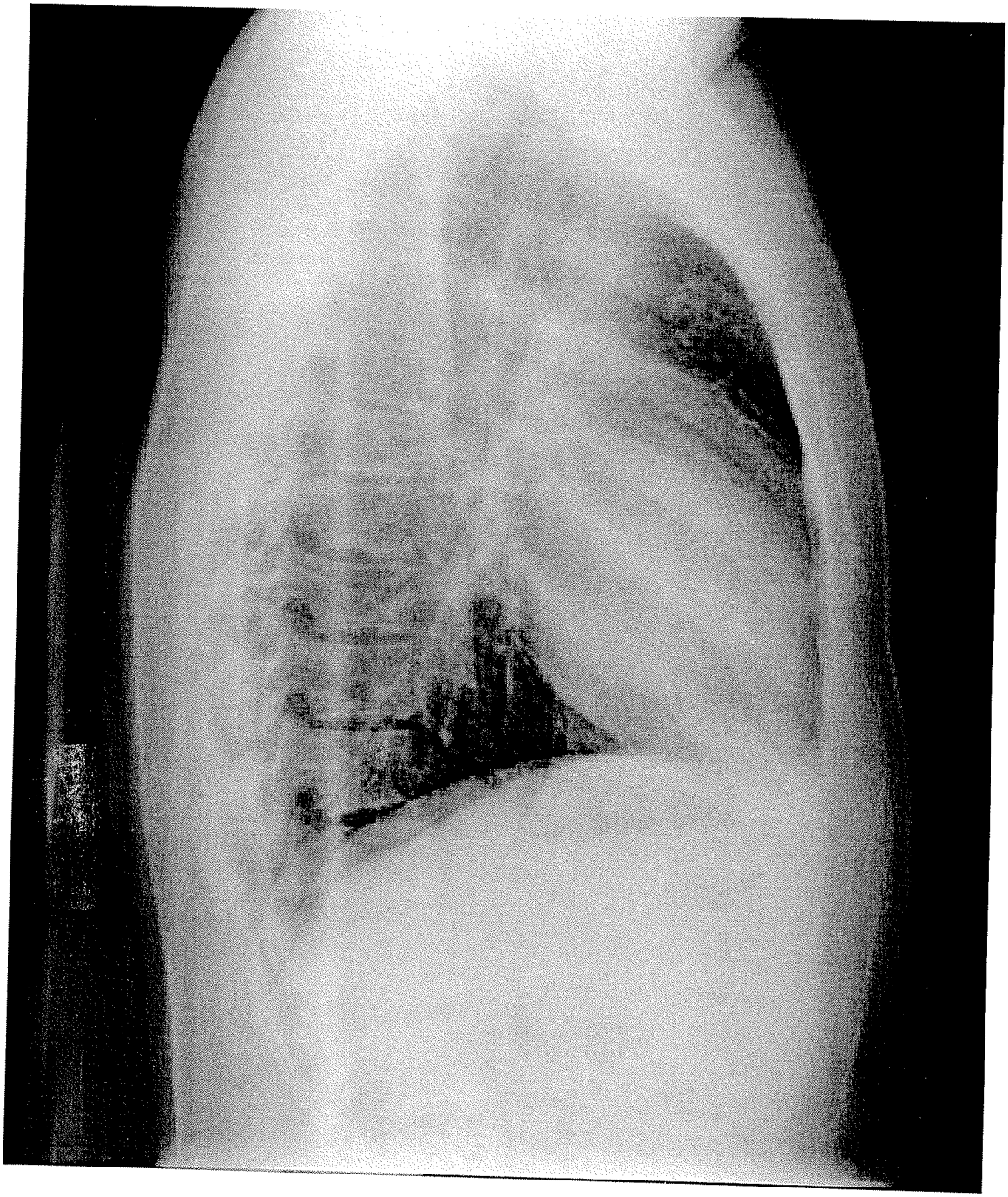
DEPARTMENT OF RADIOLOGY AND IMAGING SCIENCES

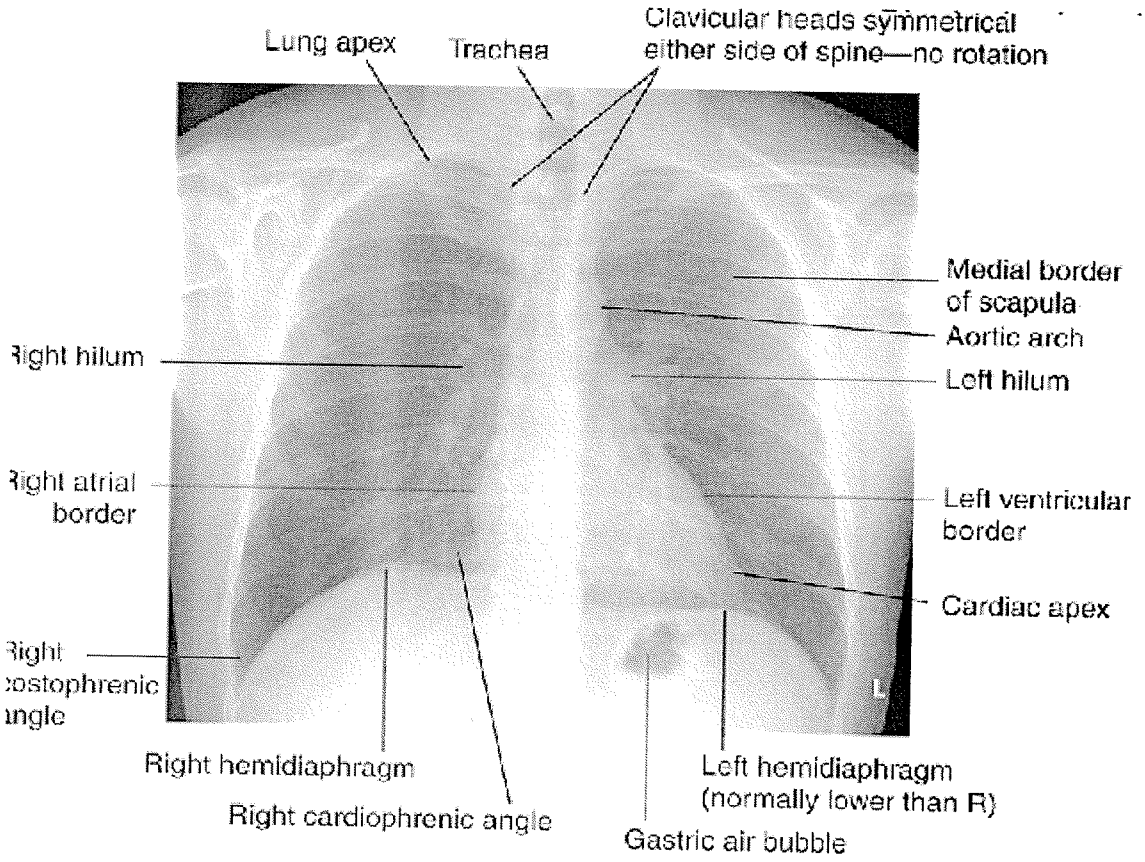
CLINICAL CORRELATION

IN CHEST X-RAY

COURSE CONTENTS

1.) *Clinical features & Radiological findings of Pneumothorax*
2.) *Clinical features & Radiological findings of Pleural effusion*
3.) *Clinical features & Radiological findings of Consolidation*





VENUE:

LECTURE HALL 1

TIME : SATURDAY 2.00 TO 4 .00 PM.

SLIMS,PONDICHERRY

Date 09/05/19

From

DR.R.CHIDHAMBARAM ,
Professor and Head,
Dept.of radio-diagnosis and Imaging Sciences ,
SLIMS,PONDICHERRY
Bharath Institute of Higher Education and Research,
Chennai.

To

The Dean,
SLIMS
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course:

Normal anatomy of female genital tract by ultrasonography

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled **Normal anatomy of female genital tract by ultrasonography** on 09/05/19. We solicit your kind permission for the same.

Kind Regards

DR.R.CHIDHAMBARAM

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: Dr. K. Balagurunathan

The HOD: Dr. R. Chidhambaram

The Expert: Dr Mohammad Hasan.

The committee has discussed about the course and is approved.

Dean	Subject Expert	HOD
(Sign & Seal)	(Sign & Seal)	(Sign & Seal

DEAN
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
OSUDU, AGARAM VILLAGE,
KOCDAPAKKAM POST,
PUDUCHERRY - 605 502

DEPARTMENT OF RADIOLOGY
SRI LAKSHMINARAYANA
INSTITUTE OF MEDICAL SCIENCE
PUDUCHERRY - 605 002.

DEPARTMENT OF RADIOLOGY
SRI LAKSHMINARAYANA
INSTITUTE OF MEDICAL SCIENCE
PUDUCHERRY - 605 002.

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OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affiliated to Bharath University, Chennai - TN]

Circular

07.05.2020

Sub: Organising Value-added Course: Normal anatomy of female genital tract by ultrasonography. reg

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research** is organizing **"Normal anatomy of female genital tract by ultrasonography"**. The course content and registration form is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before May to June 2020. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

DEAN
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
OSUDU, AGARAM VILLAGE,
KOODAPAKKAM POST,
PUDUCHERRY - 605 502

Encl: Copy of Course content

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VALUE ADDED COURSE

1. **Name of the programme & Code :**
   Integrated anatomy teaching-female genital tract by ultrasound
   RAD 10
2. **Duration & Period**
   30 hrs & September 2019– January 2020 & February20 – August 2020
3. **Information Brochure and Course Content of Value Added Courses**
   Enclosed as Annexure- I
4. **List of students enrolled**
   Enclosed as Annexure- II
5. **Assessment procedures:**
   Multiple choice questions- *Enclosed as Annexure- III*
6. **Certificate model**
   Enclosed as Annexure- IV
7. **No. of times offered during the same year**:
   September 2019– January 2020 & February20 – August 2020
8. **Year of discontinuation: 2020**

9. **Summary report of each program year-wise**

Value Added Course- September 201 - August 201					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	**RAD 10-1**	**Integrated anatomy teaching-female genital tract by ultrasound**	Dr.Brundha	MBBS	20 (Sep 19 – Jan 20)
2	**RAD 10-2**	**Integrated anatomy teaching-female genital tract by ultrasound**	Dr. Srinvasan	MBBS	20 (Feb19-Aug20)

10. **Course Feed Back**

Enclosed as Annexure- V

RESOURCE PERSON

DEPARTMENT OF RADIOLOGY
SRI LAKSHMINARAYANA
INSTITUTE OF MEDICAL SCIENCE
PUDUCHERRY - 605 002.

BIHER

COORDINATOR

DEPARTMENT OF RADIOLOGY
SRI LAKSHMINARAYANA
INSTITUTE OF MEDICAL SCIENCE
PUDUCHERRY - 605 002.

SLIMS

VALUE ADDED COURSE

TOPIC:- Integrated Anatomy teaching - Female genital tract by ultrasound

List of Students Enrolled

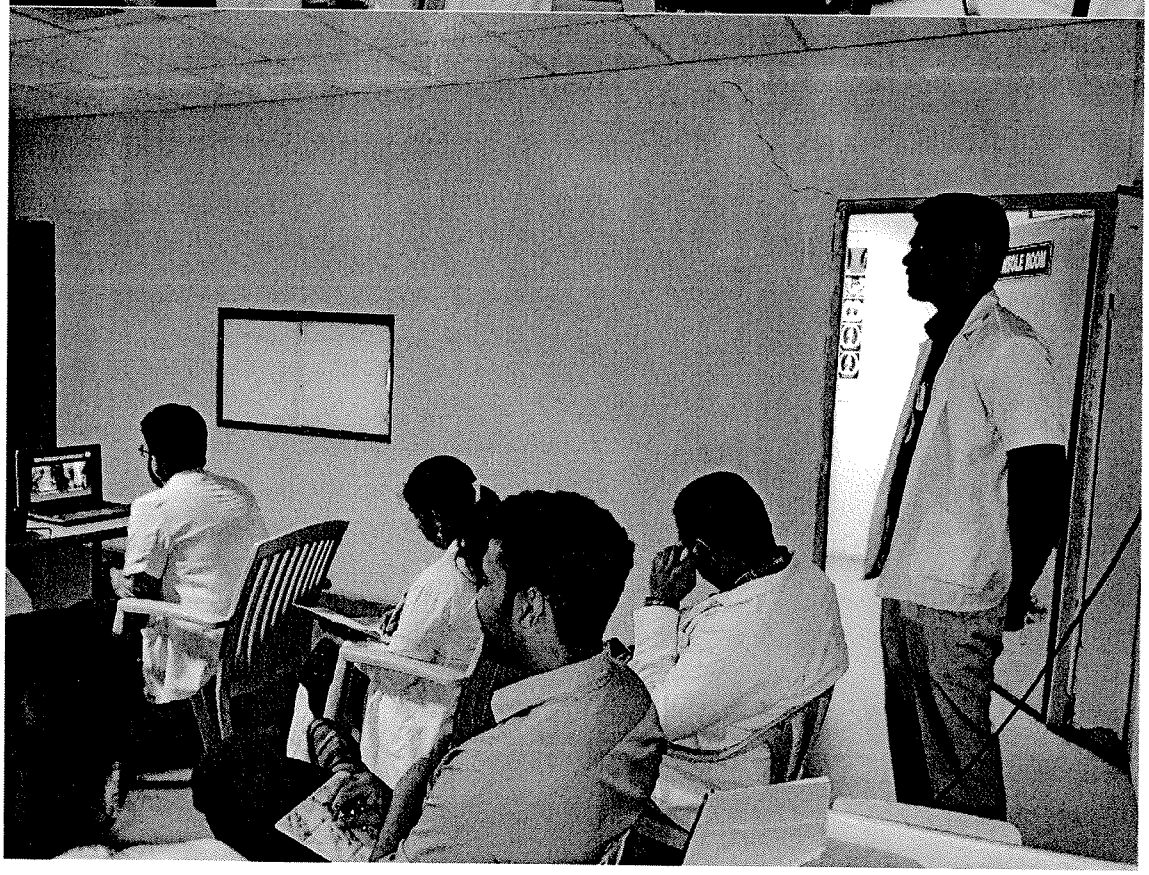
IST YEAR MBBS STUDENTS			
Sl.NO.	NAME OF THE STUDENT	UNIVERSITY REG. NO.	signature
1	DASARI VENKATA SAI MOUNISH	U16MB281	Mounish
2	DEBARPITA NATH	U16MB282	DN
3	DEEBAK .I	U16MB283	Deebak
4	DEEKSHITH .D.R	U16MB284	Deekshith
5	DEEPIKAA .D.V	U16MB285	Deepika D.
6	DELFI MARY .E	U16MB268	Delfi
7	DEVIKA.U.M	U16MB287	Devika U.M.
8	DHAKSHANA .M	U16MB288	Dhaksh
9	EDA SAI VENKATA TEJA	U16MB289	Edavenkat
10	GAURAV KUMAR	U16MB290	Gaurav
11	GOKUL SRIRAM .D	U16MB291	Gokulsr
12	GOLLA SRUTHI	U16MB292	Srudhi
13	GOMATHI .M	U16MB293	Gomathi
14	GRACELIN RINI .J	U16MB294	Gracelin
15	GUNASUNDARI .M	U16MB295	Gunasundari
16	GUNTI YAGNA NARAYAN	U16MB296	Gunti
17	HANEESHA PALETI	U16MB297	Haneesha
18	HARIHARAN .J.K	U16MB298	Hariharan
19	HARIPRIYA .T	U16MB299	Hariprya
20	HARISHKA.S	U16MB300	Harish
21	HARITHA SHREE	U16MB301	Haritha Shree
22	HARSHITHA CHOWDARY	U16MB302	Harshitha
23	HEMAPRIYA .G	U16MB303	Hema
24	JADHAV MAHESH MOHANRAO	U16MB304	Jadhav
25	JAGAIPRIYA .M	U16MB305	Jagai
26	JAYASRI .J	U16MB306	Jayasri
27	JESTIN K.J	U16MB307	Jestin
28	JEYACHANDRAN .S	U16MB308	Jeyachandran
29	JINCY J MANU	U16MB309	Jincy
30	KARTHIK .K	U16MB310	K.K.

RESOURCE PERSON **COORDINATOR**

VALUE ADDED COURSE **Annexure- II**

BIHER SLIMS





BIHER

SLIMS

FEMALE GENITAL TRACT

1. Regarding transabdominal ultrasound of the fetus:
(a) Doppler examinations impart less energy when compared with routine ultrasound.
(b) 18 to 20 weeks of gestation is the optimal time to confirm intrauterine location.
(c) Cardiac activity is seen at 5 weeks' gestational age.
(d) Crown rump length is a useful measurement of gestational age at 10 weeks.
(e) The fetal pole is discernible before cardiac pulsation.
2. The following structures are seen in the 20 weeks
(a) The falx cerebri is absent at the fetal plane.
(b) The lateral ventricles are echogenic structures.
(c) The medial walls of the lateral ventricles are formed by the septum pellucidum.
(d) The third ventricle is normally visualized.
(e) The cerebellar hemispheres are seen as round echogenic structures with a reflective vermis in the midline.
3. Regarding the fetus:
(a) The humerus and tibia as two ossification centres in the body and one in each epiphysis.
(b) Failure of fusion between the zygomatic process of the frontonasal prominence and the maxillary prominence gives rise to cleft lip.
(c) The four-chamber view during cardiac ultrasound is the primary screening view for cardiac abnormalities.
(d) On ultrasound the lungs become progressively echogenic as pregnancy advances.
(e) Duodenal atresia causes gastric peristalsis is seen in the second trimester.
4. Concerning the fetal abdomen:
(a) The small intestine becomes increasingly echogenic towards the end of pregnancy.
(b) The primitive intestinal loop lies outside the abdominal cavity in the first trimester.
(c) A defect in the abdominal wall called can be made at 10 to 12 weeks.
(d) The umbilical vein runs into the left portal vein.
(e) The abdominal circumference is measured as a parameter for gestational age in the second trimester.
5. Regarding fetal ultrasound:
(a) The femur is strongly reflective at 10 weeks.
(b) The distal femoral epiphysis is seen at 36 weeks.
(c) The beginning of ossification of the proximal epiphysis of the humerus is seen at birth.
(d) The epiphyses of ulna and radius extend to the same level at the wrist.
(e) The placenta can be identified as a discrete structure from 12 weeks.
6. In the pelvis:
(a) The urachal remnant forms the median umbilical ligament passing from the apex of the bladder to the umbilicus.
(b) The neck of the bladder rests on the urogenital diaphragm in both sexes.
(c) The detrusor is poor in the trigone of the bladder.
(d) The detrusor is supplied by the superior and inferior vesical artery.
(e) The bladder is emptied by the superior and inferior vesical artery.
7. Concerning the bladder:
(a) It is trabeculated except at the trigone.
(b) Colour doppler enables identification of ureteric jets into the bladder
(c) The wall of a high signal intensity on T1- and T2-W MRI.
(d) The internal urethral sphincter is composed of smooth muscle.
(e) The internal ureteric orifices obliquely for about 2 cm before entering the bladder cavity.
8. The following are true of the female genital tract:
(a) On T2-W MRI the junctional zone is a low signal intensity band in the endometrium.
(b) On T1-W sequences three distinct zones are seen in the uterus.
(c) Normal ovaries are low to medium signal on T1-W MRI.
(d) After gadolinium DTPA the ovarian follicles exhibit increased signal intensity.
(e) The anatomy of the fallopian tubes are best seen by MRI.
9. Concerning the female genital tract:
(a) Peritoneum covers the superior and lateral aspects of the uterus.
(b) The round ligament passes through the deep inguinal ring.
(c) The round ligament originates at the lateral angle of the uterus and passes to the labia minor.
(d) The ovary is attached to the posterior surface of the broad ligament.
(e) Endovaginal ultrasound provides good detail of the ovarian area.
10. Concerning the female genital tract:
(a) Lymphatic drainage from the upper third of the vagina is to the internal iliac nodes.
(b) The cavity of the uterus is triangular in the sagittal plane.
(c) The retroflexed uterus is better visualized with transabdominal ultrasound than the anteflexed uterus.
(d) The uterine artery is a direct branch of the aorta.
(e) The uterine artery is a direct branch of the aorta.

BIHER

SLIMS

Student Feedback Form

Course name: INTEGRATED ANATOMY TEACHING-FEMALE GENITAL TRACT BY ULTRASOUND

Subject Code: VPE 1.0

Name of student: [illegible]

Reg No: [illegible]

We are constantly striving to improve our courses and request your honest response to the following questions. Comments and suggestions will help us to improve our performance.

Sl.No	Particulars	1	2	3	4	5
1	Objectives of the course were clear					
2	Course content was relevant and adequate					
3	Lectures were well planned and delivered					
4	Lectures were clear, audible & well illustrated					
5	Teaching aids were adequate					
6	Interaction encouraged (Interactive Lectures/ Tutorials/ Discussions)					
7	Overall rating of the course	1	2	3	4	5

Rating: 1. Outstanding 2. Excellent 3. Good 4. Satisfactory 5. Not satisfactory

Signature of student

Date:

Student Feedback Form

Course name: INTEGRATED ANATOMY TEACHING-FEMALE GENITAL TRACT BY ULTRASOUND

Subject Code: VPE 1.0

Name of student: [illegible]

Reg No: [illegible]

We are constantly striving to improve our courses and request your honest response to the following questions. Comments and suggestions will help us to improve our performance.

Sl.No	Particulars	1	2	3	4	5
1	Objectives of the course were clear					
2	Course content was relevant and adequate					
3	Lectures were well planned and delivered					
4	Lectures were clear, audible & well illustrated					
5	Teaching aids were adequate					
6	Interaction encouraged (Interactive Lectures/ Tutorials/ Discussions)					
7	Overall rating of the course	1	2	3	4	5

Rating: 1. Outstanding 2. Excellent 3. Good 4. Satisfactory 5. Not satisfactory

Signature of student

Date:

BIHER

SLIMS

Date: 09/05/19

From

Dr.R.Chidhambaram
Professor and Head,
Department of Radiology,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To

The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: **Normal anatomy of female genital tract by ultrasonography**

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: **Normal anatomy of female genital tract by ultrasonography** : for 20 medical students (batch 2) .

We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards,

Dr.R.chidhambaram

DEPARTMENT OF RADIOLOGY
SRI LAKSHMINARAYANA
INSTITUTE OF MEDICAL SCIENCE
PUDUCHERRY - 605 002.

Encl: Certificates

Photographs

SRI LAKSHMI NARAYANA

INSTITUTE OF MEDICAL SCIENCES

DEPARTMENT OF RADIOLOGY AND IMAGING SCIENCES

INTEGRATED

ANATOMY TEACHING

FEMALE GENITAL TRACT

BY

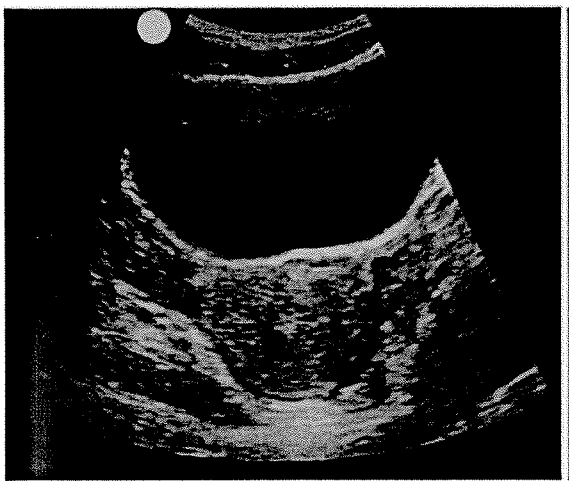
ULTRASOUND

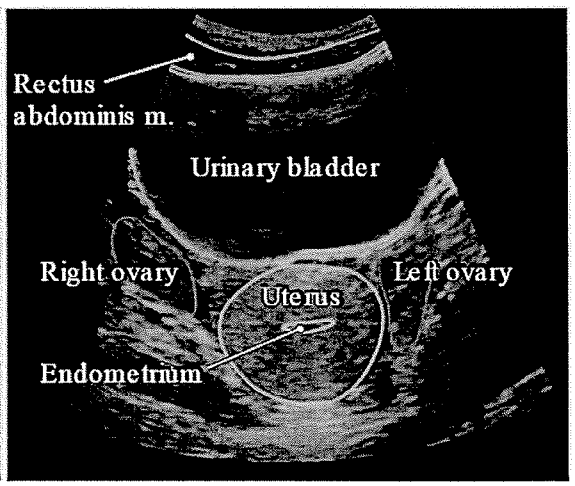
COURSE CONTENTS

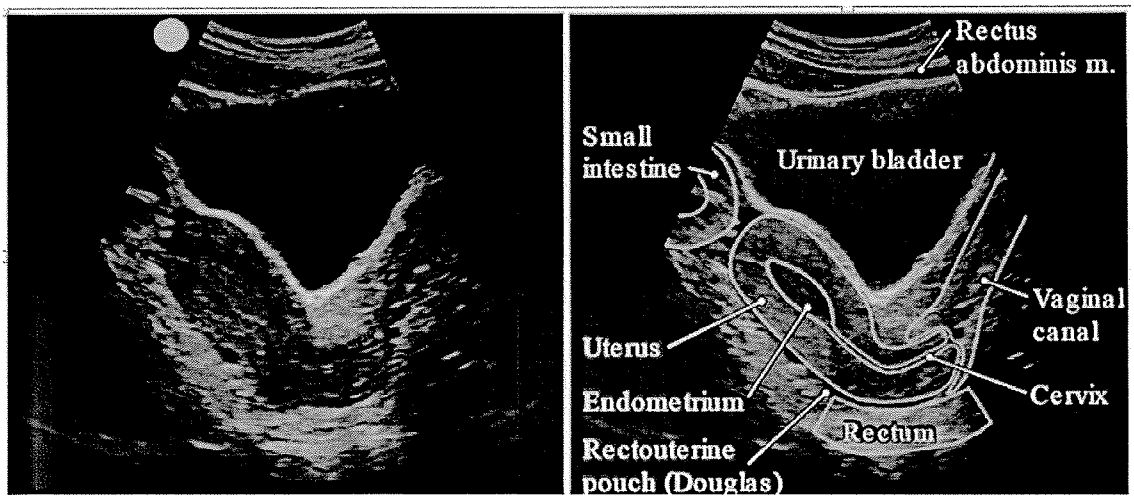
NORMAL ANATOMY OF UTERUS

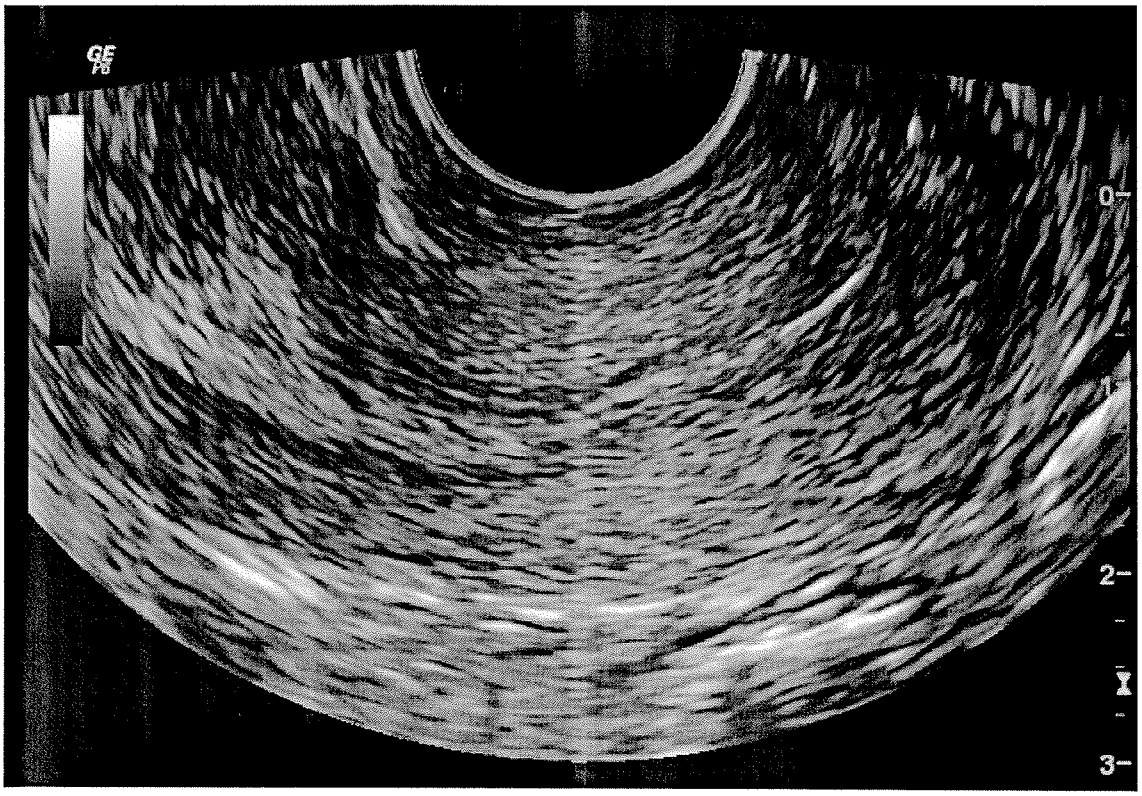
NORMAL ANATOMY OF OVARIES

NORMAL VIEW OF CERVIX, ENDOMETRIUM AND MYOMETRIUM






Rectus
abdominis m.
Small
intestine
Urinary bladder
Vaginal
canal
Uterus
Endometrium
Cervix
Rectum
Rectouterine
pouch (Douglas)


GE
0
1
2
3

VENUE :

LECTURE HALL:II

TIME : SAT 2 TO 4 PM.

Sri Lakshmi Narayana Institute of Medical Sciences

Date: 06.09.2019

From

Dr.JansiRani
Professor and Head,
Department of Biochemistry,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

To

The Dean,
Sri Lakshmi Narayana Institute of Medical College
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: Fire safety measures in a hospital

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: Fire safety measures in a hospital in Sep to Oct 2019. We solicit your kind permission for the same.

Kind Regards

Dr.JansiRani

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: Dr. Jayalakshmi

The HOD: Dr. Jansi Rani

The Expert: Dr. Kayalakshmy

The committee has discussed about the course and is approved.

Dean	Subject Expert	HOD
(Sign & Seal)	(Sign & Seal)	(Sign & Seal)

DEPARTMENT OF BIOCHEMISTRY
Sri Lakshmi Narayana Institute Of Medical Sciences
PONDICHERRY 605 502.

Dr. G. JAYALAKSHMI, BSC.,MBBS.,DTCD.,M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Ageram Kudapakkam, Post,
Villanur Commune Puducherry-605 502.

PROFESSOR & HOD
DEPARTMENT OF BIOCHEMISTRY
Sri Lakshmi Narayana Institute Of Medical Sciences
PONDICHERRY 605 502

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affliated to Bharath University, Chennai - TN]

Circular

07.09.2019

Sub: Organising Value-added Course: Fire safety measures in a hospital. reg

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research** is organizing **"Fire safety measures in a hospital"**. The course content form is enclosed below.

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution on or before Sep to Oct 2019. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

Dr. G. JAYALAKSHMI, BSC.,MBBS.,DTCD.,M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Ageram Kudapakkam, Post,
Villanur Commune Puducherry-605 502.

Encl: Copy of Course content

VALUE ADDED COURSE

1. Name of the programme & Code

Fire safety measures in a hospital

2. Duration & Period

30 hrs & Sep – Oct 2019

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Assessment - *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

1, Sep – Oct 2019

8. Year of discontinuation: 2020

9. Summary report of each program year-wise

Value Added Course- September -October 2017					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	BIO-11	Fire safety measures in a hospital	Dr. JansiRani Dr.Kajalakshmy	MBBS	20 students (Sep – Oct 2019)

10. Course Feed Back

Enclosed as Annexure- V

RESOURCE PERSON

1. **Dr.JansiRani**
2. **Dr.Kajalakshmy**

COORDINATOR
Dr.JansiRani

PROFESSOR & HOD
DEPARTMENT OF BIOCHEMISTRY
Sri Lakshmi Narayana Institute Of Medical Sciences
PONDICHERRY - 605 502

Course Proposal

Course Title: **Fire safety in a hospital**

Course Objective:

1. Overview of fire safety in a hospital
2. Fire accidents and its mode
3. Fire safety precautions

To sensitize the medical students about the importance and mishappenings that occur during fire accidents in a hospital and emergency measures to be taken during such accidents.

Course Outcome: Gained knowledge on fire safety and precautionary measures to be taken during fire outbreak in a hospital setting.

Course Audience: MBBS students of 2020 Batch

Course Coordinator: Dr.Jansirani

Course Faculties with Qualification and Designation:

1.Dr.Jansirani, Professor & HOD

2.Dr.Kajalakshmy, Assistant Professor

Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Time	Hours
1	15.9.2019	Introduction, background, objectives	4-5 PM	1
2	16.9.2019	Why fire safety needed in hospital?	4-6 PM	2
3	17.9.2019	Fire safety building planning	4-5 PM	1
4	18.9.2019	Interior designing	4-5 PM	1
5	19.9.2019	Environment safety	4-5 PM	1
6	20.9.2019	Fire safety standards	4-5 PM	1
7	21.9.2019	Fire safety design components	4-5 PM	1
8	22.9.2019	Fire safety hvac introduction	4-5 PM	1
9	23.9.2019	Ahu rooms weather maker	4-5 PM	1
10	24.9.2019	Cooling systemscooling towers	4-5 PM	1
11	25.9.2019	Cold rooms	4-5 PM	1
12	26.9.2019	Filtration	4-5 PM	1
13	27.9.2019	Typical o.t. check list for space provisions for central air conditioning works	4-5 PM	1
14	28.9.2019	Gas supply	4-5 PM	1
15	29.9.2019	Fire safety installation	4-5 PM	1
16	30.9.2019	Back Pressure Compensated Flow meter	4-5 PM	1
17	1.10.2019	Mobile theatre suction	4-5 PM	1

18	2.10.2019	Bed Head panel	4-5 PM	1
19	3.10.2019	Mixed essential and standby electrical power systems	4-5 PM	1
20	4.10.2019	Diesel fuel storage	4-5 PM	1
21	5.10.2019	Essential electrical systems for hospitals enforcing codes	4-5 PM	1
22	6.10.2019	Standby electrical power systems	4-5 PM	1
23	7.10.2019	Task illumination and selected receptacles in the hospital director's, engineering, and security and communications suites	4-5 PM	1
24	8.10.2019	Hot water circulatory and steam condensate return pumps	4-5 PM	1
25	9.10.2019	Critical branch	4-5 PM	1
26	10.10.2019	For mission critical facilities requirements	4-5 PM	1
27	11.10.2019	Hospital waste management	4-5 PM	1
28	12.10.2019	Autoclave hospital waste management Fire safety state-wide and combined treatment centers colour-coded bins for segregation of bio medical waste bio medical liquid wastes disinfection by sodium hypochlorite bio medical liquid wastes treatment by an effluent treatment plant	4-5 PM	1
29	13.10.2019	Other bio medical wastes treatment options	4-5 PM	1
30	14.10.2019	Inspection of fire safety arrangements in the hospital	3-7 PM	4
31	15.10.2019	What to be done during a fire outbreak? Demo class	3-7 PM	4
		Total		39

REFERENCE BOOKS:

1. Hospital Fire Prevention and Evacuation Guide - DIPECHO LAC

2. NABH & fire safety

Annexure I



PARTICIPANT'S HANDBOOK

BIHER SLIMS

Fire safety in hospitals

Particulars	Description
Course Title	Fire safety in a hospital
Course Code	BIO – 11
Topics and content of the course in the Hand book	1. Introduction 2. Laboratory errorsWhy fire safety needed in hospital? 3. Fire safety building planning 4. Interior designing 5. Environment safety 6. Fire safety standards 7. Fire safety design components 8. Fire safety hvac introduction 9. Ahu rooms weather maker 10. Cooling systemscooling towers 11. Cold rooms 12. Filtration 13. Typical o.t. check list for space provisions for central air conditioning works 14. Gas supply 15. Fire safety installation 16. Back Pressure Compensated Flow meter 17. Mobile theatre suction 18. Bed Head panel 19. Mixed essential and standby electrical power systems 20. Diesel fuel storage 21. Essential electrical systems for hospitals enforcing codes 22. Standby electrical power systems 23. Task illumination and selected receptacles in the hospital director's, engineering, and security and communications suites 24. Hot water circulatory and steam condensate return pumps 25. Critical branch 26. For mission critical facilities requirements 27. Hospital waste management 28. Autoclave hospital waste management

	29. Fire safety state-wide and combined treatment centers colour-coded bins for segregation of bio medical waste bio medical liquid wastes disinfection by sodium hypochlorite bio medical liquid wastes treatment by an effluent treatment plant 30. Other bio medical wastes treatment options 31. Inspection of fire safety arrangements in the hospital 32. What to be done during a fire outbreak? Demo class 33. Summary& conclusion
Advantages of learning and evaluation	• Proper Implementation of fire safety in a hospital • Strict follow up of maintenance by appropriate personnel • Awareness of precautions to be taken during a fire outbreak • Educates hospital staff for immediate action during emergency circumstances
Further learning Opportunities	1. Competency based assessment can be done. 2. As a responsible citizen, students are motivated and self-equipped with adequate knowledge 3. Creates awareness among future youngsters of the country 4. Motivates them to educate other peers of their age group to become a responsible citizen of our nation 5. Riddance of unnecessary fear during emergency situations and avoidance of chaos as a sequence of it
Key Competencies	• Evaluation by practical performance of what to be done during a fire outbreak setting – demonstration
Target Student	I MBBS
Duration	39 hrs , Sep – Oct 2019
Theory Session	35 hrs
Practical Session	4 hrs
Assessment Procedure	Assessment Evaluation by MCQ

Fire safety in hospital fire safety why fire safety in hospital?

The hospital, as an Institution is prone to fire because of

- Having many heat-dissipating equipments
- Combustible gasses /fuel, chemicals, used in different areas.
- A lot of electrical wiring, high voltage connections.
- Fire prone articles like gauze, cotton, linen, books and registrars.
- Heavy Equipments and electrical gadgets. That is inflammable and prone to hazardous incidents. Proper precautions have to be taken while planning the infrastructure.
- Adequate measures need to be considered, designed and practiced to ensure safety to all.
- Indicators like architectural designs, interior designs, electrical wiring, appropriate equipment planning and proper waste management are considered while planning such safety measures. Fires can be devastating, especially in a hospital where a large number of people who need to be evacuated may be vulnerable – immune-compromised, on life support, and incapable of moving on their own. There are special requirements that must be met with while evacuating such people in case of fire emergencies. But before that – "fires must be prevented".

Fire safety in hospital fire safety building planning

- The design of the building structure should be so planned that it allows pressurized exclusion of smoke in case of fire or any smoke leak.
- Must have enough doors and windows for proper ventilation.
- Adequate emergency rescue aids and suitable refuge area should be incorporated in the design.
- Ideally, a heavy-duty elevator especially for use of fire fighting personnel only and used in case of emergency only should be incorporated.
- The building should be so designed that it can resist damages due to earthquakes to a fair extent. Safe and easy means of access should be provided to and in every place of work /in patient area.
- This should enable access to all including the disabled to move easily.
- In case of an emergency, safe and rapid exit should be provided for all occupants.
- Each building must have separate fire exit, staircase with proper signage.

Layout planning

Following points must be kept in mind during building planning.

- There is sufficient open space around the building
- Sufficient open space between two buildings so as to minimize fire spread possibilities from or to neighbouring structures.

• Also there should be enough space for movement and parking of fire fighting vehicles, ambulances, etc in the premises and wide road approach to the building.
• Considering the size & number of occupancy, lobbies, staircases, ramps, etc should be sufficiently wide to ensure easy movement of traffic and quick evacuation during emergencies.

Fire safety in hospital fire safety interior designing

The interior designer also needs to incorporate the environment safety measures such as:-
• Adequate natural light, fresh air and colour therapy on walls and lights.
• The designs should be such that there is minimal use of combustible materials like gases, petrol or kerosene.
• The designs should use plenty of good quality fire retardant material for interior furnishing and decoration purposes.
• Appropriate waste management systems also need to be designed to prevent accidents due to hazardous waste.
• The gas and oxygen pipelines must be made of copper.

Environment safety

Following points must be kept in mind during Interior designing.
• The critical areas like Labs X-Ray, OT, ICU etc where heavy equipments are installed should be well protected and extra precautionary measures should be implemented in such critical areas,
• Interior should have fire proof doors, windows, walls and roof covered with fire proof materials.
• The floor should be so designed that they are free from obstructions, are slip-resistant & even.
• Openings in floors should be securely fenced or covered.
• Staircases, ramps should be provided with substantial handrails and other suitable support means to prevent slipping, wherever necessary.
• Easy access for the servicing and maintenance of plant, machinery and buildings should also be incorporated in a design.
• The building should be so designed that it can resist damages due to earthquakes to a fair extent.

Fire safety standards

Hospital engineering service provision for Fire Protection according to NABH:
1. Fire fighting installation approval must be obtained
2. Location of control room should be easily accessible.
3. Control panel & manned, PA equipment should be connected with detection system or fire alarm system.
4. Pumps and pump room

5. 2 separate pumps i. e .Electric and diesel pump should be available
6. Provision of Forced ventilation should be there.
7. Arrangement of filling Fire tenders
8. 4 way fire inlet must be present in case of emergency
9. Proper access for Fire tender to fire tanks
10. Fire Drill should be performed
11. Yard Hydrants should be available
12. Ring main and yard hydrants should be as per strategic locations.
13. 2 way fire heads to charge the ring main
14. Landing Hydrant & Hose reels

Fire safety design components:

1. PUMP ROOM • MAIN PUMP • JOCKEY PUMP • STANDBY PUMP / DIESEL PUMP • AIR TANK • PRIMING TANK • PUMP PANEL
2. FLOOR AREA • FIRE HYDRANT SYSTEM • HOSE REEL DRUM • SPRINKLER SYSTEM • FN 200 GAS (SERVER ROOM AND LABORATORIES) • FIRE ALARM SYSTEM :
    a) Smoke Detector
    b) Heat Detector
    c) MCP- Manual Call Point
    d) Fire Alarm Panel
3. FIRE ALARM SYSTEM • FIRE ALARM PANEL (LOBBY) a) WET RISER b) SPRINKLER RISER c) AIR RELEASE VALVE

Fire safety design components:

1. FIRE HYDRANT VALVE • RANGE : 15 TO 30 M • HIEGHT : 1 M ABOVE GROUND LVL • PIPE SIZE : 80 MM DIA • SINGLE HEADED VALVE
2. HOSE REEL DRUM • 30 M RUBBER HOSE • 1 SETUP NOZZLE • 1 BALL VALVE
3. HOSE BOX • SINGLE DOOR HOSE BOX • 3 M DISTANCE • 68% BLAST SYSTEM
4. FIRE ALARM PANEL • 14 ZONE FIRE ALARM PANEL • SMOKE DETECTOR DISTANCE : 5 M • HEAT DETECTOR IN KITCHEN AND O.T • GAS DETECTOR IN GAS BANK AREA • MCP
5. FIRE PIPES • MATERIAL : GI – C CLASS • DIAMETER : 1 TO 8 INCHES

Fire safety hvac introduction :

One of the keys to planning and selecting the HVAC system is to determine the codes to which the project must be designed, and to work from an architectural floor plan that has the appropriate space names identified. At this point, the project medical planner is an integral part of the HVAC design process. While some projects may include shell spaces, it is important for the HVAC designer to know the anticipated future use. For example, in an imaging suite with shelled areas, it is

important to determine if the space will be for magnetic resonance imaging or computed tomography (CT) with an equipment room or perhaps patient holding or ultrasound rooms. Each of these has different heating and cooling loads and air-change requirements. Prior to any design, it is important to understand the space use, the procedures to be performed and the number of patients who will receive treatment at any given time. This information helps to determine the HVAC design parameters for the project. It also provides a good platform from which to discuss the project with owners, architects and the AHJ so that agreement on the design approach and anticipated results can be reached. Designing an HVAC system for any building type requires careful planning. In health care, however, it also requires more information to meet the increased design complexity of these facilities

CENTRAL AIR CONDITIONING PLANT

Space requirements

i) Space requirement for central air conditioning plant shall be worked out on following basis: Chilling unit a) Reciprocating - 25-30 sq.m per unit (in case of single compressor unit). b) Reciprocating - 40 sq.m. per unit (in case of multi compressor unit) c) Centrifugal/ screw - 40-50 sq.m. per unit d) Centrifugal pump - 8-10 sq.m each pump e) Electrical panel - 20-25 sq.m per chilling unitf) Control panel - 20-25 sq.m

ii) Additional space for circulation shall be taken as 20- 25% of the above total space.

iii) Provision shall also be kept for anticipated future requirements.

iv) The minimum clear height of the plant room shall be 3.6 m in case of Reciprocating plants and 4.5 m in case of Centrifugal & Screw type plants.

iv) The entrance to A.C. plant room for centrifugal / screw type units shall be through rolling shutter/ suitable door shutters of steel or strong material to take self load having minimum width of 3 m & height not less than 4 m for centrifugal/ screw type units & 3.5 m for reciprocating type units.

Equipment location: The plant room shall have easy accessibility for moving in and out of equipments and shall be well ventilated. The location of the plant room shall also take into consideration the routing of the chilled water and condenser water lines from the plant room. As far as possible the plant room should be in close proximity to the electrical substation, since AC plant is main power load. The plant room shall be preferably located in a separate service building along with the substation. Basements shall be avoided from the fire safety point of view.

Floor loading and other structural requirements:

i) The floor loading of the AC plant shall be 2000 Kg/sq m

ii) ii) The Plant room should have a fresh water connection & drain trap.

Fire safety weather maker / ahu rooms weather maker / ahu rooms

Space requirements

i) Floor area requirement for the AHU room shall be as under: For AHUs upto 340 CMM : 4.5 m X 3.5 m For AHUs between 340 CMM & 680 CMM : 5.5 m X 4.5 m

ii) The minimum clear height of the AHU room shall be the same as that of the air-conditioned space to facilitate laying of ducts. Equipment Location AHU rooms should be contiguous to the respective areas to be air-conditioned by them. Their location should also take into consideration the feasibility of routing the ducts as well as provision of chilled water lines, water connections for the humidification equipments, fresh air inlet point and drain outlets. In multistoried constructions, the AHUs should be located in a vertical configuration to facilitate laying of chilled water lines. Individual AHUs shall not serve more than one floor from the fire safety point of view. Similarly each fire compartment shall have a separate AHU. Where the AHUs are located in the basement or in any floor below the air conditioned floors, individual shafts shall be provided for each AHU from the AHU room for the supply and return air, from the fire safety point of view.

Floor loading and other structural requirements.

i) The floor loading of AHU room shall be 800 Kg/ sq m

ii) The doors of the AHU rooms shall be single leaf, air tight having a minimum width of 1.2 m and openable outside. The floor of the AHU room shall slope towards the drain point. For clean room applications and other special requirements the internal finish of the AHU room shall be suitable for these special applications.

iii) All cutouts in the floor for the pipelines and cable shall be effectively sealed from the fire safety point of view.

iv) The clear height required to be maintained under the false ceiling shall take into consideration the ducting design and after allowing for the depth of the beams, thickness of the false ceiling including its frame work, recessed light fittings, etc.

v) The cutouts required in the floor slabs for installing the pipes, ducts and / or cables shall be decided at the initial planning stage and marked in the architectural drawings.

vi) Requirements for fresh air openings, water and drain in the AHU rooms as well as insulation of exposed roof slabs of conditioned areas as well as AHU room shall also be detailed in the initial planning stage.

vii) The beams in the ceiling of AHU rooms shall be of low depth to facilitate installing of supply air duct and return air duct. • Air exchanges In Operation Theatre Fresh Air Positive Pressure Unit = 60 Air Changes /hr • Air exchanges In ICU 30 Air changes /Hr • Total Air Changes Velocity 0.45 M/Sec • All adjacent rooms are on Negative Pressure • Temperature 20 +/- 3° Inside Operation Theatre • Have Variable Frequency Drive • Humidity Range Between 30% to 60% • Hepafilter 0.3 microns in Operation Theatre • Magnetic Differential Pressure Guage Provides Hepa Filter Working Status

FIRE SAFETY AHU SCHEMATICS

Designers should also consider adding casing components to the unit that will enhance ease of maintenance and service. These may include rigging devices (e.g., rails, lifts, winches) to assist with motor, fan or other large component removal and replacement; grease-fitting extensions to the exterior of the casing to allow service without entering the unit; inspection windows and adequate lighting (consider putting lighting on timers to prevent unnecessary usage and premature burnout); and pressure and temperature test ports in each section with a means for ease of opening and closing.

FIRE SAFETY COOLING SYSTEMSCOOLING TOWERS

The space occupied by each cooling tower & approximate operating weight for each cooling tower is given as under. In addition there shall be ample open space all around cooling towers for free flow of air. Equipment location These may be located at a well ventilated place either at ground level and contiguous to the plant room, or on the terrace of the building in consultation with the Architect. In case the cooling towers are located on the terrace of the building, the structural loading of the terrace shall be considered. For this respective columns are to be raised by two feet at the terrace. Cooling towers shall be installed in such a way that their load is transferred directly to the columns for which necessary Mild steel-I sections shall be provided by Airconditioning contractor. The cooling towers shall be rested on Mild Steel-I sections & not on terrace slab. Sufficient free space shall be left all around for efficient operation of the cooling tower.

MECHANICALVENTILATION/ EVAPORATIVE COOLING SYSTEM

Space Requirement

i) The space requirement for the equipments, air washers etc., shall be as per the manufacturer's recommendations.

ii) Space shall also be provided as required for the installation of the pumps along with the air washers.

iii) The minimum clear height of the equipment and air washer rooms shall be 3.6 m. The actual height required would depend upon the capacity of the equipment and manufacturer's recommendation.

Equipment Location i) The plant room shall be located contiguous to the space to be ventilated to reduce the pressure drop in the system. ii) Where air washers are also to be installed the room shall be treated with waterproof treatment and shall be located adjacent to the blower room. iii) The plant room shall be so located that it is conveniently possible to exhaust or inject the air to / from the ambient. Floor loading & other Structural Requirements i) The floor loading of the plant room and air washer room shall be 2000 kg./sq.m. ii) The doors of the plant room and air washer room shall be single leaf, air tight and open able outside. The floor and walls of the air washer room shall be properly treated, preferably with tiles to prevent seepage of water to the adjoining areas. The floor of the air washer room shall be properly sloped towards the drain point. iii) The air washer room shall be provided with water and drain points. iv) Fresh air opening along with masonry louvers, fresh water connection and drain outlet shall be provided in the plant room / air washer room

FIRE SAFETY COLD ROOMS COLD ROOMS Space Requirements i) The space requirement shall have to be worked out in individual cases depending upon the system selected. ii) Sufficient space should be kept around the equipment's for operation and maintenance purposes. iii) Normal room height in the building should be adequate for the equipment room as well as the cold room. Equipment Location i) Plant Room The plant room shall have to be necessarily adjacent to the cold room where DX system is used. The plant room shall have easy accessibility for men and materials and shall be well ventilated. In an air-cooled system, the condenser shall have to be located in a well ventilated space and preferably within the equipment room. Floor loading and other Structural Requirements i) The floor loading for the equipment room shall be 2000 kg /sq. m. ii) The floor loading/ weight of the equipment for AHU rooms and cooling towers shall be as under 3.3.4 & 3.5. iii) Where the cold rooms are located in the uppermost floor, the roof slab shall be provided with effective water proofing treatment to avoid any damage to the insulation of the cold room. For the same reason, the cold rooms shall be located away from the wet areas such as toilets. iv) Where the cold rooms are located on the ground floor, the flooring shall be effectively treated to prevent any seepage of water from the ground into the cold room. v) Suitable insulation along with vapour barrier shall be provided on all the sides of the cold room including the roof and flooring, especially in low humidity applications. GENERAL STRUCTURAL REQUIREMENTS i) If the building is air conditioned, the roof of the air conditioned areas & W.M. room shall have insulation on the roof (preferably over deck insulation wherever possible) and insulation in the walls. Buildings or complexes that have a connected load of 100kW or greater or an airconditioned area of 1000 m2 or more should comply with the thermal transmittance value (U-factor) requirements or R- value of insulation specified

below. The U-factor takes into account all elements or layers in the construction assembly, including the sheathing, interior finishes, and air gaps, as well as exterior and interior air films. The roof insulation shall not be located on a suspended ceiling with removable ceiling panels. ii) All the glazed window of air-conditioning areas shall preferably be provided with double pane glass windows. iii) Buildings or complexes that have a connected load of 100kW or greater or an air-conditioned area of 1000 m2 or more should comply with the fenestration requirements iv) All the doors/ windows of air-conditioned areas shall be made airtight. Air leakage for glazed swinging entrance doors and revolving Doors shall not exceed 5.0 l/s m2. Air leakage for other f enestration and doors shall not exceed 2.0 l/s m2. v) The following areas of the enclosed building envelopes shall be sealed, caulked, gasketed, or weather stripped to minimize air leakage: a) Joints around fenestration and door frames b) Openings between walls and foundation and between walls and roof and wall panels. c) Opening at penetrations of utility services through roof, walls, and floors d) Site-built fenestration and doors e) Building assemblies used as ducts and plenums f) All other openings in the building envelope vi) For air conditioning areas, where the return air is collected/ carried back to AHU rooms above false ceiling, the false ceiling shall be airtight & preferably shall be of Gypsum Board. vii) Total water requirements of air conditioning plant shall be assessed @15 litre/TR/Hr of plant operation. For 24 hour operation the number of operating hours shall be taken as 16. For small central plants a makeup water tank of same capacity shall be provided along the cooling towers with bottom of this make up tank being at least 0.75 mtrs above thesump level of cooling tower. For large size central plants an underground tank of total water requirement capacity shall have to be provided near the A.C. Plant room and a makeup water tank of part water requirement shall be provided along with cooling towers.

FIRE SAFETY FILTRATIONFILTRATION The efficacy of air filters is determined primarily by particle size, but can be affected by the relative electrical charges of particles and filters. Bacteria typically are quite small, requiring filters that remove particles below 1μm in size. ANSI/ASHRAE Standard52.2-2007(ASHRAE2007) specifies a test procedure for evaluating the performance of air-cleaning devices as a function of particle size, resulting in a minimum efficiency reporting value (MERV) for a given device. As shown in Table 2-3, for example, MERV 14 filters remove 75% to 85% of particles in the range of 0.3 to 1.0μm.Table2-4,from ANSI/ASHRAE/ASHE Standard 170-2008, gives requirements for prefiltration and final filtration in different areas. As indicated in Table 2-4, true HEPA (MERV 17; 99.99%) filters are required only for protective environment (PE) rooms; such filters are also required for pharmacies per U.S. Pharmacopoeia General Chapter 797 (USP 2012). HEPA filters are often specified

for bone marrow and organ transplant patient rooms and orthopedic surgery. The MERV rating system is described in detail in ASHRAE Standard 52.2-2007 (ASHRAE 2007). It is based on a test over a range of particle sizes. Standard designations of overall percent filter efficiency are no longer commonly used. AIR-HANDLING AND DISTRIBUTION SYSTEMS Review the preliminary life safety plan: Align AHU and air distribution zones with smoke compartment zones. This minimizes the required number of smoke dampers and simplify smoke damper control sequences. Identify areas with specialized air-handler requirements. :Some areas in the hospital, such as operating rooms, procedure rooms, bone marrow treatment areas, other special treatment areas, and telecommunications and electrical equipment rooms require additional air-handler components, increased airflow, or lower supply temperatures, because of their unique requirements. Consider optimal air-handling unit size.: Determine the desired capacity range for AHUs. Using a large number of small- capacity units can limit the disruptions to staff and patients caused by system shutdowns for maintenance or repair, but this requires significantly more maintenance time for filter changes, lubrication, coil cleaning, and other preventive work. Determine airflow requirements for each air-handler zone. :Develop a room-by-room airflow summary chart. Compare the air requirements for cooling load, air exchange rate, and makeup air. Consider system redundancy. :The designer should consider system redundancy early in the design process to ensure that any additional mechanical space for additional equipment or components is identified. System redundancy may be required by code or regulations or may be desired by the owner for certain mission-critical functions. Strategically locate mechanical rooms and chases. : Mechanical rooms housing AHUs requiring large amounts of outdoor air for ventilation, economizer cycles, or smoke ventilation need to be positioned near exterior walls or roofs to simplify air intake and relief. This decision may also be affected by aesthetic architectural considerations, such as which elevations can accommodate louvers. Determine AHU configuration and components.: To accurately determine the size of AHUs, the designer must determine each AHU's required components and arrangement. Include sufficient access sections for inspection and service. The designer should work with equipment vendors to confirm sizes and determine equipment weights for the structural engineer. Identify components requiring emergency power:. Many AHU components may require emergency power in order to maintain space conditions for critical areas, provide smoke ventilation, or maintain critical pressurization control. Remember to include any critical control components, such as pneumatic-control air compressors, control panels, and powered control devices.

FIRE SAFETY TYPICAL O.T. CHECK LIST FOR SPACE PROVISIONS FOR CENTRAL AIR CONDITIONING WORKS i) A.C Plant room ii) AC

plant room water connection & drainage iii) Cooling tower location iv) AHU room v) AHU room water connection & drainage vi) Shaft for carrying chilled water pipes vii) False ceiling co-ordination viii) Ceiling height to accommodate ducting ix) Water requirement x) Routes of piping/ cable xi) Thermal/ acoustic insulation xii) Air tightness of windows/ doors xiii) Insulation for AC areas on top floors. Outdoor Air Intakes Designers must carefully consider the location of the outdoor air intake for an AHU. Intakes must not be located near potential contaminant sources, such as boiler and generator stacks, laboratory exhaust vents, plumbing vents, cooling towers, ambulance waiting and vehicle parking areas, loading docks, and helipads. Many information sources provide generally accepted criteria for minimum separation distances from the outdoor air intake to potential contaminant sources to ensure adequate separation and dilution. These spacings vary from 10 to 75 ft [3 to 23 m], with 25 ft [7.6 m]

FIRE SAFETY GAS SUPPLY Medical gas piping is needed for oxygen, nitrous oxide, medical air, nitrogen, carbon dioxide, vacuum and anesthesia waste exhaust Scope of work The details of the Product and System is mentioned below & the Design, Supply, Installation, Testing and Commissioning of Central Medical Gas Pipeline System with all accessories and basic systems, should exactly conform to the hospital building and meet all the requirements of the hospital needs:- • The Bed Head Panels should be (Vertical and Horizontal) with Medi-Rail System. • There should be rigid / swivel / single arm / double arm pendants for the OT & ICU. • There should be an area Alarm Panel / Master Alarm Panel for all medical gases. • The Medi-rail system should be provided with all mounting accessories. • There should be a provision of a nurse call system. Pipe material • They should be solid, seamless, deoxidized, non arsenical, half hard, tempered & of degreased material confirming to HTM 2022 Standards. • The pipe sizes should be of the following standard size only, as under: 28mm OD x 1.2 mm thick 22mm OD x 0.9 mm thick 15mm OD x 0.9 mm thick 12mm OD x 0.7 mm thick • Fittings used for connecting copper tubing should be of Copper and brazed type connection as per BS: 864: Part 2:1983. All pipe-jointing fittings should be made of Copper as per BS 864 Standards and should be suitable for a steam of working pressure of 17 bars and especially be made for brazed socket type connections. • Shut off valves should be suitable for the pipe diameter of non lubricated 90 degree turn lever & having stainless steel hard chrome brass body with PTFE seat and S.S. ball. • Sizes to be appropriate for copper pipes with screw threaded ends and brass adapter .All valves should be pneumatically tested for double the working pressure and degreased for medical gases supply.

FIRE SAFETY Installation • Installation of piping should be carried out with strict cleanliness. • Only pipes, fittings and valves which have been degreased to be used. • Pipe fixing clamps should be of non-ferrous or non-deteriorating plastic

type suitable for the diameter of the pipe being used. Testing • After installation, all the pipes should be cleaned or purged with gas, and then the complete system to be tested at 1 1/2 times of working pressure for minimum 24 hours for any faults or leaks. Painting • All the existing and proposed exposed pipes will have to be painted with two coats of synthetic enamel paint & according to the colour codification as per IS-2379 of 1963. Terminal outlets • To conform to the following features: All outlets should accept, retain and release the probes by means of a quick release mechanism, to be of design for single - handed operation. • The terminal unit/probe connection will be of non-swivel type, so that any secondary equipment, such as a flow meter, is not tilted by the weight of the probe hose. • The outlet should be strictly totally leak proof, safe and easy to operate. • All the probes of a particular gas should be non-interchangeable specific gas and vacuum probes. • All outlets to be permanently identifiable with colour for specific gas / vacuum besides bearing labelled name of the gas, to be engraved on its face. GAS SUPPLY

FIRE SAFETY Back Pressure Compensated Flow meter • The flow meter should be sturdy and reliable for an accurate measuring of the flow of gases. • The flow meter should be made of chromium plated brass body. • The metering tube and cover should be made of unbreakable Poly carbonate. • The flow adjustment should be by a needle valve fitted with inlet filter- 100um. • The flow rate range should be between 0- 15 litres per minute. • The flush flow should be minimum of 60 litres per minute. • The reading in the flow meter should be on the centre of the floating ball. • The inlet pressure should be minimum of 60 psi. Ward Suction Unit • The whole unit should be wall mountable ward Vacuum Unit. • The capacity of the Jars should be between 550ml / 2000ml. • The range of control of flow should be between 0 To 700 Mm./Hg. • An over flow safety valve should be present in the Lid assembly. • The lid should be made of ABS Plastic variety. • The jar should be made of unbreakable poly carbonate material. • The jar should be sterilisable by steam to the temperature of above 132 Degree Celsius. • The vacuum control regulator should have an ON/OFF Knob. • It should have a high pressure hose at inlet and a low pressure hose at collection end of the jar. The operation theatre should be provided with :- GAS SUPPLY

FIRE SAFETY MOBILE THEATRE SUCTION UNIT Consisting of:- • Unbreakable Poly Carbonate Collection jars 2 Nos of 2000ml capacity each. • Provision of an ABS Lid with over flow safety valve is required. • A special 3 way valve is to be provided to operate either left hand side or right hand side and both should be operable simultaneously. • A regulator is to be provided to control the negative pressure from 0 to 750 mm./ Hg. with an ON /OFF knob. • All these items should be assembled on an Aluminium powder coated trolley with castors for mobility in the operation theatre. • A 1 – 2 mtr high pressure hose should be

provided at the inlet and 2-3 Mtr low pressure hose to be provided at collection end of the jar. OT PENDENT DESIGN: • Provision should be for 2 Oxygen and 2 Nitrous Oxide Gas Outlets. • Four Switch Sockets of 5/15 Amps each. • Stainless steel IV hooks with Infusion Pump Mounting Facility. • There should be 1 Monitor Shelve. Alarm System for Gases Should have the mandatory essential features:- • Wall Mountable. Digital display of line pressure in Psi. • An Audio Visual Alarm for High & Low level of gases. • A reliable pressure sensor. • The alarms should be provided with pressure sensors with an in-built On-Off switch. • The system should have a facility to be kept off as and when required. • The audio alarms to become active in case of any abnormality in the pressure and to be shut off by pressing the MUTE button to be provided in the system. • The audio alarm should restart automatically if the pressure does not come back to the normal range within 15 - 30 minutes, thus warning that the fault is still active and unattended. • The system should have feather touch buttons in the system. • A battery pack to be provided for uninterrupted power supply to the system with minimum 2 hours back-up supply for the system. • The whole area is to be made of fire-proof material as per international standard. GAS SUPPLY

FIRE SAFETY Bed Head panel • A horizontal Bed Head Panel with provision of all the Gas Outlets & Electrical 5/15 amps switches, Sockets, Nurse Call cut out as per requirement on each bed. • Each Bed Head Panel should be provided with the following :- • 2 each for Oxygen & 2 Vacuum Outlets. • 4 multi- pins 5/15 Amps, Switch Sockets outlets combined. • Medi-rail. Provision for Nurse Call Cut out. Nurse Calling System A digital nurse calling system for large hospital denotes quiet working & efficiency. The system should be having:- • A Wall mounted unit to be installed on each bed of good pleasant design of aluminium panel with screw attachment & coded colour powder coating. • The front panel should have the following : 1. 3 colour indicators : • RED for Calling. • GREEN for Ready • YELLOW for Wait • Reset switch • Hanging cord • Patient Switch to be installed at the nursing station. • Central monitor to have bright red digital display for bed numbers Features :- • Single 3 Sec beep on call or Periodic beep. • Acknowledgement switch on the monitor. • Flashing display on call & freeze mode on wait. • Central monitor to accommodate minimum 10- 20, beds capacity. • Siren mode if the patient is not attended after providing wait signal. • Electrical Installation of single wire to be laid from every bed to the nursing station through concealed conduits. • The central monitor to work on 230v 50hz supply. • Provision of DC voltage to be supplied to wall unit & patients switch so that micro shocks & leakage current shocks are avoided. GAS SUPPLY General Terms • The firm shall install the entire system in the hospital in accordance to the building plan requirements and measurements on completion of the construction. • The firm shall give an undertaking for 7 years comprehensive AMC after 2 years of warranty

period. • All safety standards have to be met during installation & after installation a compliance report will have to be submitted by the firm. • User & Technical /Maintenance manual will have to supplied by the firm. • The firm will supply the list of hospitals where the same equipment has been installed.

STANDBY ELECTRICAL POWER SYSTEMS • MIXED ESSENTIAL AND STANDBY ELECTRICAL POWER SYSTEMS For facilities where full standby power is required, it is permissible for the Standby Electrical System generators to provide power to the Essential Electrical System if the Standby Electrical System, as a whole, meets the requirement of the NFPA 99, NFPA 110, and other applicable codes. • COMMISSIONING (a) In addition to installation acceptance testing specified in NFPA 110, a commissioning plan shall be developed, specified, documented, and executed to ensure proper operation of the Essential Electrical System, both its individual components and the system as a whole. The commissioning plan shall include, but not be limited to, all sources of power, paralleling switchgear, transfer switches, fueling systems, and tank leak detection, interconnections to other systems, annunciators, load shedding, exercise functions, peak shaving, and communications pathways between equipment. (b) The A/E shall prepare control and operation drawing(s) or stipulate that the Contractor prepare them, as part of system commissioning and operations and maintenance documents. The drawings shall show all elements of the system and their interrelationships, including both power and control interconnections and sequences of operation. Physical locations of equipment shall be included. • EQUIPMENT AND RATINGS GENERATORS Generators used for the Standby Electrical System shall be rated as Limited Running Time prime power. If separate from the Standby Electrical System generators, generators dedicated to the Essential Electrical System shall be rated as standby. AUTOMATIC TRANSFER SWITCHES (ATS) ATS shall be 4-pole where the neutral circuit conductor is transferred by the transfer equipment, and the Standby or Essential Electrical System is designed as a separately derived system. ATS shall include the bypass isolation option. ATS shall be limited to 800A (amperes) maximum size and located to provide the highest practicable reliability in service to the load, which generally entails minimizing the switch-to-load distance.

STANDBY ELECTRICAL POWER SYSTEMS DIESEL FUEL STORAGE Diesel storage tank(s) shall be provided with leak detection, and a means to prevent degradation of stored fuel due to oxidation, microorganism growth, and corrosion. LOCATION (a) Do not locate the first level of distribution of the Standby Electrical System or Essential Electrical System, such as the generators and paralleling switchgear, in the same room with other power systems. (b) In the generator paralleling switchgear or distribution switchboard, Life Safety Branch overcurrent protective devices shall occupy a dedicated section or sections. •

EXISTING FACILITIES (a) Variations in wiring arrangements in existing facilities are acceptable if the performance and reliability specified in VA Master Construction Specifications and criteria herein are not compromised. Such variations may particularly occur with certain wiring in separate or common raceways, with certain functions connected to one or another system or branch, or with certain provisions for automatically or manually delayed restoration of power from the alternate (emergency) source of power. (b) The A/E shall submit a narrative describing the existing conditions and how the new design best meets the intent of applicable codes and provides an equivalent degree of performance and reliability. (c) When adding the ATS to an existing Essential Electrical System, the A/E shall match the existing pole switching configuration in terms of equipment and design, i.e., 3-pole or 4-pole transfer switches.

STANDBY ELECTRICAL POWER SYSTEMS ESSENTIAL ELECTRICAL SYSTEMS FOR HOSPITALS ENFORCING CODES • Alarm and alerting systems, such as Fire Alarm and Medical Gas Systems • Automatic doors: Used for building egress • Elevator cab lighting, control, communication, and signal systems • Exit signs • Generator set location: Task illumination, battery charger for emergency battery powered lighting units, and selected receptacles • Illumination of means of egress • Telecommunications Systems where used for issuing instructions during emergency conditions, including public address and Code One (Blue) systems and Disaster Control or Emergency Communication Centers CRITICAL BRANCH SHALL SUPPLY POWER TO: • Acute Nursing: Task illumination and selected receptacles • Stepdown Units: Task illumination and selected receptacles • Anesthetizing Locations: Task illumination, selected receptacles, and fixed equipment; task illumination includes battery back-up • Angiographic Laboratories: Task illumination, selected receptacles, and selected power circuits • Blood, Bone, Eye, and Tissue Banks: Task illumination, selected receptacles, and refrigerators • Cardiac Catheterization Laboratories and Rooms: Task illumination and X-ray unit • Coronary Care Unit: Task illumination and PBPUs • Emergency Room Treatment Areas and Life Support Rooms: Task illumination and PBPUs • General Patient Bedrooms: Night lights, an alcove or a lavatory mirror light, one receptacle per bedwall, preferably in the PBPU, if available, and a bathroom light • Hemodialysis Rooms: Task illumination and one receptacle for each dialysis unit PBPU • Human Physiology Labs: Task illumination, selected receptacles, and selected circuits • Intensive Care Units: Task illumination and PBPUs • Medication Rooms and Medication Preparation Areas: Task illumination, selected receptacles, and refrigerators • Minor Operating Rooms: Task illumination and selected receptacles • Nurse Call systems • Nurses Stations: Task illumination and selected receptacles • Pharmacy Dispensing Area (including Satellite Pharmacies): Power files, laminar flow hoods, refrigerators,

copier for transmittal of physicians' orders, task illumination, and selected receptacles • Psychiatric Bedrooms: Task illumination (ceiling only) • Surgical Operating Rooms: Task illumination (50% of the general fluorescent fixtures above the surgery table including battery backup within two of these fixtures), all X-ray units, and one film processor per suite

STANDBY ELECTRICAL POWER SYSTEMS • Surgical Recovery Rooms: Lighting fixture over each bed, one receptacle for each bed (or PBPU), night lights for each bed (or PBPU), and emergency alarm circuits • Main Computer Room, Backup Computer Room, Telecommunications Rooms, Telephone Operators Room, and Antenna Headend Equipment Room: All UPS equipment, lighting, and receptacles WARD TREATMENT ROOMS: TASK ILLUMINATION AND SELECTED RECEPTACLES • Dental Suites: Each ceiling track operatory surgical light, each dental operating unit, one duplex receptacle in each treatment area, and a storage refrigerator • Electrical Rooms: 50% of lighting and 50% of receptacles; also provide additional battery-powered lighting main electrical room • Engineering Control Center and Mechanical Equipment Rooms: UPS equipment, task illumination, and selected receptacles for operating and controlling internal auxiliary power, data gathering panels, control air compressors, dryers, and any electric control for heating, ventilating, and air-conditioning (HVAC) systems • Laboratory Service: Task illumination, selected receptacles in areas used to continue essential functions or critical experiments in the event of power failure, fume hoods, exhaust fans, and refrigerators • Pharmacy Delivery Systems and Delivery Areas: Task illumination, selected receptacles, dumbwaiter for delivery of STAT requests, and pneumatic tube system for STAT requests if no other delivery system is readily available • Respiratory Care Beds: PBPUs; when PBPU is not provided, task illumination and one receptacle for each bed • Security Station: Monitoring security alarm systems, task illumination, one receptacle, intrusion and duress alarms at agent cashier, pharmacy, drug storage room in warehouse, canteen office, canteen retail store room, and canteen storage • Special Procedure Rooms (Radiology): Task illumination and X-ray unit • HVAC for Surgical Suites, Intensive Care, Coronary Care, and Emergency Treatment Spaces, and other areas as deemed necessary by VA • Medical dispensing equipment

STANDBY ELECTRICAL POWER SYSTEMS Equipment Branch Non-Delayed Automatic Connection Arrange the following generator accessories for non-delayed automatic connection to the alternate power source: • Electrically operated louvers • Other generator accessories essential for generator operation • Transfer fuel pump Equipment Branch Delayed-Automatic Connection Arrange the following equipment for delayed-automatic connection to the alternate power source, including necessary controls: • Vacuum pumps and oral evacuation pumps serving medical and surgical functions, including controls • Sump pumps and other

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equipment such as associated control systems and alarms required for the safety of major equipment that may be exposed to water • Medical and dental air compressors serving medical and surgical functions, including controls (such systems may be connected to the Critical Branch; the A/E shall coordinate with the Chief Engineer at the facility) • Smoke control and stair pressurization • Kitchen hood supply and/or exhaust systems, if required to operate during a fire in or under the kitchen hood • Uninterruptible Power Supply (UPS) equipment serving other than telecommunications equipment • Medical and laboratory refrigerators and freezers as required • Oxygen storage control panel • Equipment and control systems for each elevator bank: Design control systems to operate at least one elevator at a time and designate one elevator to serve the Surgical Suite during emergencies • Fire pump, jockey pump, and make-up pump for water-based fire protection systems; lighting and selected receptacles in fire pump room • Hyperbaric facilities • Hypobaric facilities • Automatic operated doors • Autoclaving equipment (shall be permitted to be arranged for either delayed-automatic or manual connection to the alternate source)

STANDBY ELECTRICAL POWER SYSTEMS ADMINISTRATIVE AREAS: TASK ILLUMINATION AND SELECTED RECEPTACLES IN THE HOSPITAL DIRECTOR'S, ENGINEERING, AND SECURITY AND COMMUNICATIONS SUITES • Closed-loop water chilling equipment for linear accelerator • Domestic Water Pumps: Equipment, control system, light fixture, and receptacle near the pump • Electric tape for heat tracing of piping requiring freeze protection HEATING, VENTILATING AND AIR-CONDITIONING (HVAC) SYSTEMS: o Heating Equipment: Operating Suites, Recovery, Intensive Care, Coronary Care, Infection and/or Isolation Rooms, Emergency Treatment Spaces, and General Patient Rooms; under certain conditions, NFPA 99 may not require heating of General Patient Rooms and Infection Isolation Rooms o Air-conditioning equipment, lubricating oil pumps for centrifugal compressors, control air compressors, air dryer and absorption machine refrigerant pump to draw down lithium chloride before crystallization (omit for machines accomplishing this manually) o Chillers, chilled water circulating pumps, fans, and controls for surgical suites, recovery rooms, intensive care, and coronary care units o Chillers, chilled water circulating pumps, fans, and controls for animal research facilities o HVAC equipment for Bone Marrow Transplant (BMT) areas o HVAC equipment for Magnetic Resonance Imaging (MRI) Suites and Computerized Topographic (CT) Scanners o HVAC equipment serving emergency areas in outpatient clinics in seismic and high-risk hurricane areas o HVAC equipment for Main Computer Room, Telecommunications Rooms, Telephone Operators Room, and Antenna Headend Equipment Room o Exhaust fans serving Autopsy Rooms, reagent-grade Water Treatment Rooms, Orthotic Laboratory

special exhaust systems, battery charging areas, flammable storage rooms, and illustration rooms (Medical Media) o Supply, return, and exhaust ventilating systems for Infection Isolation Rooms, Protective Environment Rooms, and exhaust fans for laboratory fume hoods and nuclear medicine areas where radioactive material is used. These systems are permitted on delayed automatic system only, and shall not be served via manual system. Some systems may be placed on the Critical Branch. Coordinate with VA. o Ventilation, cooling, and control equipment for electrical rooms

STANDBY ELECTRICAL POWER SYSTEMS HOT WATER CIRCULATORY AND STEAM CONDENSATE RETURN PUMPS: Equipment, controls, and light fixture and receptacle near the pumps • Hot Water Generator: Equipment, controls, and light fixture and receptacle near the generator • Kitchen: Illumination and minimum equipment to feed patients during extended outage; freezers and refrigerators • Laboratory Air Compressors and Vacuum Pumps: Equipment, controls, and light fixture and receptacle near the compressors and pumps • Animal Ward lighting • Mortuary Refrigerator or Cold Room: Refrigeration equipment and task illumination • Radiology Suite: Task illumination, one automatic X-ray film processor, and one X-ray unit • Refrigerated Medical Storage: Refrigeration equipment • Sewage Pumps: Equipment, controls, and light fixture and receptacle near the pumps. SUPPLY, PROCESSING, AND DISTRIBUTION (SPD): o Task illumination and selected receptacles in the following areas: core, sterile storage, non-sterile storage, preparation, and decontamination o One ultrasonic cleaner, one ethylene oxide gas sterilizer, one steam sterilizer, one washer sterilizer, and one gas generator o Equipment in warehouse areas necessary to preserve subsistence drugs and X-ray film materials that may be subjected to damage from infestation, humidity, or temperature • Water and Sewage Treatment Plant: Lighting, receptacles, and equipment needed during emergency ALTERNATE SOURCE OF POWER (a) The alternate source of power shall be one or more diesel engine-driven generator sets. Provide physical space for one additional generator; paralleling switchgear shall be appropriately provisioned. Refer also to the Physical Security Design Manual. (b) Coordinate location(s) for generator remote alarm annunciator(s) with VA. The preferred locations are in the Energy Center control room and in the Security office or Telephone Operators Room (whichever is continuously staffed). **STANDBY ELECTRICAL POWER SYSTEMS CRITICAL BRANCH** In addition, connect the following items to the Critical Branch, arranged for delayed automatic connection to the alternate power system: • Nurse Call System • Patient Bedrooms: Bathroom light, an alcove or lavatory mirror light, night light, and one receptacle per bed wall • Electrical Rooms and Closets: 50% of lighting and one

receptacle • Main Computer Room, Backup Computer Room, Telecommunications Rooms, Telephone Operators Room, and Antenna Headend Equipment Room: All UPS equipment, lighting, and receptacles • Mechanical Rooms: Task illumination and one receptacle ALTERNATE SOURCE OF POWER The alternate source of power shall consist of a diesel engine-driven generator set. ESSENTIAL ELECTRICAL SYSTEM FOR OTHER HEALTHCARE FACILITIES The Essential Electrical System for other healthcare facilities shall comply with the Type 3 system as defined in NFPA 99. If electrical life support equipment is required or critical care areas are present in the facility, the Essential Electrical System shall comply with the Type 1 system as defined in NFPA 99. If a Type 1 system is required, connect the functions/items listed above in SECTION 4.6 to the Essential Electrical System. ALTERNATE SOURCE OF POWER. ESSENTIAL ELECTRICAL SYSTEM FOR OTHER FACILITIES. BOILER PLANT AND ENERGY CENTER. Provide emergency power for task illumination and equipment necessary for emergency operations during an extended power outage. These buildings generally have their own diesel engine-driven generator set. FIRE STATION. Provide emergency power for lighting and communication circuits necessary to sustain operation during power outages. If emergency generator power from an adjacent Boiler Plant or Energy Center is not available, provide auxiliary battery- powered lighting and communication devices.

STANDBY ELECTRICAL POWER SYSTEMS STANDBY ELECTRICAL SYSTEM FOR MISSION CRITICAL FACILITIES REQUIREMENTS (a) A Standby Electrical System may be required to provide full power backup for Mission Critical facilities. The Standby Electrical System shall be sized for full load operation of the entire electrical system, and must be capable of sustaining operation of all electrical loads for a minimum four-day period during which the electric utility source is not available. Additional sustainability time may be required for hurricane-prone areas, arctic areas, high seismic areas, areas vulnerable to other natural disasters, Continuity of Operation (COOP) facilities, or for other locations as specified by VA. (b) The Standby Electrical System may be sized, if required by VA to provide power for other new or existing buildings or loads in addition to the Mission Critical facility. STANDBY SOURCE OF POWER (a) The source of power shall be one or more indoor diesel generator sets that generate at the utility service entrance voltage, typically 5kV or 15kV nominal. The point of connection shall typically be the utility service entrance point. The generators shall be rated Limited Running Time prime power, with a suggested limit of 750 hours of yearly operation at this rating. (b) Provide physical space for one additional generator; paralleling switchgear shall be appropriately provisioned. (c) Investigate peak shaving, cogeneration, or load interruption incentives with the serving electrical utility and submit an analysis narrative with

recommendations to VA. Unless an advantageous interconnection agreement is obtained, the standby power system shall not parallel with the utility. (d) The location of the standby power system, including switchgear and diesel fuel storage, shall comply with the Electrical Design Manual, the Physical Security Design Manual, and applicable Codes.

FIRE SAFETY HOSPITAL WASTE MANAGEMENT Hospital Waste Management Once identified and segregated 1. Out rightly send Domestic Effluents to ..the municipal sewers 2. Isolate & Collect the infectious liquid wastes(streams 2 & 3), Disinfect completely and then send to municipal sewers Pack the segregated solid waste according to prescribed mode and send it for proper disposal May be At BMW CTDF (Bio- Medical waste common Treatment and Disposal Facility) Where, The BMW shall be treated using standard methods such as incineration, Autoclaving, Micro –Waving ,and the treated waste residue shall be finally disposed off in a secured landfill Hospital Waste classification Inspection & Re- Segregation SHARP STORAGE AND DISPOSALBIO MEDICAL PLASTIC WASTES DISINFECTION BY SODIUM HYPOCHLORITE BIO MEDICAL WASTES DESTRUCTION BY DOUBLE CHAMBERED INCINERATOR

FIRE SAFETY Waste Categories Description and Examples

1.General Waste No risk to human health eg:office paper,wrapper,kitchen waste,general sweeping etc.

2.Pathological Waste Human Tissue or fluid eg:body parts,blood,body fluids etc.

3.Sharps Sharp waste eg:Needle,scaples,knives,blades etc.

4.Infectious waste Which may transmit bacterial,viral or parasitica disease to human being,waste suspected to contain pathogen eg:labrotory culture,tissues(swabs)bandage etc.

5.Chemical waste Eg:Labrotory reagent,disinfectants,Film Developer

6.Radio-active waste Eg: unused liquid from radiotherapy or lab research,contaminated glasswares etc. Waste Categories Description with examples

7.Pharmacutical Waste Expired outdated drugs /chemicals

8.Pressurized container Gas cylinder,aerosal cans etc

9.Genotoxic Waste Waste Containing Cytotoxic Drugs(often Used In Cancer Therapy) • 2.Segregation: Done at point of Generation of waste and put in separate coloured bags.Color coding varies from nation to nation.For eg. In AIIMS hospital,New delhi, Following color code bags are practised. Infectious Waste/Pathological Waste HOSPITAL WASTE MANAGEMENT

FIRE SAFETY Generation,Segregation,Collection,St orage,Transportation and treatment of waste

1.Generation: Type Site of Generation Disposal By Non-Hazardous waste/General waste Office,Kitchen,Adminis tration,Hostels,Stores, Rest rooms etc Muncipal/Public Authority Hazardous (Infectious & toxic waste) Wards,Treatment room, Dressing room, OT, ICU,Labour room, Labrotory, Dialysis room, CT scan, Radio- imaging etc Hospital itself Step
1. Create policy devotion and accountability for wellness-care trash control Step
2. Make a national review of health-care waste techniques Step
4. Develop a policy on regional and collaborative methods of health-care waste treatmentc • Option 3: treatment of health-care waste in existing industrial or municipal treatment features (e.g. municipal incinerators), where these can be found. Containers Colour Tells other staff what is in the container • Tells the contractor what to do with the waste • Can apply to both sacks and rigid containers Safe for Disposal to General Waste Carcass, anatomical Sharps Cytotoxic Bio Medical Wastes Collection &Transport by Common Treatment & Disposal Facility **AUTOCLAVE HOSPITAL WASTE MANAGEMENT FIRE SAFETY STATE-WIDE AND COMBINED TREATMENT CENTERS COLOUR-CODED BINS FOR SEGREGATION OF BIO MEDICAL WASTE BIO MEDICAL LIQUID WASTES DISINFECTION BY SODIUM HYPOCHLORITE BIO MEDICAL LIQUID WASTES TREATMENT BY AN EFFLUENT TREATMENT PLANT** Sharp Management □ Must be collected at the point of generation, in a leak-proof and puncture-resistant container □ Containers must bear the international biohazard symbol and appropriate wording □ Containers should never be completely filled, nor filled above the full line indicated on box. Unauthorise d Use/Reuse Unsafe collection Unsafe disposa l HOSPITAL WASTE MANAGEMENT
FIRE SAFETY Other Bio Medical Wastes Treatment Options Other Bio Medical Wastes Treatment Options Plasma Pyrolysis Liquid Infectious Medical Wastes • Placed directly in the Biohazardous waste, • Autoclaved & the poured down a sanitary sewer, • Solidified using an approved disinfectant solidifier and discarded in the solid waste Liquid Infectious Medical Waste, i.e., the contents of suction canisters, may be disposed as follows Comparison of Treatment Technologies Pneumatic tube Pneumatic tubes (or capsule pipelines; also known as pneumatic tube transport or PTT) are systems that propel cylindrical containers through networks of tubes by compressed air or by partial vacuum

Annexures II

STUDENT LIST

DEPARTMENT OF BIOCHEMISTRY

S.No	Reg No	Name	Signature
1	U19MB331	NIRMAL KUMAR B	
2	U19MB332	NISHANTHI V	
3	U19MB333	NITIN NARAYAN M	
4	U19MB334	NIVASINY P S	
5	U19MB335	NUKUVOLU NIENU	
6	U19MB341	PRAKHAR GAUTAM	
7	U19MB342	PRIYADHARSHINI A	
8	U19MB343	PRIYADHARSHINI M	
9	U19MB344	PRIYANSHU KESHARI	
10	U19MB345	PULAK ACHARYA	
11	U19MB346	RAAJ SETHU VINAYACK R	
12	U19MB347	RABYA TABASUM	
13	U19MB348	RAHUL MAHESHVAR M G	
14	U19MB349	RAHUL RAJ	
15	U19MB350	RAJAGOPAL R	
16	U19MB336	PADMAJA T	
17	U19MB337	PAVAN KALYAN POTLURI	
18	U19MB338	PAVITHRA T	
19	U19MB339	PRABHU MANIKANDAN V S	
20	U19MB340	PRADHEEP K	

Nursing p. 5

1. The acronym "RACE" stands for:
   a) Rescue, alarm, confine, search
   b) Release, activate, contain, evacuate
   c) Run away to the closest exit
2. When using a fire extinguisher, the first step in PASS is:
   a) Aim the extinguisher at the base of the fire
   b) Discharge the extinguisher
   c) Pull the pin
   d) Check to see if the first extinguisher is full
3. The building fire alarm function which provides the earliest warning of a fire is:
   a) Sprinklers
   b) Employees
   c) Smoke detectors
   d) Public address system
4. Which of the following statements is not true:
   a) Elevators may sometimes be used in fire situations, if not located in a zone threatened by fire
   b) The most likely route for evacuation of patients is down stairwells
   c) Sprinklers are activated automatically by heat
   d) The risk of fire is higher when construction activity is present
5. There is a fire is a microwave oven. You activate the alarm, ask another staff member to call security and you locate the nearest fire extinguisher. Which of the following steps is incorrect:
   a) Pull the pin with the fire extinguisher upright
   b) Aim at the base of the flames
   c) Squeeze the lever while sweeping the nozzle slowly back and forth
   d) Replace the fire extinguisher in its original position when the fire is safely out
6. If a fire alarm is sounded, the fire/smoke zone doors:
   a) Close automatically

b) Should be propped open to facilitate lateral evacuation

c) Will remain open until someone closes them

d) Will remain in their usual position

7. A lateral evacuation of a patient care area involves:

a) Closing all patient care and other doors on the unit

b) Evacuating the patient through the smoke/fire to a safe zone

c) Conducting a head count of all patients and staff

d) All of the above

8. The fire alarms sound on a patient care unit. You begin closing doors. A visitor asks nervously what is going on. You respond:

a) The hospital has frequent fire drills and closing all doors is a part of our fire action plan

b) There is a fire close by and we should prepare to evacuate

c) I'm not sure what is going on!

9. A visitor decides to break the rules by having a quick cigarette in the bathroom. He accidentally drops the cigarette into the trashcan and a fire ignites. Which of the following statements are not true:

a) Patients in the room should be removed from the room

b) Visitors should be removed from the room

c) Occupants of adjacent rooms may need to be moved as a precautionary measure

d) There is no need to activate a pull station since the fire can be easily extinguished

10. Sprinklers are activated when:

a) There is smoke in an area during a fire

b) Someone activates a pull station during a fire

c) Heat from a fire activates a sprinkler

d) Fire safety quiz answers

Parvan

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d) Fire safety quiz answers

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that **SATHISH KANNAN** has actively participated in the Value Added Course on Fire safety measures in a hospital held during Sep 2019 – Oct 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. Kajalakshmy
RESOURCE PERSON
DEPARTMENT OF BIOCHEMISTRY
Sri Lakshmi Narayana Institute Of Medical Sciences
PONDICHERRY - 605 502.

Dr. Jansirani
COORDINATOR
PROFESSOR & HOD
DEPARTMENT OF BIOCHEMISTRY
Sri Lakshmi Narayana Institute of Medical Sciences
PONDICHERRY 605 502

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that **RAMANAN** has actively participated in the Value Added Course on Fire safety measures in a hospital held during Sep 2019 – Oct 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. Kajalakshmy
RESOURCE PERSON
DEPARTMENT OF BIOCHEMISTRY
Sri Lakshmi Narayana Institute Of Medical Sciences
PONDICHERRY - 605 502.

Dr. Jansirani
COORDINATOR
PROFESSOR & HOD
DEPARTMENT OF BIOCHEMISTRY
Sri Lakshmi Narayana Institute Of Medical Sciences
PONDICHERRY 605 502

Course feedback form

Course title: Date : 1·10·2019

Course code: BIO - 11

Department: Biochemistry

S.no	Design of the course	1	2	3	4	5
1	The objective of the course clear to you				✓	
2	The course contents met with your expectations				✓	
3	The lecture sequence were well planned				✓	
4	The lectures were clear and easy to understand					
5	The audiovisual teaching aids were effectively used			✓		
6	The instructor's encouraged interaction and was it helpful			✓		
7	The contents were illustrated with examples			✓		
8	Overall Rating of the course			✓		

*** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory**

Suggestions if any:

Good

Radiya
Signature

Course feedback form

Course title: Date : 1.10.2019

Course code: BIO - 11

Department: Biochemistry

S.no	Design of the course	1	2	3	4	5
1	The objective of the course clear to you				✓	
2	The course contents met with your expectations			✓		
3	The lecture sequence were well planned					
4	The lectures were clear and easy to understand			✓		
5	The audiovisual teaching aids were effectively used					
6	The instructor's encouraged interaction and was it helpful			✓		
7	The contents were illustrated with examples			✓		
8	Overall Rating of the course			✓		

*** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory**

Suggestions if any:

Good

Priyadarshini. M
Signature

Date: 30.10.2019

From

Dr.Jansirani
Professor and Head,
Department of Biochemistry,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To

The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: Fire safety measures in a hospital

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: Fire safety measures in a hospital from Sep to Oct 2019 for 20 students. We solicit your kind action to send certificates for the participants that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards,

Dr.Jansirani

Encl: Certificates

Photographs

Sri Lakshmi Narayana Institute of Medical sciences

Date-21-10-19

From
Dr. K. Harsha Vardhan
Professor and Head,
Department of dermatology
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

To
The Dean
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: Lichen planus

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: Lichen planus on 20-11-2019. We solicit your kind permission for the same.

Kind Regards

Dr. K. Harsha Vardhan

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: Dr. Jayalakshmi

The HOD: Dr. A. Buvanaratchagan

The Expert: Dr. A. Buvanaratchagan

The committee has discussed about the course and is approved.



Dean Subject Expert HOD

Sri Lakshmi Narayana Institute of Medical sciences

Date-21-10-19

From
Dr. K. Harsha Vardhan
Professor and Head,
Department of dermatology
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

To
The Dean
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: Lichen planus

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: Lichen planus on 20-11-2019. We solicit your kind permission for the same.

Kind Regards

Dr. K. Harsha Vardhan

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: Dr. Jayalakshmi

The HOD: Dr. A. Buvanaratchagan

The Expert: Dr. A. Buvanaratchagan

The committee has discussed about the course and is approved.

Dr. G. JAYALAKSHMI, BSC., MBBS., DTCD., M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Agaram, Kudapakkam Post,
Villianur Commune, Puducherry-605502.
Dean

PROFESSOR & HEAD
DEPT. OF DERMATOLOGY
SRI LAKSHMI NARAYANA INSTITUTE OF
MEDICAL SCIENCES
Subject Expert

PROFESSOR & HEAD
DEPT. OF DERMATOLOGY
SRI LAKSHMI NARAYANA INSTITUTE OF
MEDICAL SCIENCES
OSUDU, PUDUCHERRY.
HOD

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OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affliated to Bharath University, Chennai - TN]

Circular

28.10.2019

Sub: Organising Value-added Course: Lichen Planus(Nov 2019 – Feb- 2020)

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research** is organizing **"Lichen Planus"**. The course content is enclosed below."

The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before 13-11-2019. Applications received after the mentioned date shall not be entertained under any circumstances.

Dr. G. JAYALAKSHMI M.S., MBBS., DTCD., M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Agaram, Kudapakkam Post,
Villianur Commune, Puducherry - 605502.

DEAN

Encl: Copy of Course content

Course Proposal

Course Title: lichen planus
Course Objective: To review the causes, presentation and treatment of lichen planus
Course Outcome: Completed
Course Audience: second year mbbs students
Course Coordinator: Dr. Bhuvanaratchagan
Course Faculties with Qualification and Designation:
Dr. Bhuvanaratchagan
Professor Department of Dermatology
Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Time	Hours	Lecture taken by
1	20-11-19	Introduction	4 to 6 pm	2hours	Dr. Bhuvanaratchagan
2	26-11-19	Pathogenesis	4:30 to 6:30 pm	2hours	Dr. Bhuvanaratchagan
3	29-11-19	etiology	5 to 7 pm	2hours	Dr. Bhuvanaratchagan
4	2-12-19	Triggers	4 to 6 pm	2hours	Dr. Bhuvanaratchagan
5	6-12-19	Types	4:30 to 6:30 pm	2hours	Dr. Bhuvanaratchagan
6	10-12-19	Clinical presentation	5 to 7 pm	2hours	Dr. Bhuvanaratchagan
7	13-12-19	Variants	5 to 7 pm	2hours	Dr. Bhuvanaratchagan
8	18-12-19	COMPLICATIONS	4 to 6 pm	2hours	Dr. Bhuvanaratchagan
9	23-12-19	Investigations	4:30 to 6:30 pm	2hours	Dr. Bhuvanaratchagan
10	27-12-19	General measures	5 to 7 pm	2hours	Dr. Bhuvanaratchagan
11	31-12-19	Treatment	5 to 7 pm	2hours	Dr. Bhuvanaratchagan
12	2-1-20	Other modalities of treatment	4 to 6 pm	2hours	Dr. Bhuvanaratchagan
13	6-1-20	Newer therapies	4:30 to 6:30 pm	2hours	Dr. Bhuvanaratchagan
14	10-1-20	Case discussion	5 to 7 pm	2hours	Dr. Bhuvanaratchagan
15	14-1-20	Q&A, mcqs	4 to 6 pm	2hours	Dr. Bhuvanaratchagan
			Total Hours	30	

REFERENCE BOOKS:

Rooks Textbook of dermatology 9th edition
Fitzpatrick 's dermatology in general medicine 8th edition

ABSTRACT-VALUE ADDED COURSE

1. **Name of the programme & Code**
   Lichen planus and DR12
2. **Duration & Period**
   30 hrs & Nov 2019 - Feb 2020
3. **Information Brochure and Course Content of Value Added Courses**
   Enclosed as Annexure- I
4. **List of students enrolled**
   Enclosed as Annexure- II
5. **Assessment procedures:**
   Multiple choice questions- *Enclosed as Annexure- III*
6. **Course Feed Back**
   Enclosed as Annexure- IV
7. **No. of times offered during the same year**:
   Nov 2019 - Feb 2020
8. **Year of discontinuation: 2020**

9. **Summary report of each program year-wise**

Value Added Course- Nov 2019 - Feb 2020					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	DR12	Lichen planus	Dr. Buvanaratchagan	2nd year MBBS	15 (Nov 2019 - Feb 2020)

10. **Certificate model**
    Enclosed as Annexure- V

Dr. Buvanaratchagan
RESOURCE PERSON
PROFESSOR & HEAD
DEPT. OF DERMATOLOGY
SRI LAKSHMI NARAYANA INSTITUTE OF
MEDICAL SCIENCES
OSUDU PUDUCHERRY.

Dr. Buvanaratchagan
COORDINATOR
PROFESSOR & HEAD
DEPT. OF DERMATOLOGY
SRI LAKSHMI NARAYANA INSTITUTE OF
MEDICAL SCIENCES
OSUDU PUDUCHERRY.

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ANNEXURE-1

LICHEN PLANUS



PARTICIPANT HANDBOOK

COURSE DETAILS

Particulars	Description
Course Title	Lichen planus – an overview
Course Code	DR12
Objective	1. To learn about the clinical features 2. To learn about the diagnosis 3. To learn about the treatment
Further learning opportunities	Recent advances in management
Key Competencies	To make a diagnosis and provide adequate treatment
Target Student	2nd MBBS Students
Duration	30hrs nov 2019 to feb 2020
Theory Session	10hrs
Practical Session	20hrs
Assessment Procedure	Multiple choice questions

Introduction

Lichen Planus (leichen = tree moss, planus = flat) is an idiopathic, chronic inflammatory disorder that affectsthe skin .

Epidemiology

- Incidence varies from 0.14% - 4%,higher prevalance in India.
- 2/3rd of cases occur in ages between 30-60yrs.
- In children, only 1-4% of total LP cases have been reported. Positive family history more common insuch cases.

Etiopathogenesis

The etiopathogenesis of LP is mostly unknown, however it is considered tobe an autoimmune disorder.

The proposed Etiology includes:

- Idiopathic.
- Drugs.
- Infections & vaccination. (HCV,MMR, DPT)
- Associated with autoimmune disorders. (Ulcerative collitis, Type 2 DM,Myasthenia gravis, LE, Alopecia aerata)
- Contact allergens

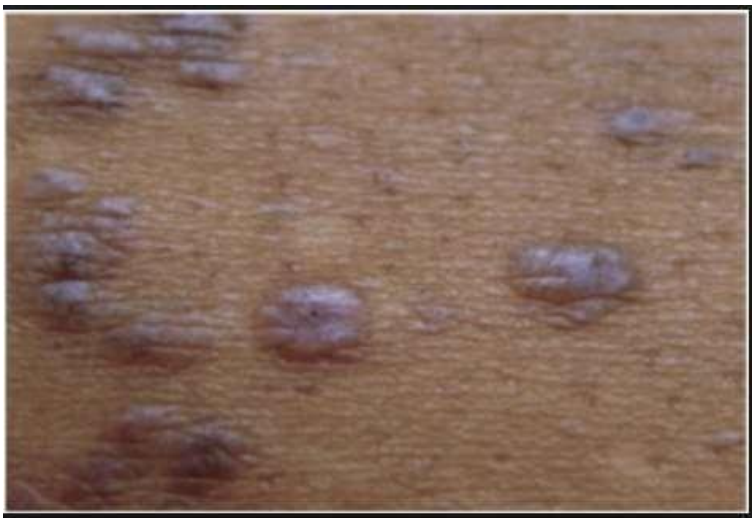
Clinical Features

Classical lesions are violaceous, planetopped, polygonal papules and plaques that are extremely pruritic.

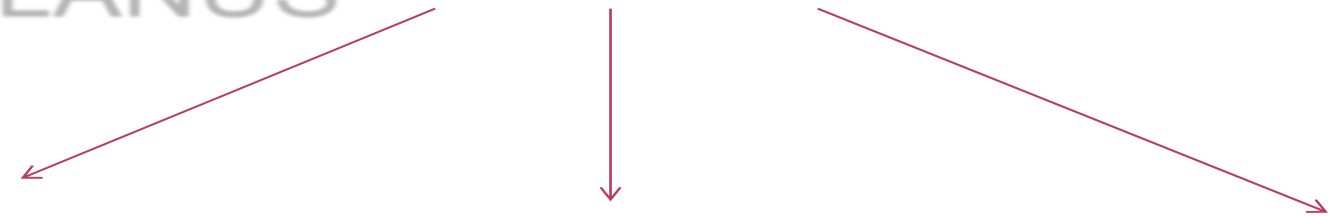
- Fine whitish puncta or radiating reticulate networks k/a Wickham's striae are present over the surface of well developed papules. This corresponds to focal thickening ofthe granular layer.

- +ve Koebner's phenomenon (linear distribution of lesions following trauma) – hallmark of Classical LP
- Common sites : Flexors of wrists and forearms, dorsal surface of hands,ant. aspect of legs, neck and lowerback.
- Lesions heal with hyperpigmentation.





VARIANTS OF LICHEN PLANUS



Configuration of lesions

Annular LP

Linear LP

Morphology of Lesions

a. Hypertrophic LP
b. Atrophic LP
c. Vesicobullous LP
d. Erosive LP
e. LP pigmentosus
f. Actinic LP
g. Eruptive LP

Site of Involvement

a. LP of Scalp
b. Mucosal LP
c. Nail LP (NLP)
d. Inverse LP
e. Palmoplantar LP

1. Annular LP

-Characterized by violaceous papules arranged in a ring like fashion or single large plaquewith central clearing & active raised border.

-Usually seen on glans penis or trunk.

-Atrophic part shows flattened epidermis and loss of rete ridges.

-Annular Atrophic LP (AALP) isan unusual variant with both annular and atrophic features.

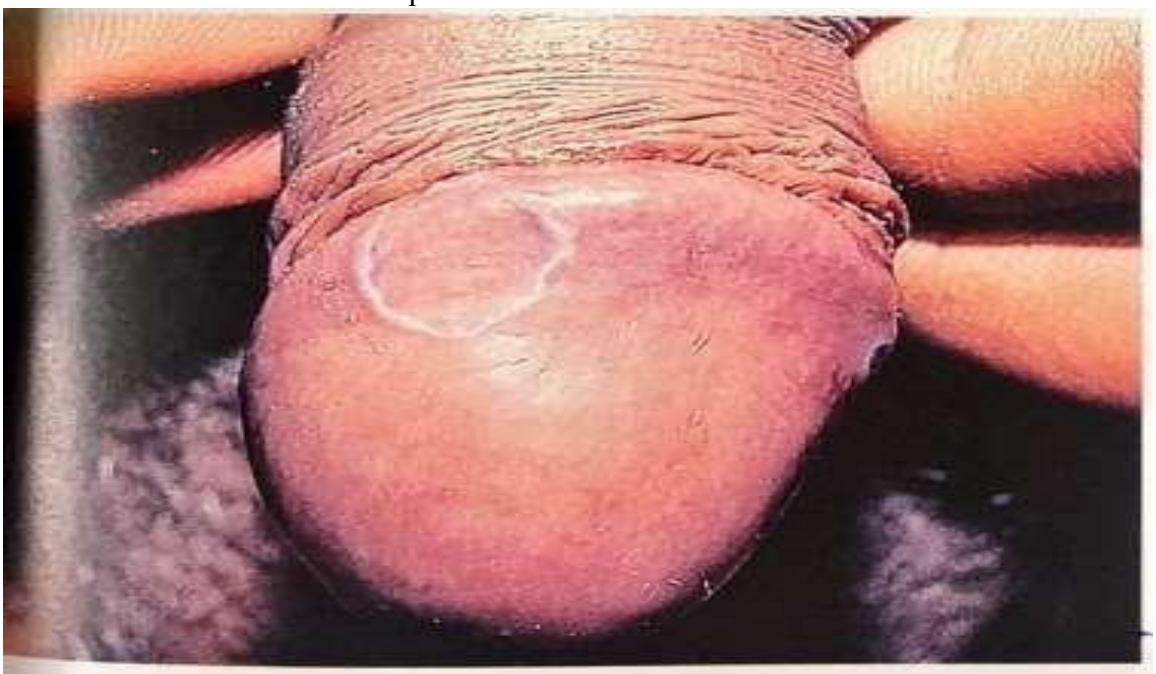


Fig. 28.6: LP: Annular lesions on the glans penis (Courtesy of Dr. Chetan Oberai, Mumbai).

2. Linear LP

- LP lesions occur in a linearfashion following lines of Blashko

- Typically seen on limbs.

- More common in childhood.

-Rarely LP can occur in a linearfashion at the site of a healed herpes zoster scar. (k/a Isotopic response of Wolff)





3. Hypertrophic LP (LPVerrucosus)

- Extremely pruritic form ofLP

-Hyperkeratottic plaques on shins and ankles.
-May coalesce to form thick verrucous plaque with central clearing
-Long standing cases can progress





4. Atrophic LP

-Usually occurs after resolution of typical LP

-Thinning of epidermis and fibrosisof papillary dermis.

-Lesions start as papules □ large plaque □center becomes depressed nd atrophic.

- Corticosteroids aggravate this type.





5. Vesicobullous LP

-Development of blisters within the papules of LP.

-Occurs d/t severe liquefactive degeneration of the basal layer of epidermis i.e. exaggerated Max Joseph space causing sub-epidermal blister.



6. Erosive LP (k/a UlcerativeLP)

-Usually seen on mucosal surfaces of oral cavity or genitalia.

-Characterized by erosions on the surface of papular lesions.

-It is an agrresive form and mayend fatally.





7. Pigmentosus

-Usually seen in skin types III and IV.

-Slate grey to brownish black macules on sun exposed areasand flexural folds.

-Different patterns of pigmentation can be seen diffuse (m/c), reticular, blotchy or perifollicular.





8. Actinic LP (k/a LP Tropicalisor Subtropicalis)

-Onset is usually in summer and lesions primarily involve sun exposed areas.

-Lesions are blue, brown plaques with annular configuration, atrophic centre and hypopigmented raised border.

- No pruritis.
- No Koebnerization.





9. Eruptive LP (k/aacute/exanthematous LP)

-Widely distributed and disseminated lesions over trunk, inner aspect ofwrist and dorsum of feet.

- Self limiting course.

-Heals with hyperpigmentation in 3-9



10. Lichen Planopilaris (k/a Follicular LP or LP of Scalp)

- F>M

-Characterized by chronic lymphocytic inflammation around the upper part of the hair follicle.
-Presents as irregular patchy hair loss with loss of follicular ostia.

- Underlying skin is hypopigmented.

-Perifollicular erythema and perifollicular scales are present at the periphery of the lesion.

- Rare LPP variants are 1.Graham Little Picardi Lassueur Syndrome:

Triad of cicatricial alopecia of scalp,non scarring alopecia of axilla and pubis and perifollicular keratotic papules.

2. Frontal Fibrosing Alopecia(FFA):

Progressive & symmetrical band of frontal/ frontotemporal hair recession and loss of follicular orifices and perifollicular erythema around remaining hairs.





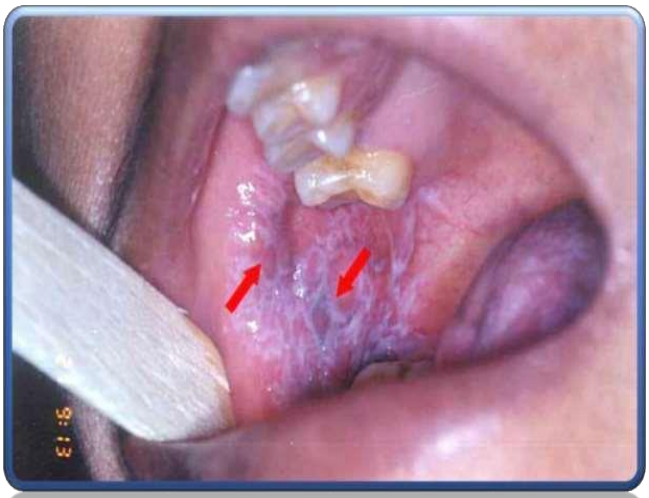


ORAL LP

- Types: Reticular(m/c), Plaque like, Papular, Erosive, Atrophic and Bullous.
- Sites affected are buccal mucosa,(m/c) lateral margins of tongue, gingiva, lips and hard palate.
- Stress, spicy and acidic foods can cause flare ups of the disease.
- Dental amalgams have been indicated in the pathogenesis of oral LP.

- Reticular LP is characterized by irregular atrophic plaques with white streaks in a lacy pattern.
- Erosive LP: large erythematous well defined erosions with or without pseudomembrane formation.
  Lesions are intensely painful.
- Oral LP carries risk of Malignant transformation. (0.4%-1.5%)





GENITAL LP

- Male genitalia are involved in25% cases and the glans penis is most commonly affected with annular lesions frequently present.
- ulval and vaginal LP is usually asymptopmatic till erosions develop.
- Vulval intraoital lesions surrounded by white, lacy, reticulate borders are characteristic
- C/F – Burning, itching, pain, abnormal discharge and dyspareunia.





ESOPHAGEAL LP

- Rare
- Suspected in middle aged womenwith oral LP with c/o dysphagia and odynophagia.
- Endoscopy shows lacy white papules, pin point erosions, desquamation, pseudomembranes and stenosis.
- Malignant transformation to SCChas been reported.

11. Nail LP (NLP)

- Nails are affected in 10% of LPpatients.
- 50-60 yrs.
- fingernails affected more than toenails. A.Typical NLP : diffuse nail ridging,thinning of nail plate, distal splitting,(onychoschizia) and dorsal pterygium

B.Trachonychia : nail roughness and excessive longitudanal ridging.

C.Idiopathic atrophy of nails: acute and rapid course leading to nail destruction ina few months.

- Other nail findings yellow nail syndrome, nail bed erosions, longitudinal melanonychia and erythronychia.

- Pup tent sign – seen d/t nail bed involvement that elevates nail plate and may cause longitudanal splitting.



12. Inverse LP

-Unusual variant in which lesions are present in the intertriginous areas of axilla(m/c), groin, cubital and popliteal fossa.

-Reddish brown discrete papules and nodules are seen.



13. Palmoplantar LP

- young men, 20-40 years

-Highly pruriginous, erythematous scaly plaques with or without hyperkeratosis.

-Lesions are usually present on internal plantar arch and palmswith sparing of fingertips





Special forms of LP or Lichenoid Eruptions.

Drug induced LP–

-May be localized or generalized with eczematous papules and plaquesand variable desquamation.
-They typically manifest as PIH and alopecia and don't show Wickham'sstriae.
-The eruptions are symmetric on trunk and extremities.
-Photodistribution may be seen with some drugs.
-Most lesions disappear in 3-4 months, except Gold induced eruptions which may need upto 2 yrs after discontinuation.



Common inducers

- Gold salts
- β blockers
- Antimalarials
- Diuretics; Thiazide, Furosemide, Spironolactone
- Penicillamine

Less common

- ACE inhibitors
- Calcium channel blockers
- Sulfonylurea
- Nonsteroidal anti-inflammatory drugs
- Ketoconazole
- Tetracycline
- Phenothiazine
- Sulfasalazine
- Carbamazepine
- Lithium
- Antituberculosis
- Iodides
- Radiocontrast media
- Radiotherapy
- Antipsoriatic therapy: Etanercept, Infliximab, Adalimumab
- Omalizumab

Inducers of lichen planus by contact

- Color film developers
- Dental restorative materials
- Musk ambrette
- Nickel
- Gold

Inducers of photodistributed lichenoid eruption

- 5-Fluorouracil (Efudex)
- Carbamazepine (Tegretol)
- Chlorpromazine (Compazine, Thorazine)
- Diazoxide (Proglycem)
- Ethambutol
- Pyritinol
- Quinine
- Quinidine (Quinaglute)
- Tetracycline
- Thiazide
- Furosemide (Lasix)

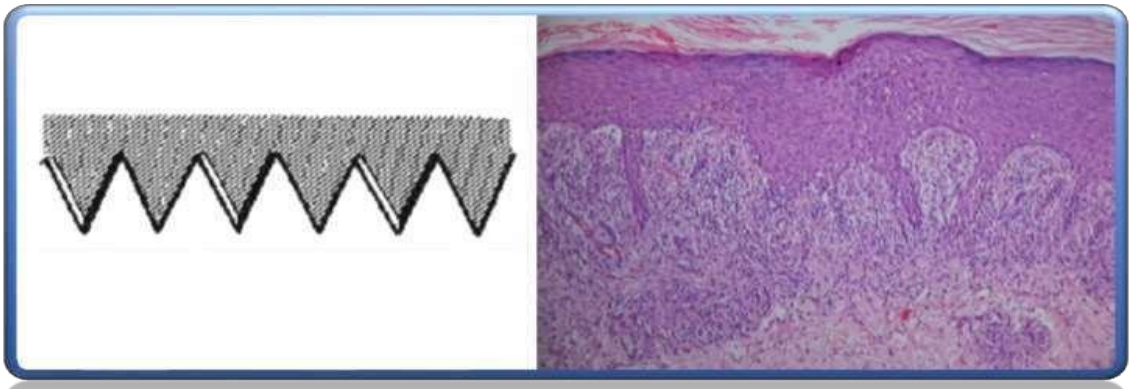
Inducers of oral lichen planus and lichenoid eruption

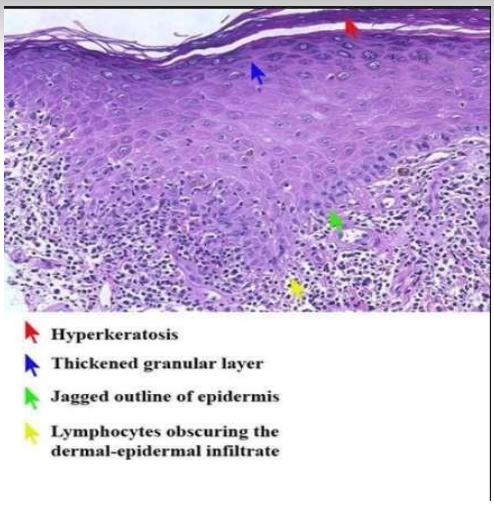
- Allopurinol (Zyloprim)
- ACE inhibitors
- Cyanamide
- Dental restorative materials, Mercury, Silver, Gold
- Gold salts
- Ketoconazole (Ketoconazole)
- Nonsteroidal anti-inflammatory drugs
- Penicillamines (Cuprimine)
- Sulphonylurea
- Interferon-α and Ribavirin

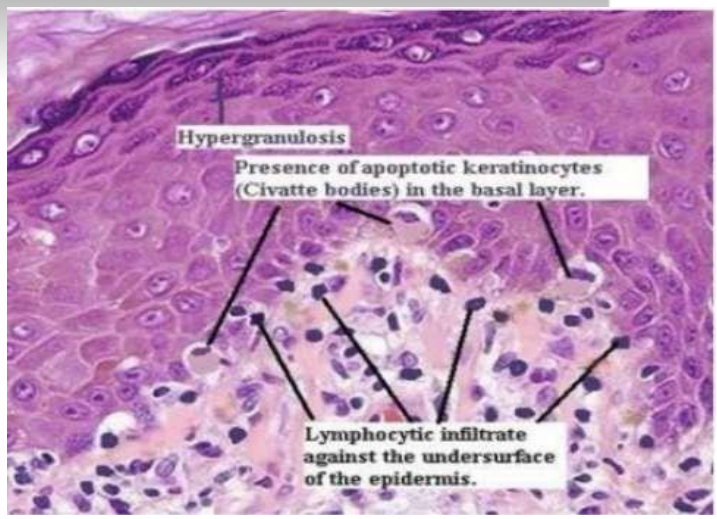
Histopathological Examination

The epidermal changes include hyperkeratosis, wedge shaped areas of hypergranuloses, elongation of rete ridges (saw tooth pattern)

- Multiple apoptotic cells/ colloid-hyaline/ Civatte bodies are seen at the DEJ.
- Band like lymphocytic infiltrate seen in papillary dermis.
- Few eosinophils are seen in drug induced LP.Melanin pigmentation is more in older,waning lesions, in LP pigmentosus and dark skinned individuals.
- Max Joseph spaces (small separation between epidermis and dermis) can be seen d/t interface







Prognosis and Clinical Course

LP is an unpredictable disease that typically persists for 1-2 yrs but may follow a chronic relapsing courseover the years.

The duration varies according to the siteand extent of involvement.

- The duration of the disease fromshortest to longest is :
- Generalized < Cutaneous < Cutaneous+ mucous membrane < Mucous membrane < Hypertrophic <Lichen

Differential Diagnosis

BOX 26-1 DIFFERENTIAL DIAGNOSIS OF LICHEN PLANUS

Classic	Psoriasis
	Drug eruption
	Lichen simplex chronicus
Annular	Granuloma annulare
	Tinea
Linear	Nevus unius lateris
	Lichen striatus
	Linear epidermal nevus
Hypertrophic	Lichen simplex chronicus
	Prurigo nodularis
	Lichenoid cutaneous amyloidosis
	Kaposi sarcoma
Atrophic	Lichen sclerosus
Follicular	Lichen nitidus
	Lichen spinulosus
Childhood	Lichen nitidus
	Lichen striatus
	Pityriasis lichenoides
	Papular acrodermatitis of childhood

BOX 26-2 DIFFERENTIAL DIAGNOSIS OF SITE-SPECIFIC LICHEN PLANUS

Nail	Psoriasis
	Onychomycosis
	Alopecia areata
Genital	Psoriasis
	Seborrheic dermatitis
Palms and soles	Secondary syphilis
Lichen planopilaris	Cicatricial alopecia
	Lupus erythematosus
	Inflammatory folliculitis
	Alopecia areata
	Cicatricial pemphigoid
	Keratosis follicularis spinulosa decalvans
Mucosal	Paraneoplastic pemphigus
	Candidiasis
	Lupus erythematosus
	Leukokeratosis
	Secondary syphilis
	Traumatic patches

TREATMENT OF CUTANEOUS LP

Topical therapy Systemic therapy
Physical/ Phototherapy

GENERAL MEASURES

Avoidance of sun in case of Actinic LP Stop offending Drug

Treat the viral infecton, if present.

Topical Therapy

Potent glucocorticoids used for limited cutaneous disease

Calcineurin inhibitors eg. Tacrolimus, Pimecrolimus.

Intralesional steroids – Triamcinolone acetonide (5-10mg/ml) may be used for treating Nail LP and hypertrophic LP (higher conc. of 10-20mg/ml) every 4 weeks.

Phototherapy

Psoralens and PUVA is usually successful in generalised cutaneous LP.

It is used in conjunction with oral glucocorticoids for faster response.

UV-B, both narrow and broad band are safe and efficient treamtent options.

Systemic Therapy

Systemic glucocorticoids are often useful in doses of 30-80mg/day of prednisone for 4-6 weeks with subsequent tapering over 4-6weeks.

Retinoids: they have an anti inflammatory activity.

- Acitretin 30mg/day for 8 weeks.

- Tretinoin 10-30 mg/day

-Low dose Etretinate 10-20mg/day for 4-6 months has shown complete remission in cutaneous, oral and nail LP

TREATMENT OF ORAL LP

General Measures

- Good oral hygiene.
  -Regular personal and professional dental care.
  -Replacement of amalgam or gold dental restorations.

- Avoid spicy food.

Topical therapy

- Topical steroids: Triamcinolone acetonide 0.1%, Fluocinolone acetonide 0.1%, clobetasol proprionate 0.025% in an Orabase is effective.

- 4-6 times daily application
  -In case of co-infection with Candida, chlorhexidine gluconate mouthwashand topical anticandidal medications.

- Topical Tacrolimus effective in erosive mucosal disease provides relief from burning and pain.
  Pimecrolimus 1% cream is also equally effective.

- Retinoids – topical tretinoin gel is effective in erosive as well as plaque like oral lesions.

  Isotretinoin gel is effective in non
  erosive esions as well.

Annexure 2

Bharath Institute of Higher Education and Research

Sri Lakshmi Narayana Institute of Medical Sciences

Participant list of Value-added course: **LICHEN PLANUS- DR12**

(Nov 2019 – Feb- 2020)

2nd Year MBBS Student			
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3	SUSMITA KHAN	U18MB383	
4	SWAPNIL	U18MB384	
5	SWARNAB JANA	U18MB385	
6	SWATHI .K	U18MB386	
7	TADAR YAMING	U18MB387	
8	TECHI NADAM	U18MB388	
9	THENDRAL NILAVAN .M	U18MB389	
10	TINA CAROLINE J	U18MB390	
11	URVASHI PAL	U18MB391	
12	VAISHNAVI TRIPATHI	U18MB 392	
13	VARSHITHA N	U18MB393	
14	VIKAASH M	U18MB394	
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Dr. Buvanaratchagan

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Asso. Professor, Dermatology
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

Dr.Buvanaratchagan

COORDINATOR

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ANNEXURE-3

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

LICHEN PLANUS Annexure - III

MULTIPLE CHOICE QUESTIONS

Course code: DR12

ANSWER ALL QUESTIONS

1. Pterygium of nail is characteristically seen in:

A. Lichen planus

B. Psoriasis

C. Tinea unguium

D. Alopecia areata

2. . Wickham's striae are seen in

A. Lichen nitidus
B. Lichen scrufosum
C. Lichen planus
D. DLE

3. About micro-munor abscesses which of the following statements are true -

A. Seen in stratus corneum
B. Seen in psoriasis
C. Contain neutrophils only
D. All of the above

4. A 30 year old male presents with pruritic flat-topped polygonal, shiny violaceous papules with flexural distribution. The most likely diagnosis is

A. Psoriasis
B. Pityriasis rosea
C. lichen planus
D. Lichenoid dermatitis

5. Compy's sign (white patches due to degenerated squamous epithelium occurring on buccal Mucosae and gums) is seen in

A. Moniliasis
B. Pemphigus
C. Lichen planus
D. Measles

6. which of the following does not exhibit lichenoid tissue reaction

A. erythema multiforme
B. secondary syphilis
C. lichen planus
D. leukoplakia

7. Which of the following is wrong statement?

A. Koilonychias in Vit B12 deficiency
B. Oncholysis in Psoriasis
C. Mees lines in Arsenic poisoning
D. Pterygium of nails in Lichen Planus

8. psoriatic arthropathy has all features except

A. arthritis precedes or follows
B. seronegative
C. more nail dystrophy is seen than skin plaques
D. cardiac valve involvement is common

9. pseudorhagade are seen in

A. lichen planus
B. ectodermal dysplasia
C. congenital syphilis
D. pemphigus

10. Degeneration of basal cells occur in a) b c)

A. Lichen planus
B. pemphigus
C. psoriasis
D. all of the above

ANNEXURE-3

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

LICHEN PLANUS Annexure - III

MULTIPLE CHOICE QUESTIONS

Susmita Khan

Course code: DR12

ANSWER ALL QUESTIONS

1. Pterygium of nail is characteristically seen in:

A. Lichen planus
B. Psoriasis
C. Tinea unguium
D. Alopecia areata

10/10

2. . Wickham's striae are seen in

A. Lichen nitidus
B. Lichen scrufosum
C. Lichen planus
D. DLE

14/1/20

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D. all of the above

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ANNEXURE-3

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

LICHEN PLANUS Annexure - III

MULTIPLE CHOICE QUESTIONS

Swapnil

Course code: DR12

ANSWER ALL QUESTIONS

1. Pterygium of nail is characteristically seen in:

A. Lichen planus
B. Psoriasis
C. Tinea unguium
D. Alopecia areata

9/10

2. . Wickham's striae are seen in

A. Lichen nitidus
B. Lichen scrufosum
C. Lichen planus
D. DLE

14/1/20

3. About micro-munor abscesses which of the following statements are true -

A. Seen in stratus corneum
B. Seen in psoriasis
C. Contain neutrophils only
D. All of the above

4. A 30 year old male presents with pruritic flat-topped polygonal, shiny violaceous papules with flexural distribution. The most likely diagnosis is

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D. pemphigus

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B. pemphigus
C. psoriasis
D. all of the above

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ANNEXURE-4

Student Feedback Form

Course Name: **LICHEN PLANUS**

Subject Code: **DR12**

Name of Student: _____ Roll No.: _____

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear					
2	Course contents met with your expectations					
3	Lecturer sequence was well planned					
4	Lectures were clear and easy to understand					
5	Teaching aids were effective					
6	Instructors encourage interaction and were helpful					
7	The level of the course					
8	Overall rating of the course	1	2	3	4	5

**** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory***

Suggestions if any:

Signature

Date:14-01-2020

ANNEXURE-4

Student Feedback Form

Course Name: **LICHEN PLANUS**

Subject Code: **DR12**

Name of Student: Swapnil Roll No.: U18MB384

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear					✓
2	Course contents met with your expectations				✓	
3	Lecturer sequence was well planned					✓
4	Lectures were clear and easy to understand				✓	
5	Teaching aids were effective					✓
6	Instructors encourage interaction and were helpful				✓	
7	The level of the course					✓
8	Overall rating of the course	1	2	3	4	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

Signature

Date:14-01-2020

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ANNEXURE-4

Student Feedback Form

Course Name: **LICHEN PLANUS**

Subject Code: **DR12**

Name of Student Susmitakhan Roll No.: U18MB383

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear			✓		
2	Course contents met with your expectations				✓	
3	Lecturer sequence was well planned					✓
4	Lectures were clear and easy to understand				✓	✓
5	Teaching aids were effective				✓	
6	Instructors encourage interaction and were helpful			✓		
7	The level of the course				✓	
8	Overall rating of the course	1	2	3	4	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

Signature

Date:14-01-2020

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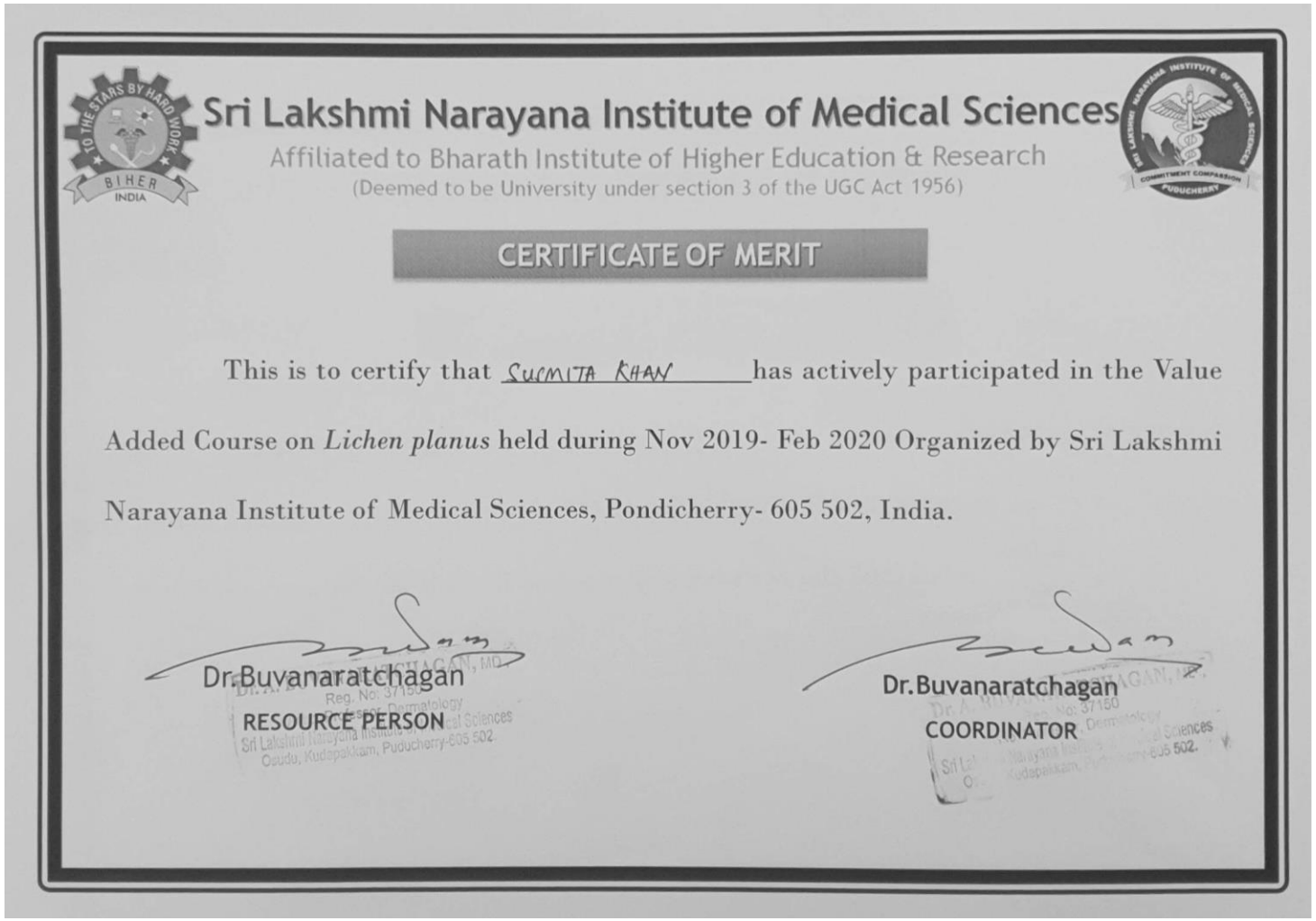

Sri Lakshmi Narayana Institute of Medical Sciences

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(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that SUCMITA KHAN has actively participated in the Value Added Course on *Lichen planus* held during Nov 2019- Feb 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr.Buvanaratchagan
RESOURCE PERSON

Dr.Buvanaratchagan
COORDINATOR

ANNEXURE-5

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that SWAPNIL has actively participated in the Value Added Course on *Lichen planus* held during Nov 2019- Feb 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. A. BUVANARATCHAGAN, MD
Reg. No: 37150
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

Dr.Buvanaratchagan
RESOURCE PERSON

Dr. A. BUVANARATCHAGAN, MD
Reg. No: 37150
Professor of Dermatology
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

Dr.Buvanaratchagan
COORDINATOR

Course completion letter

Date:20-01-2020

From
Dr. Bhuvanaratchagan
Department of Dermatology
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research
Chennai.

Through Proper Channel

To
The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: lichen planus

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: **lichen planus** on 20 11-19. We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching th photographs captured during the conduct of the course.

Kind Regards

Dr. Bhuvanaratchagan

<HOD Sign and Seal>

PROFESSOR & HEAD
DEPT. OF DERMATOLOGY
SRI LAKSHMI NARAYANA INSTITUTE OF
MEDICAL SCIENCES
OSUDU, PUDUCHERRY.

Encl: Certificates

Photographs

Scanned by TapScanner


LICHEN PLANUS

Sri Lakshmi Narayana Institute of Medical Sciences

Date: 25.06.2019

From
Dr.Abarna.V
Department of Microbiology,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

To
The Dean,
Sri Lakshmi Narayana Institute of Medical College
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: Certificate course in Stress management among medical students & Lab automation in clinical microbiology

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled **Certificate course in Stress management among medical students** July 2019 to October 2019 **& Lab automation in clinical microbiology from** November 2019 to March 2020 for undergraduates. We solicit your kind permission for the same.

Kind Regards

Dr.Abarna .V

Department of Microbiology

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: Dr.G.Jayalakshmi

The HOD: Dr.Abarna. V

The Expert: Mrs.Swathi.S

The committee has discussed about the course and is approved.

Dean	Subject Expert	HOD
(Sign & Seal)	(Sign & Seal)	(Sign & Seal)

Dr. G. JAYALAKSHMI, BSC.,MBBS.,DTCD.,M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Ageram Kudapakkam, Post,
Villanur Commune Puducherry-605 502.

DEPT OF MICROBIOLOGY
SRI LAKSHMI NARAYANA INSTITUTE OF
MEDICAL SCIENCES-PONDICHERRY 605 502

DEPT OF MICROBIOLOGY
SRI LAKSHMI NARAYANA INSTITUTE OF
MEDICAL SCIENCES-PONDICHERRY 605 502

Circular

30.10.2019

Sub: Organising Value-added Course: Certificate course in Lab Automation in Clinical microbiology

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research**, is organising ". The course content "**Certificate course in Lab Automation in Clinical microbiology"** form is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before Nov 1st 2019. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

Dr. G. JAYALAKSHMI, BSC.,MBBS.,DTCD.,M.D
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Ageram Kudapakkam, Post,
Villanur Commune Puducherry-605 502

Encl: Copy of Course content form.

Course Proposal

Course Title: Certificate course in Lab Automation in Clinical microbiology

Course Objective:

1. Introduce the students to different fields of communication
2. To learn basic principles of automation
3. To learn the basic skills in automation

Course Outcome: Certificate course in Certificate course in Lab Automation in Clinical microbiology

Course Coordinator: Dr.abarna.V

Course Faculties with Qualification and Designation:

1. **Mrs.Swathi.S MSc, Tutor**
2. **Dr.Naveenkumar.C MSc;Phd, Assistant Professor**

Course Curriculum/Topics with schedule (Min of hours

Sln o	Date	Topic	Time	Hour	Lecture taken by
1.	6.11.2019	Definition of Lab Automation in Clinical microbiology	4-6p.m	2	Mrs.Swathi.S
2.	13.11.2019	Components of Automation	4-6p.m	2	Dr.Naveenkumar.C
3.	20.11.2019	Workflow	4-6p.m	2	Dr.Abarna.V
4.	27.11.2019	Classic system vs Automation	4-6p.m	2	Dr.Abarna.V
5.	4.12.2019	Software used in Lab automation	4-6p.m	2	Dr.Naveenkumar.C
6.	11.12.2019	Quick Tests for Species Identification 1	4-6p.m	2	Mrs.Swathi.S
7.	18.12.2019	Quick Tests for Species Identification 2	4-6p.m	2	Dr.Abarna.V
8.	8.1.2020	Hands On Training of 1,2	4-6p.m	2	Mrs.Swathi.S
9.	22.1.2020	Quick Tests for Susceptibility Testing 1	4-6p.m	2	Mrs.Swathi.S
10.	29.1.2020	Quick Tests for Susceptibility Testing 2	4-6p.m	2	Dr.Abarna.V
11.	5.2.2020	Hands on training of 1,2	4-6p.m	2	Mrs.Swathi.S
12.	19.2.2020	Effects of Laboratory Automation on Incubation Times of Agar Plates	4-6p.m	2	Dr.Abarna.V
13.	26.2.2020	Effects of Laboratory Automation on Quality	4-6p.m	2	Mrs.Swathi.S
14.	4.3.2020	Automated reading	4-6p.m	2	Dr.Abarna.V
15.	11.3.2020	LIS (Laboratory information system)1	4-6p.m	2	Dr.Naveenkumar.C
16	18.3.2020	LIS (Laboratory information system)2	4-6p.m	2	Mrs.Swathi.S

VALUE ADDED COURSE

1. Name of the programme & Code

Lab automation in clinical microbiology

2. Duration & Period

34hrs Nov 2019– March 2020

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Multiple choice questions- *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

34hrs Nov 2019– March 2020

8. Year of discontinuation: 2020

9. Summary report of each program year-wise

Value Added Courses (Nov 2019– March 2020)					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	MIC12	**Lab automation in clinical microbiology**	Mrs Swathi.S	MBBS	Nov 2019– March 2020

10. Course Feed Back

Enclosed as Annexure- V

RESOURCE PERSON **COORDINATOR**

Lab Automation in Clinical microbiology

PARTICIPANT HAND BOOK

BIHER

SLIMS

Annexure1

COURSE DETAILS

Particulars	Description
Course Title	**Lab Automation in Clinical microbiology**
Course Code	MIC12
Objective	1. Definition of Lab Automation in Clinical microbiology 2. Components of Automation 3. Workflow 4. Classic system vs Automation 5. Software used in Lab automation 6. Quick Tests for Species IdentificationDepression 7. . Quick Tests for Susceptibility TestingCritical thinking 8. Effects of Laboratory Automation on Incubation Times of Agar Plates 9. Effects of Laboratory Automation on Quality 10.Automated reading 11.LIS (Laboratory information system)
Further learning opportunities	**Lab Automation in Clinical microbiology**
Key Competencies	On successful completion of the course the students will have an idea of Lab Automation in Clinical microbiology
Target Student	Ahs
Duration	32 hrs Nov 2019– March 2020
Date of discontinuation of course	2020
Theory Session	28hrs
Practical Session	6hrs
Assessment Procedure	Questionnaire

Lab Automation in Clinical microbiology

Date	Time	Topic	Resource person
6.11.2019	4-6pm	Definition of Lab Automation in Clinical microbiology	Mrs.Swathi.S
13.11.2019	4-6pm	Components of Automation	Dr.Naveenkumar.C
20.11.2019	4-6pm	Workflow	Dr.Jayalakshmi.G
27.11.2019	4-6pm	Classic system vs Automation	
4.12.2019	4-6pm	Software used in Lab automation	Dr.Naveenkumar.C
11.12.2019	4-6pm	Quick Tests for Species Identification 1	Mrs.Swathi.S
18.12.2019	4-6pm	Quick Tests for Species Identification 2	Dr.Jayalakshmi.G
8.1.2020	4-6pm	Hands On Training of 1,2	Mrs.Swathi.S
22.1.2020	4-6pm	Quick Tests for Susceptibility Testing 1	Mrs.Swathi.S
29.1.2020	4-6pm	Quick Tests for Susceptibility Testing 2	Dr.Jayalakshmi.G
5.2.2020	4-6pm	Hands on training of 1,2	Mrs.Swathi.S
19.2.2020	4-6pm	Effects of Laboratory Automation on Incubation Times of Agar Plates	Dr.Jayalakshmi.G
26.2.2020	4-6pm	Effects of Laboratory Automation on Quality	Mrs.Swathi.S
4.3.2020	4-6pm	Automated reading	Dr.Jayalakshmi.G
11.3.2020	4-6pm	LIS (Laboratory information system)1	Dr.Naveenkumar.C
18.3.2020	4-6pm	LIS (Laboratory information system)2	Mrs.Swathi.S

1. Defintion of Laboratory Automation in microbiology

"Automation is the technology by which a process or procedure is performed without human assistance

In the laboratory context this means that every switch from manual work to machines can be called automation. In this broad sense all machines in the laboratory are a kind of automation.

As a consequence the introduction of centrifuges into the laboratory routine decades ago had been a form of laboratory automation already. More intuitively acceptable is the term automation for machines executing longer workflows, for example blood culture analysis with continuous growth monitoring or automated minimal inhibitory concentration (MIC) determination.

However, in the current discussion among microbiologists the terms "laboratory automation" or "total lab automation" are normally used for the automation of the diagnostic workflow including all steps from inoculation to final result. Therefore a laboratory automation system has to process different specimen containers, agar plates, broths and slides. Specimens sent to a microbiology laboratory for bacterial culture have to be inoculated and incubated. Subsequently the culture results have to be evaluated, documented and, if need be, follow-up work initiated. Not included in this form of automation is the registration of specimens at the time of their arrival at the laboratory and the generation of a report for the clinician.

2. Components of Lab automation

Laboratory automation consists of two principal components. The first component is hardware and the second component is workflow. Adjusting existing workflows to the possibilities of the automation system is an essential step to fully tap the potential of the respective hardware.

A prerequisite for these adjustments is a flexible, well-structured and adequate control system for the hardware.

Focus of this review is the total lab automation of the classic bacterial culture and the main developments and progresses during the last three to four years. Besides some remarks on the different hardware systems it emphasizes possible and/or necessary workflow alterations in the context of

laboratory automation. It does not cover developments related to PCR or automation of culture of mycobacteria and fun

3. Workflow

A workflow is a repeatable pattern of activity. A pattern consists of a sequence of operations performed by a person, a machine or a combination of both [The term workflow can be used for short and for long sequences of operations. On one hand a workflow can be considered to be the basic organizational element within a laboratory. In this case the lifecycle of a patient sample in the microbiology laboratory can be described as a sequence of workflows. On the other hand, the term workflow is used to describe the whole process from arrival of a sample at the laboratory until the end of the diagnostic procedures.

- Lean

The term lean is a technical term from manufacturing. It arose from the Toyota Production System

- Time to Result

Time to result is the time necessary to generate, produce or receive data. It is the interval between

start and end of a workflow. This can be for example the time from ordering of follow-up work until

reading of the result.

A lean workflow aims at the shortest possible time to result.

- Time to Report

From the laboratory's point of view time to report is the time between arrival of the sample in the

laboratory and dispatch of the (final) report. From the clinician's point of view time to report is the

time between taking the patient sample until receipt of the report.

4. Classic System vs. Automation

The terms "classic system" and "classic workflow" are used for reference to the manual processes currently used in the majority of microbiology laboratories. In the classic system broths, slides and plates are inoculated manually, incubated in stand-alone incubators and read by looking at the actual plates.

The terms "automation" and "automated workflow" are used for reference to processes and workflows which use machinery for inoculation, incubation and imaging and thus have a much reduced manual hands-on time per sample.

However, it is not possible to strictly distinguish between classic and automated workflows because many intermediates with different levels of automation are theoretically possible or actually exist, e.g., due to the development of automated specimen processors. Workflows with a strong emphasis on manual work fall among the definition of "classic workflow". The term "manual workflow" is avoided on purpose because even in the automated workflow many steps have to be done manually.

- Total Lab Automation

The terms total lab automation or total laboratory automation (TLA) are used for reference to

systems which are capable of processing broths, slides and agar plates (media). These systems can

inoculate, incubate and image plates.

- What Is Quality?

To define the term quality for a microbiology laboratory the definitions from manufacturing and management can be consulted

Quality can be described as a measure of excellence and

uniformity. It can be provided by strictly following established standards to obtain results without significant variations. Quality can be implemented by defining standards and adhering to standards.

In process controls are used to monitor adherence to standards.

5. Software used in Lab automation

Looking at the available soft ware one can distinguish different levels of automation.Some automates are capable of inoculation only, some systems can inoculate and incubate. These two versions can be summarized under the term "partial automation". More elaborate systems are capable of inoculation (agar plates, broths and slides), incubation and imaging of agar plates. None of the systems can image slides or broths. These systems are the systems currently

providing the maximum version of automation. Companies try to market these systems as total laboratory automation

and throughout the review this term will be used to designate the most sophisticated systems.

However, in fact even these systems do not provide a "total automation". To fulfil the claim to be

a "total automation" and to fulfil the definition of automation mentioned above many developments

are essential (see paragraph: Wish list). Further information on the systems available can be found in two excellent reviews published in 2016 [12,13].

5. Workflow

The implementation of total lab automation entails auditing and review of longstanding routines.

Some assays, which are easy to perform in the classic system, are cumbersome and inconvenient to perform within an automated workflow.

6.. Quick Tests for Species Identification

In the classic system so called quick tests are performed directly on or from agar plates to guide follow-up work, e.g., catalase test, coagulase test, indole test, oxidase test or different latex agglutinationmtests. They are used to guide follow-up work, i.e., to decide whether further identification (ID) is necessary and which method is best suited for identification. Quick tests are performed directly and immediately when plates are read, that is when the technician holds the plate in her/his hand. In the automated system small tests are possible but time consuming because images are read not actual plates. To perform these tests plates would have to be called to the workstation and this would take time. In the meanwhile (until arrival of the plates) the technician would either have to wait patientl for the plate or continue reading and would have to go back to the specimen as soon as the plate is available. Both alternatives are incompatible with a lean workflow. Additionally, the time necessary to perform a quick test in an automated system is comparable to the time needed to perform a definitive ID. Therefore these tests will disappear in total lab automation and a definitive

ID will be performed in all cases. Since matrix assisted laser desorption ionization – time of flight mass spectrometry

MALDI-TOF MS has largely replaced biochemical identification and is still unrivaled in terms of

short time to result, low cost per determination and versatility and number of identifiable specie with a single workflow MALDI-TOF identification will replace the quick tests This necessary

workflow change will have a collateral benefit. All bacteria will be identified to the species level. Descriptive names for bacteria like "coagulase-negative staphylococci" will disappear

7. . Quick Tests for Susceptibility Testing

Other quick tests can give a hint on susceptibility of bacteria, e.g., PBP2a (penicillin binding protein 2a) agglutination tests for a quick determination of susceptibility of staphylococci towards methicillin. These quick tests can be easily performed during classic reading but are not convenient to perform in an automated workflow for the reasons mentioned above. In the classic system these quick tests are used to determine whether further antimicrobial susceptibility testing (AST) is necessary, i.e., they are used to reduce more laborious and more expensive susceptibility tests (agar diffusion, MIC determination). However, in a certain number of cases two tests have to be performed. In an automated workflow it is easier to perform a definitive susceptibility test (agar diffusion, MIC determination) immediately and thus to avoid double testing and additional hands on time. This will increase the amount of definitive susceptibility tests. The main collateral benefit of only using definitive susceptibility tests is an increase in quality. A certain percentage of all quick test results are either false positive or false negative. These errors are avoided by the described approach.

Agardilution—Susceptibility Testing

Agar plates for agar dilution assays are supplemented with a defined amount of antibiotic.

Because these agar dilution plates are quite expensive (compared to agar plates without supplement)

laboratories tend to use one plate for testing multiple strains. This can easily be done during classic

reading and follow-up work. Plates are manually labeled and depending on the skill of the technician

up to eight or even more different strains can be tested on a single plate. From a quality perspective,

experts have demanded for some time already that only one strain is tested per plate. There is a risk of

confusion of samples and strains during follow-up work and reading of plates if multiple strains are

tested per plate. However, in the laboratory routine applying multiple strains to one plate is still quite

common. In the automated system testing of multiple strains on one plate is not feasible. Each plate

has a unique identifier which steers the plate through the system. As soon as a plate is imaged this

image is added to one sample/specimen/case in the database.

8.. Effects of Laboratory Automation on Incubation Times of Agar Plates

The classic system works with incubation times measured in days. This has historical and organizational reasons. Plates are inoculated on day 0 and read once each following day until the end of the defined absolute incubation time, for example for 2 days. It is not feasible to document individual inoculation times of individual plates in the classic system. With laboratory automation plates are fully tracked as long as they stay within the system. Therefore incubation times can, and must be defined by the hour and minute. However, data on minimum and maximum incubation times are scarce. Laboratory staff normally adheres to the recommended incubation times mentioned in the package insert of the respective plate. These recommendations are normally based on data generated by the manufacturer and these data are mainly confidential and not publicly available. From an organizational point of view two principal types of incubation time exist: (A) the incubation time after which plates are read for the first time, and (B) the incubation time after which plates

are read for the last time. Choice of time of first read is dependent on the intended follow-up work. Choice of time of last read is dependent on the confidence level of a negative result. The longer the expected pathogens need for reliable growth the longer the incubation time has to be chosen. And the slowest pathogen sets the pace. To choose time points A and B optimally we need data on growth kinetics of bacterial species.

With total lab automation the generation of these kinetics is possible for the first time because plates can be imaged after individually chosen intervals of time, for example every two hours.

Looking at the results of bacterial growth kinetics three different time points can be determined: (A) first growth, that is the time point when the first bacterial mass is visible; (B) single colonies, that is the time point when the size and morphology of the colonies allow to distinguish between morphologies and allow follow-up work (species identification, susceptibility testing); and (C) typical growth, that is the time point when the morphology of the growing colonies is characteristic for a bacterial species; this time point can mainly be determined on chromogenic media and it is the color of the colony which is the decisive parameter.

- Incubation Times of Chromogenic Plates

Data on incubation times for growth of methicillin-resistant Staphylococcus aureus (MRSA), certain multi-drug resistant gram-negative bacteria (MDRGN) and vancomycin-resistant enterococci (VRE) on selective chromogenic plates were recently published (Burckhardt, Ann Lab Med 2019). Appearance of first growth was dependent on type and manufacturer of agar plate, bacterial species, bacterial strain and amount of bacteria inoculated. The more bacteria that were inoculated the earlier growth was detected.

First growth was visible as early as four hours after inoculation. However the bacterial mass available on the agar plate at first growth was not sufficient for follow-up work. Additionally different morphologies due to bacterial mixtures could not be distinguished. Single colonies appeared later and their appearance was dependent on the same parameters as the appearance of first growth, which is agar, species, strain and inoculum. In case the plates used were not only selective but also chromogenic a third time point was defined, that is the time point of typical growth. For MRSA this was between 14 and 22 h, for VRE this was between 12 and 48 h. Moreno-Camacho and co-workers showed in their

report, that growth of Escherichia coli,P. aeruginosa,E. faecalis and S. aureus on chromogenic plates was three to four hours faster in the automated system than in their classic system .

- Incubation Times of Agar Diffusion Plates

Incubation time for agar diffusion plates for susceptibility testing traditionally was

Klebsiella pneumonia,Staphylococcus aureus and Staphylococcus epidermidis. Their experiments with

E. coli ATCC 25922, S. aureus ATCC 29213 and more than 100 clinical isolates of each species reveale

9. . **Effects of Laboratory Automation on Special Sample Types**

- Effects on Blood Culture

De Socio and co-workers evaluated the effect of an automated workflow on the time to report for mono-microbial positive blood cultures In their setting the time to report was reduced by 24 h

and the duration of empirical therapy (in contrast to evidence/AST-based therapy) was reduced b The 30-day crude mortality rate was reduced by 12%.

- Effects on Urines

Urine is a sample type which is easy to process with an automated workflow. The container

for urines is simple, the sample itself is liquid, the sample can readily be acquired from the

patient in sufficient amounts and for microbiological work-up only few agar plates are necessary.

Additionally chromogenic media are available which ease the reading process.

As soon as urines were processed with total lab automation two effects were observed.

First, the detection rate of all bacteria and especially of fastidious species rose. This effect

was most pronounced for Alloscardovia omnicolens,Actinotignum schaalii,Gardnerella vaginalis and

Neisseria gonorrhoeae among others [32,33].

Second, the observed times to report were reduced. Klein and co-workers automated a classic workflow where only a single read on day one was common practice in a laboratory staffed 12/7.They observed a reduced time to report of 1.5 h. Theparee and co-workers transformed their classic workflow from first read after a minimum incubation time of 14 h to reading automated images after 12 h of incubation and observed a reduction of time to report of preliminary negative results, ID and

The effects on the time to report for urines and blood cultures were already described above.

10. Effects of Laboratory Automation on Quality

Quality of work will increase if machines are used for inoculation. Machines perform their tasks

in a steady and consistent fashion impossible for humans to achieve. Samples are always shaken

in the same way; the streaking pattern of a machine is always identical and is neither influenced

by inter- or intra-operator/technician variability. Several studies described the generation of more

single colonies [21,38,40] which reduced the number of subcultures for necessary follow-up work

(mainly for MIC determination).

Additionally plates are imaged reliably after a defined incubation time, thus reducing variabilityin colony aspect and size due to differences in incubation time. Reading of plates should be morecomparable and this is an important prerequisite for automated reading (see below).

The phenomenon of higher detection rates of fastidious organisms was already mentioned above. Samples which show no-growth in the classic system but show growth of pathogens in the automated system have to be considered false-negative in the classic system. Most probably the very standardized and constant incubation conditions support the growth of fastidious bacteria.

Culturing, identifying and testing bacteria is the prerequisite for an accurate and evidence-based antibiotic therapy. Therefore the higher recovery rate is an improvement of quality.

11. Automated Reading

Automated reading was evaluated for chromogenic plates (MRSA [

The sites worked with three different chromogenic media and images were taken immediately after manual reading, i.e., after 16–24 h after start of incubation. The authors found an overall sensitivity of 100% and an overall specificity of 90% [

41]. The study on VRE analyzed more than 100,000 VRE plates at three different study sites. The sites worked with 2 different plates and images were taken after 24 h or 40 h. The authors found an overall sensitivity of 100% for VRE detection and a negative predictive value of 100% for automated reading. For reporting purposes this is extremely important because with these data at hand automated reporting of negative reports can be done without further human assistance. However, data on specificity and the positive predictive value were suboptimal with

89% and 38% respectively Glasson and co-workers evaluated automated and classical reading of almost 10,000 urines processed at three different sites and found a sensitivity of 99% and a specificity

of 85% for blood and MacConkey agar. For quantification the agreement was 92% [43

12. LIS

In general microbiology laboratories already work with a computerized laboratory information system. Its function is to enable administration of patient samples, documentation of arrival and processing of samples and follow-up work. It is used to create lab reports. During the implementation of a TLA the

lab manager has to decide whether the LIS remains the master or becomes the slave of the TLA operating system. The decision is essential. A switch during work is not possible.

The currently available systems automate parts of the lifecycle of a patient sample for microbiologic diagnosis. To further improve the systems, to further reduce manual work and to reach the goal of "total automation" the manual parts of the microbiological workflow have to be automated.

Two different kinds of manual work/tasks can be discerned: (A) tasks within the current automated workflow, and (B) tasks before or after or adjacent to the current automated workflow.

Tasks within the current automated workflow which are still done manually are many and varied,

as follows:

(a) filling up the machine with consumables;

(b) sorting of sample containers in specialized racks;

(c) loading and unloading of racks into the specimen processor;

(d) follow-up work (that is identification, susceptibility testing, subculture);

(e) reading of plates;

(f) Generating reports for the clinicians;

(g) waste management;

Tasks before or after the currently automated workflow are many and varied, too, including:

(a) sample registration in the laboratory;

(b) incubation, assessment and documentation of broths;

(c)staining, assessment and documentation of slides;

(d) incubation and further processing of anaerobes and microaerophilic bacteria;

7.2. Which Data Is Needed for Optimization of Automation?

References

1.Groover, P.M. Fundamentals of Modern Manufacturing: Material, Processes and Systems, 4th ed.; John Wiley & Sons Inc.:

Hoboken, NJ, USA, 2010.

2.Wikipedia. Workflow. Available online: https://en.wikipedia.org/wiki/Workflow (accessed on 12 September 2018).

3.Womack, J.P.; Jones, D.T.; Roos, D. The Machine that Changed the World; Free Press: New York, NY, USA, 1990.

Annexure- II

VALUE ADDED COURSE

Certificate course in Lab Automation in Microbiology

MIC12

List of Students Enrolled Nov 2019 – March- 2020

List of MBBS Student			
Sl. No	**Name of the Student**	**Roll No**	**Signature**
1	AAYESHA TAUHEED	U19MB251	
2	ABHIJITH A	U19MB252	
3	ABIHA SHERIN M	U19MB253	
4	ABINAYA SHANMUGAM	U19MB254	
5	ADHITI PRAKASH	U19MB255	
6	ADITHYA S KUMAR	U19MB256	
7	S M AISHMEKA SAIRA	U19MB257	
8	AISHU MUPPANENI	U19MB258	
9	AJETH R	U19MB259	
10	AKASH P	U19MB260	
11	AMIR FAJURA A	U19MB261	
12	AMLAN KUMAR KAR	U19MB262	
13	ANANDHA VIGNESHVAR A	U19MB263	
14	ANISHA C	U19MB264	
15	ANMOL KAUL	U19MB265	
16	ANNET GERIZIM	U19MB266	
17	ANUSHA MOL VINCENT VJP	U19MB267	
18	ARAVIND N	U19MB268	
19	ARNAB ADHIKARI	U19MB269	
20	ARNAB JYOTI DAS	U19MB270	

RESOURCE PERSON

COORDINATOR

Sl. No	Name of the Student	Roll No	Signature
1	ARTHY M	U19MB271	
2	ARUNESHWARAN N	U19MB272	
3	ARUSHI MAHINDRA GAIKWAD	U19MB273	
4	ASHA J	U19MB274	
5	ASHMI RAHIMAN	U19MB275	
6	ATHULYA RAVINDRAN	U19MB276	
7	BALAJI M	U19MB277	
8	BALAJI S	U19MB278	
9	BAVINENI RAMYA SAI SREE	U19MB279	
10	BHUVAN SUNDAR M	U19MB280	
11	BIPIN HARIKUMAR	U19MB281	
12	BOOPATHISHANKAR K	U19MB282	
13	CAMILUS D	U19MB283	
14	CELINA OKRAM	U19MB284	
15	CHALLA SINDHOOR	U19MB285	
16	CHATE RUTUJA BHALCHANDRA	U19MB286	
17	DHARSHANA G	U19MB287	
18	K DHARSHNI	U19MB288	
19	DHIR ASUTOSH ASHIM	U19MB289	
20	EZHILMARAN R	U19MB290	

RESOURCE PERSON

COORDINATOR

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - III

Lab automation in clinical microbiology

Apath

Course Code: MIC12

I. ANSWER THE QUESTIONS:

1. What are the various methods of Lab automation ?

- Bactec culture
-

2. What is LIS ?

laboratory information system

3. What are the quality control used in lab automation?

- tape.

4. What are the quick test for species identification ?

- Vitek

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - III

Lab automation in clinical microbiology

Course Code: MIC12

I. ANSWER THE QUESTIONS:

1. What are the various methods of Lab automation ?

- Lab automation method

2. What is LIS ?

Lab information system

3. What are the quality control used in lab automation?

-

4. What are the quick test for species identification ?

Bacte

AnnexureIV

Student Feedback Form

Course Name: **Lab automation in Clinical Microbiology**
Subject Code: **MIC12**

Name of Student: Ajeeth Roll No.: U19MB259

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear			✓		
2	Course contents met with your expectations				✓	
3	Lecturer sequence was well planned				✓	
4	Lectures were clear and easy to understand			✓		
5	Teaching aids were effective			✓		
6	Instructors encourage interaction and were helpful			✓		
7	The level of the course				✓	
8	Overall rating of the course	1	2	3	4	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

Date: 18/3/2020

Ajeeth
Signature

AnnexureIV

Student Feedback Form

Course Name: **Lab automation in Clinical Microbiology**
Subject Code: **MIC12**

Name of Student: Anmol Kaul Roll No.: U19MB265

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear					
2	Course contents met with your expectations		✓	✓		
3	Lecturer sequence was well planned					
4	Lectures were clear and easy to understand			✓		
5	Teaching aids were effective		✓			
6	Instructors encourage interaction and were helpful			✓	✓	
7	The level of the course					
8	Overall rating of the course	1	2	3	4	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

Signature

Date: 18/2/2020

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that AJITH has actively participated in the Value Added Course on **Lab Automation In Clinical Microbiology** held during Nov 2019 – March 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Mrs.Swathi.S
RESOURCE PERSON

Dr. Abarna.V
COORDINATOR

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that AANMOL KAUL has actively participated in the Value Added Course on **Lab Automation In Clinical Microbiology** held during Nov 2019 – March 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Mrs.Swathi.S
RESOURCE PERSON

Dr. Abarna.V
COORDINATOR

Date : 18.3.2020

From
Mrs.Swathi.S,
The Department of Microbiology,
Sri Lakshmi NarayanaInstitute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To
The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course Certificate course in Lab Automation in Clinical microbiology reg

Dear Sir,

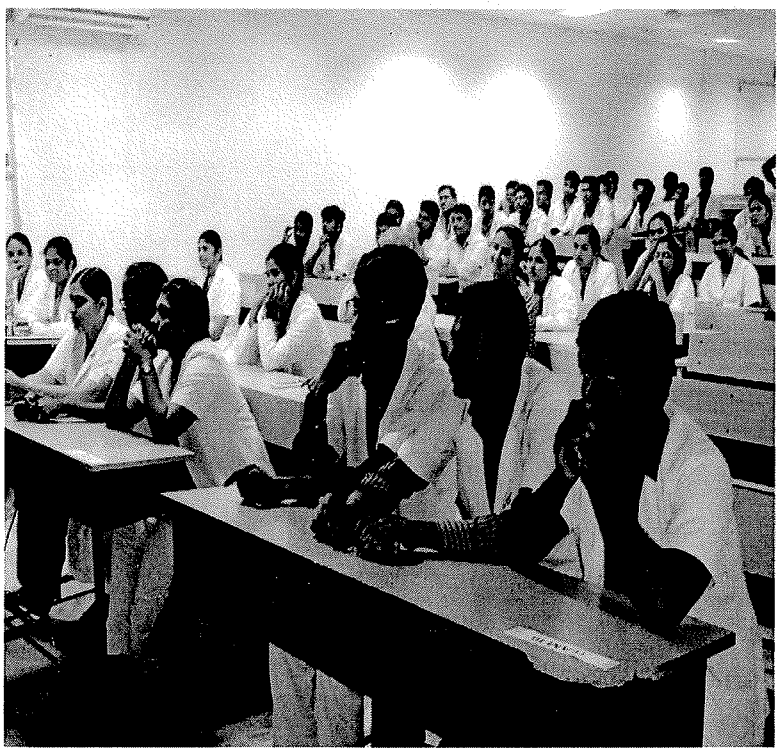
With reference to the subject mentioned above, the department has conducted the value-added course titled**: Certificate course in Lab Automation in Clinical microbiology** from November to March 2020 for 40 students. We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards,
S.Swathi

The Head Department of Microbiology

Encl: Certificates

Photographs



Sri Lakshmi Narayana Institute of Medical Sciences

`

Date: 01.10.2019

From

Dr. V. Raghavendran
Professor and Head,
Department of Pediatrics,
Sri Lakshmi Narayana Institute of Medical Sciences,
Bharath Institute of Higher Education and Research,
Chennai.

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To

The Dean,
Sri Lakshmi Narayana Institute of Medical College
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: Office Practice in Pediatric Nephrology

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: Office Practice in Pediatric Nephrology for final year MBBS students from November to December 2019. We solicit your kind permission for the same.

Kind Regards

Dr. V. Raghavendran

FOR THE USE OF DEANS OFFICE

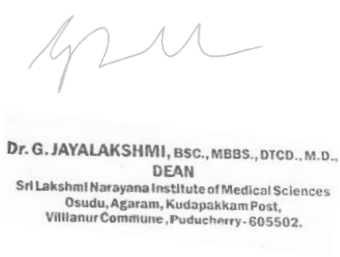
Names of Committee members for evaluating the course:

The Dean: **Dr. Jayalakshmi**

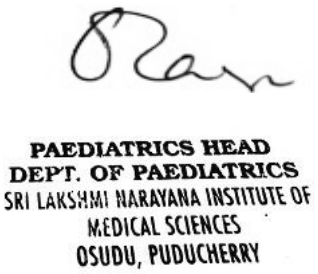
The HOD: **Dr. V. Raghavendran**

The Expert: **Dr. Karuppiah Pandi**

The committee has discussed about the course and is approved.







Dean	Subject Expert	HOD
(Sign & Seal)	(Sign & Seal)	(Sign & Seal)

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affliated to Bharath University, Chennai - TN]

Circular

06.10.2019

Sub: Organising Value-added Course: Office Practice in pediatric Nephrology. reg

With reference to the abovementioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research** is organizing **"Office Practice in pediatric Nephrology"** to be conducted over 2 months - November to December 2019.

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before 20th October 2019. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

Dr. G. JAYALAKSHMI, BSC., MBBS., DTCD., M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Agaram, Kudapakkam Post,
Villianur Commune, Puducherry - 605502.

Encl: Copy of Course content

Course Proposal

Course Title: **Office Practice in Pediatric Nephrology**

Course Objective:

1. To enhance the knowledge regarding diagnosis and management of common kidney related disorders with which children present to the OPD.
2. To make the target students well adversant with the Indian guidelines regarding management of pediatric kidney diseases.
3. To assess the impact of the course by conducting post course assessment of the target students and by getting their feedback.

Course Outcome: Improvement in knowledge about management of common pediatric kidney related disorders encountered in office practice

Course Audience: Final year MBBS students of academic year 2019

Course Coordinator: Dr. V. Raghavendran

Course Faculties with Qualification and Designation:

1.Dr. V. Raghavendran, MD Paediatrics, Professor & HOD

2.Dr. Karuppiah Pandi, MD paediatrics, Associate Professor

3.Dr. Satyamanasa Gayatri Vinay S

Course Curriculum/Topics with schedule (Min of 30 hours)

Sl No	Date	Topic	Faculty	Time	Hours
1.	01.11.2019	Common nephrology problems in Indian children – broad overview	Dr. V. Raghavendran	4-5p.m	1
2.	02.11.2019	Nephrotic syndrome – definition, etiology, pathology	Dr. Karuppiah Pandi	2-3p.m	1
3.	03.11.2019	Nephrotic syndrome – clinical features, lab investigations, treatment of 1st episode	Dr. Satyamanasa Gayatri Vinay S	4-6p.m	2
4.	04.11.2019	Nephrotic syndrome – response to steroid, complications and their management	Dr. V. Raghavendran	4-6p.m	2
5.	06.11.2019	Management of frequently relapsing and steroid dependent nephrotic syndrome	Dr. Karuppiah Pandi	4-6p.m	2
6.	07.11.2019	Nephrotic syndrome – management of steroid resistant cases	Dr. Satyamanasa Gayatri Vinay S	4-5p.m	2
7.	08.11.2019	UTI – definition, etiology, risk factors, clinical features	Dr. V. Raghavendran	4-5P.M	1

8.	09.11.2019	UTI – lab diagnosis, imaging recommendations, treatment	Dr. Karuppiah Pandi	4-6 p.m	2
9.	10.11.2019	UTI - complications and long term sequelae, VUR	Dr. Satyamanasa Gayatri Vinay S	4-6 p.m	2
10	11.11.2019	Pediatric hypertension	Dr. V. Raghavendran	4-5 p.m	1
11	13.11.2019	CAKUT, antenatal hydronephrosis	Dr. Karuppiah Pandi	4-5 p.m	1
12	14.11.2019	AKI, CKD	Dr. Satyamanasa Gayatri Vinay S	4-6 p.m	2
13	15.11.2019	Pre course and Post Course evaluation, Feedback analysis from Likert scale	Dr. V. Raghavendran	2-4 p.m	2
		Practical Class			
13.	16.11.2019	Case discussion – steroid sensitive nephrotic syndrome	Dr. Karuppiah Pandi	3-4 pm	1
14.	17.11.2019	Case discussion – steroid resistant nephrotic syndrome	Dr. Satyamanasa Gayatri Vinay S	3-4 pm	1
15.	18.11.2019	Case discussions – UTI, CAKUT	Dr. V. Raghavendran	2-4 pm	2
16.	20.11.2019	Case discussions – AKI, CLD	Dr. Karuppiah Pandi	2-4 pm	2
17.	21.11.2019	Assessment and giving feedback in weaker areas	Dr. Karuppiah Pandi	2-6 pm	4
		Total			30 hrs

Reference Books (Minimum two)

1. **Nelson Textbook of Pediatrics**
2. **Pediatric Nephrology – Aravind Bagga**

VALUE ADDED COURSE FOR OFFICE PRACTICE IN PEDIATRIC NEPHROLOGY

1. Name of the programme & Code

Office Practice in Pediatric Nephrology and PECO11

2. Duration & Period

30 hrs (November – December 2019)

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Multiple choice questions- *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

Once (November – December 2019)

8. Year of discontinuation: 2020

9. Summary report of each program year-wise

Value Added Course (November – December 2019)					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	PECO11	Office Practice in Pediatric Nephrology	Dr Karuppiah Pandi	Final year MBBS	20 (Nov – Dec 2019)

10. Course Feed Back

Enclosed as Annexure- V

ASSISTANT PROFESSOR
DEPARTMENT OF PAEDIATRICS
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

(Dr. Karuppiah Pandi)

PAEDIATRICS HEAD
DEPT. OF PAEDIATRICS
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
OSUDU, PUDUCHERRY

COORDINATOR
(Dr. V. Raghavendran)

Annexure 1

OFFICE PRACTICE IN PEDIATRIC NEPHROLOGY



PARTICIPANT HAND BOOK

BIHER SLIMS

COURSE DETAILS

Particulars	Description
Course Title	Office practice in pediatric nephrology
Course Code	PECO11
Objective	1. Management of steroid sensitive nephrotic syndrome in children 2. Management of urinary tract infection in children.
Further learning opportunities	Management of Acute kidney injury and end stage renal disease in children
Key Competencies	On successful completion of the course the students will have the knowledge about management of nephrotic syndrome and UTI as per Indian guidelines
Target Student	Final year MBBS Students
Duration	30 hrs (November – December 2019)
Theory Session	20 hrs
Practical Session	10 hrs
Assessment Procedure	Multiple choice questions

Management of steroid sensitive nephrotic syndrome

Nephrotic syndrome is an important chronic disease in children. About 80% children with idiopathic nephrotic syndrome show remission of proteinuria following treatment with corticosteroids, and are classified as 'steroid sensitive'. Most patients have multiple relapses, placing them at risk for steroid toxicity, systemic infections and other complications. A small proportion of patients who are not steroid sensitive (steroid resistant) are also at risk for similar complications and renal insufficiency. Most pediatricians would encounter few patients with nephrotic syndrome in their practice. They should be familiar with management of these patients and be aware of situations in which referral to a pediatric nephrologist is required. Long-term management of these patients should thereafter be a joint effort between the pediatrician and the pediatric nephrologists.

Nephrotic syndrome is characterized by heavy proteinuria, hypoalbuminemia (serum albumin < 200 mg/dL) and edema. Nephrotic range proteinuria is present if early morning urine protein is 3+/4+ (on dipstick or boiling test), spot protein/creatinine ratio >2

mg/mg, or urine albumin excretion >40 mg/m2 per hr (on a timed-sample). Precise quantitative assessment of proteinuria, including 24-hr urine protein measurement is seldom necessary.

Initial Evaluation - A detailed evaluation is necessary before starting treatment with corticosteroids. The height, weight and blood pressure should be recorded. Regular weight record helps monitor the decrease or increase of edema. Physical examination is done to detect infections and underlying systemic disorder, e.g., systemic lupus erythematosus, Henoch Schonlein purpura, etc. Infections should be treated before starting therapy with corticosteroids. Investigations recommended at the initial episode include: (i) urinalysis; (ii) complete blood count, blood levels of albumin, cholesterol, urea and creatinine. Estimation of blood levels of antistreptolysin O and C3 is required in patients with gross or persistent microscopic hematuria. Appropriate tests are performed, if necessary, for associated conditions (e.g., chest X-ray and tuberculin test, hepatitis B surface antigen, antinuclear antibodies). Urine culture is not necessary unless the patient has clinical features suggestive of a urinary tract infection.

Treatment of the Initial Episode - Adequate treatment of the initial episode, both in terms of dose and duration of corticosteroids, is important. Evidence from multiple studies suggests that appropriate therapy at the first episode of nephrotic syndrome is an important determinant of the long-term course of the disease. Medication: The standard medication for treatment is prednisolone or prednisone. The medication is administered after meals to reduce its gastrointestinal side effects. The use of methylprednisolone, dexamethasone, betamethasone, triamcinolone or hydrocortisone is not recommended. There is also limited evidence on the efficacy or benefits of therapy with deflazocort for nephrotic syndrome. Treatment regimen: Various treatment regimens have been used for the treatment of the initial episode of nephrotic syndrome. The International Study for Kidney Diseases in Children had originally recommended a regimen comprising of four-weeks each of daily and alternate day steroid therapy, which was used for almost three decades. Controlled studies later suggested that prolongation of initial steroid therapy for 12 weeks or longer is associated with significantly reduced risk for subsequent relapses. However, prolonged treatment with steroids is

associated with a higher frequency of adverse event. The Cochrane Renal Group, on systematic analysis of the literature, recommends that the duration of initial prednisolone therapy should be for a minimum of 12 weeks. It further suggests that the benefits of sustained remission and reduction in relapse rates are superior if alternate-day treatment is not stopped abruptly at 12 weeks, but tapered over the next 2-4 months. It is emphasized that none of the studies included in this analysis was placebo controlled, most lacked allocation concealment and were not powered to evaluate side effects of prolonged treatment. The debate regarding appropriate dose and duration of steroid treatment is not resolved. Other regimens are being examined that reduce the risk of relapse without increased side effects. Based on current evidence and opinion, the Group recommends that the initial episode of nephrotic syndrome be treated with prednisolone at a dose of 2 mg/kg per day (maximum 60 mg in single or divided doses) for 6 weeks, followed by 1.5 mg/kg (maximum 40 mg) as a single morning dose on alternate days for the next 6 weeks; therapy is then discontinued. The benefits and safety of

prolonged initial steroid therapy, beyond 12 weeks, require confirmation from further studies.

Treatment of Relapse - The patient should be examined for infections, which should be treated before initiating steroid therapy. Appropriate therapy of an infection might rarely result in spontaneous remission, thereby avoiding the need for treatment with corticosteroids. Prednisolone is administered at a dose of 2 mg/kg/day (single or divided doses) until urine protein is trace or nil for three consecutive days. Subsequently, prednisolone is given in a single morning dose of 1.5 mg/kg on alternate days for 4 weeks, and then discontinued. The usual duration of treatment for a relapse is thus 5-6 weeks. Prolongation of therapy is not necessary for patients with infrequent relapses (see below). In case the patient is not in remission despite two weeks treatment with daily prednisolone, the treatment is extended for 2 more weeks. Patients showing no remission despite 4 weeks' treatment with daily prednisolone should be referred for evaluation.

Infrequent Relapsers - Patients who have three or less relapses a year and respond promptly to prednisolone are managed using the aforementioned regimen for each relapse. Such children are at a low risk for developing steroid toxicity.

Frequent Relapsers and Steroid Dependence - Patients with frequent relapses or steroid dependence should be managed in consultation with a pediatric nephrologist. It is usually not necessary to perform a renal biopsy in these cases. Following treatment of a relapse, prednisolone is gradually tapered to maintain the patient in remission on alternate day dose of 0.5-0.7 mg/kg, which is administered for 9-18 months. A close monitoring of growth and blood pressure, and evaluation for features of steroid toxicity is essential. If the prednisolone threshold, to maintain remission, is higher or if features of corticosteroid toxicity are seen, additional use of the following immuno-modulators is suggested. (a) Levamisole is administered at a dose of 2-2.5 mg/kg on alternate days for 12-24 months(7-9). Co-treatment with prednisolone at a dose of 1.5 mg/kg on alternate days is given for 2-4 weeks; its dose is gradually reduced by 0.15-0.25 mg/kg every 4 weeks to a maintenance dose of 0.25-0.5 mg/kg that is

continued for six or more months. Occasionally, it might be possible to discontinue treatment with corticosteroids. The chief side effect of levamisole is leukopenia; flu-like symptoms, liver toxicity, convulsions and skin rash are rare. The leukocyte count should be monitored every 12-16 weeks. (b) Cyclophosphamide is administered at a dose of 2-2.5 mg/kg/day for 12 weeks(10). Prednisolone is co-administered at a dose of 1.5 mg/kg on alternate days for 4 weeks, followed by 1 mg/kg for the next 8 weeks; steroid therapy is tapered and stopped over the next 2-3 months. Therapy with cyclophosphamide should be instituted preferably following remission of proteinuria. Total leukocyte counts are monitored every 2 weeks; treatment with cyclophosphamide is temporarily discontinued if the count falls below 4000/mm3 . An increased oral fluid intake and frequent voiding prevents the complication of hemorrhagic cystitis; other side effects are alopecia, nausea and vomiting. The risk of gonadal toxicity is limited with a single (12 weeks) course of cyclophosphamide. The use of more than one course of this agent should preferably be avoided. In view of its toxicity, the use of chlorambucil, unless under close supervision, is not

recommended. (c) Calcineurin inhibitors: Cyclosporin (CsA) is given at a dose of 4-5 mg/kg daily for 12-24 months. Prednisolone is co-administered at a dose of 1.5 mg/kg on alternate days for 2-4 weeks; its dose is gradually reduced by 0.15- 0.25 mg/kg every 4 weeks to a maintenance dose of 0.25-0.5 mg/kg that is continued for six or more months. Occasionally, treatment with corticosteroids may be discontinued. Estimation of trough blood levels of CsA is required in patients with suspected noncompliance, unsatisfactory response or nephrotoxicity (increase in serum creatinine by 30% or more from the baseline). Trough (12-hr) CsA levels should be kept between 80- 120 ng/mL(12). Side effects of CsA therapy include hypertension, cosmetic symptoms (gum hypertrophy, hirsutism) and nephrotoxicity; hypercholesterolemia and elevated transaminases may occur. Estimation of blood levels of creatinine is required every 2-3 months and a lipid profile annually. A repeat kidney biopsy, to examine for histological evidence of nephrotoxicity, should be done if therapy with calcineurin inhibitors is extended beyond 2 years. Tacrolimus is an alternative agent, administered at a dose of 0.1-0.2 mg/kg daily for 12-24 months. Side effects include hyperglycemia, diarrhea and rarely

neurotoxicity (headache, seizures). The use of tacrolimus is preferred especially in adolescents, because of lack of cosmetic side effects. Blood levels of creatinine and glucose should be estimated every 2-3 months. (d) Mycophenolate mofetil (MMF) is given at a dose of 800-1200 mg/m2 along with tapering doses of prednisolone for 12-24 months(7,14). The principal side effects include gastrointestinal discomfort, diarrhea and leukopenia. Leukocyte counts should be monitored every 1-2 months; treatment is withheld if count falls below 4000/mm3. Choice of agent: The advantages of using these drugs should be balanced against their potential toxicity. There are few studies comparing one agent with another, but evidence for efficacy is strongest for cyclophosphamide and CsA. Levamisole has a modest steroid sparing effect and is a satisfactory initial choice for patients with frequent relapses or steroid dependence. Treatment with cyclophosphamide is preferred in patients showing: (i) significant steroid toxicity, (ii) severe relapses with episodes of hypovolemia or thrombosis, and (iii) poor compliance or difficult follow up, where 12 weeks therapy might be possible to ensure than long-term compliance. Treatment with CsA or tacrolimus is recommended for

patients who continue to show steroid dependence or frequent relapses despite treatment with the above medications. Either of these agents is effective in maintaining remission in most patients with steroid sensitive nephrotic syndrome. The chief concern with their use is nephrotoxicity, but with careful assessment of renal function, minimizing the maintenance dose and utilizing renal biopsies in those receiving prolonged therapy, this risk can be minimized. Recent case series and a controlled trial support the use of MMF as a steroid sparing agent. The lack of renal, hemodynamic and metabolic toxicity with this agent makes it an attractive alternative to calcineurin inhibitors. In some patients receiving therapy with levamisole, MMF and calcineurin inhibitors, treatment with prednisolone might be tapered and discontinued after 6-12 months. Some patients who respond to therapy with levamisole, MMF and calcineurin inhibitors may relapse once these medications are discontinued. Relapses during or following therapy with these agents are treated with prednisolone as described above. Failure of alternative medication: If a patient has two or more relapses over 6 months while on treatment with any of the above agents, its replacement with an alternative medication

should be considered. A protocol summarizing the management of patients with steroid sensitive nephrotic syndrome is shown in Fig. 1. Supportive Care This forms an important aspect of managing children with nephrotic syndrome. Diet: A balanced diet, adequate in protein (1.5-2 g/ kg) and calories is recommended. Patients with persistent proteinuria should receive 2-2.5 g/kg of protein daily. Not more than 30% calories should be derived from fat and saturated fats avoided. While salt restriction is not necessary in most patients with steroid sensitive nephrotic syndrome, reduction of salt intake (1-2 g per day) is advised for those with persistent edema. Salt should not be added to salads and fruits, and snacks containing high salt avoided. Since treatment with corticosteroids stimulates appetite, parents should be advised regarding ensuring physical activity and preventing excessive weight gain. Edema: Control of edema is an integral part of supportive care. Since treatment with corticosteroids usually leads to diuresis within 5-10 days, diuretics are avoided unless edema is significant. Diuretics should also not be given to patients with diarrhea, vomiting or hypovolemia. Patients with persistent edema and weight gain of 7-10% are treated with oral frusemide (1-3 mg/kg

daily). Additional treatment with potassium sparing diuretics is not required if frusemide is used at this dose for less than one week. Patients requiring higher doses and prolonged duration of treatment with frusemide should receive potassium sparing diuretics, e.g., spironolactone (2-4 mg/kg daily). Blood pressure should be monitored frequently. A gradual reduction of edema, over one week, is preferred. Edema not responding to the above therapy should be managed in a hospital. A combination of a loop and thiazide diuretic, and/or a potassium sparing agent is occasionally necessary. For patients with refractory edema, a combination of diuretics and albumin infusion is used. Albumin (20%) is given as an infusion at a dose of 0.5-1 g/kg over 2-4 hr, followed by administration of frusemide (1-2 mg/ kg intravenously). While infusion of albumin results in increased urine output, the effect is not sustained and repeated administration might be necessary. Albumin should be administered very cautiously in patients with renal failure, pneumonia or pulmonary edema due to its potential to increase the plasma volume. Patients receiving albumin should be observed for respiratory distress, hypertension and congestive heart failure. Refractory ascites

interfering with respiration or associated with breaks in the skin may be removed by cautious paracentesis. A protocol for treatment of edema is shown in Fig. 2. Patient and parent education: Long-term outcome of children with steroid sensitive nephrotic syndrome is satisfactory, with the majority in sustained remission and with normal renal functions by adolescence. A proportion of patients, especially those (i) with early onset of nephrotic syndrome, (ii) with a frequently relapsing course, and (iii) requiring treatment with alkylating agents or CsA may continue to show relapses beyond adolescence(18). Parents should be reassured that despite a relapsing course, progression to end stage renal failure necessitating dialysis or transplantation is extremely rare. Parental motivation and involvement is essential in the long-term management of these children. They should be provided information about the disease, its expected course and risk of complications. The following are emphasized: (a) Urine examination for protein at home using dipstick, sulfosalicylic acid or boiling test. The examination should be done every morning during a relapse, during intercurrent infections or if there is even mild periorbital puffiness. The frequency of urine

examination is reduced, to once or twice a week, during remission. The importance of detecting relapse before development of significant edema is stressed. (b) Maintain a diary showing results of urine protein examination, medications received and intercurrent infections. (c) Ensure normal activity and school attendance; the child should continue to participate in all activities and sports. (d) Since infections are an important cause of morbidity, patients should receive appropriate immunization and other measures for protection.

Other medications: The use of antacids or histamine receptor antagonists (e.g., ranitidine) is not necessary, unless there are symptoms of upper gastrointestinal discomfort. Long-term calcium supplementation (calcium carbonate, 250-500 mg) is necessary if the patient receives more than 3 months treatment with prednisolone(19). Patients with steroid sensitive nephrotic syndrome do not usually require medications for hyperlipidemia, since lipids normalize following remission. Immunization: Parents should be advised regarding the need for completing the primary immunization. Administration of some vaccines, e.g., hepatitis B, measles-mumps-rubella or meningococcal vaccines may rarely precipitate a relapse.

Patients receiving prednisolone at a dose of 2 mg/ kg/day or greater, or total 20 mg/day or greater (for patients weighing >10 kg) for more than 14 days are considered immunocompromised(20). Such patients should not receive live attenuated vaccines; inactivated or killed vaccines are safe(20). Live vaccines are administered once the child is off immunosuppressive medications for at least 4 weeks. If there is a pressing need, these vaccines may be given to patients receiving alternate day prednisolone at a dose less than 0.5 mg/kg. All children with nephrotic syndrome should receive immunization against pneumococcal infections(21). It is important to note that not all pneumococcal serotypes are included in the vaccines and that antibody levels may decline during a relapse. Previously vaccinated children may, therefore, develop pneumococcal peritonitis and sepsis. The Expert Group endorses the recommendations of the Immunization Committee of the Indian Academy of Pediatrics(22). The Committee recommends 2-4 doses of the heptavalent conjugate pneumococcal vaccine for children below 2 yr of age. For previously unimmunized children between 2-5 yr old, a priming dose of the conjugate vaccine should be followed 8 weeks later, by a dose of the

23-valent polysaccharide vaccine. Children older than 5 yr require only a single dose of the polysaccharide vaccine. The vaccine should be given during remission, preferably when the child is not receiving daily prednisolone. Revaccination after 5 yr is considered for children (<10-yr-old) with active nephrotic syndrome. Patients in remission and not on immunosuppressive therapy should receive the varicella vaccine. One dose is recommended for children between 12 months and 12 yr of age, and 2 doses separated by an interval of at least 4 weeks for children 13 yr or older(23).

Kidney Biopsy Children with idiopathic nephrotic syndrome not having hematuria, hypertension or impaired renal function are treated with corticosteroids without requiring a kidney biopsy. A biopsy is usually not necessary in patients with frequent relapses or steroid dependence before starting treatment with levamisole, cyclophosphamide or MMF, but should be performed before therapy with calcineurin inhibitors. A biopsy is required to identify the underlying renal disease in certain cases (Table III). Kidney biopsies must be performed by experts with experience in the procedure. Centers that perform kidney biopsies should have facilities for

evaluation of the specimens by light and immunofluorescence microscopy

Complications Patients with steroid sensitive nephrotic syndrome are at risk for certain complications, early detection of which is necessary. Infections: Children with nephrotic syndrome are susceptible to severe infections, which need prompt treatment. Common infections include peritonitis, cellulitis and pneumonia. Viral and bacterial infections may occasionally precipitate relapses in patients previously in remission. The clinical features and management of common serious infections are summarized in Table V. Varicella may be a severe illness in patients with nephrotic syndrome receiving corticosteroids or other immunosuppressive drugs. Susceptible patients (those unimmunized or with no history of varicella) who are exposed to a case of chickenpoxshould therefore receive a single dose of varicella zoster immunoglobulin, within 96 hr of exposure to prevent or lessen the severity of the disease(17). Since, this preparation is expensive and not easily available, a single dose of intravenous immunoglobulin (400 mg/kg) may be used instead(23). However, no clinical data showing the effectiveness of the latter

strategy are available. Patients who develop varicella should receive intravenous acyclovir (1500 mg/m2/day in 3 doses) or oral acyclovir (80 mg/kg/day in 4 doses) for 7-10 days(23). The dose of prednisolone should be tapered to 0.5 mg/kg/day or lower during the infection. Patients with nephrotic syndrome who are Mantoux positive but show no evidence of tuberculosis should receive prophylaxis with INH for six months(24). Those showing evidence of active tuberculosis should receive standard therapy with anti-tubercular drugs. Thrombosis: Children with nephrotic syndrome are at risk for venous and, rarely, arterial thrombosis(16,17). Reduced intravascular volume, immobilization, indwelling vascular catheters, aggressive diuretic use and puncture of deep vessels predispose to thrombus formation. Renal vein thrombosis is suspected in a patient with oligoanuria, hematuria or flank pain, especially following an episode of dehydration. Femoral and mesenteric arterial thrombosis may occasionally occur. Deep vein thrombosis of calf veins is less common in children but may lead to pulmonary embolism. Saggital sinus and cortical venous thrombosis may follow episodes of diarrhea and present with convulsions, vomiting, altered sensorium and

neurological deficits. Ultrasonography, Doppler studies and cranial MRI are useful in confirming the diagnosis. Patients with thrombotic complications require urgent treatment. The treatment includes correction of dehydration and other complications, and use of heparin (IV) or low-molecular-weight heparin (subcutaneously) initially, followed by oral anti-coagulants on the long-term(16,17). There is no role for prophylactic treatment with anticoagulants in patients with hypoalbuminemia and edema. Hypertension: This may be detected at the onset of nephrotic syndrome or later due to steroid toxicity. Therapy is initiated with ACE inhibitors, calcium channel blockers or β adrenergic antagonists, keeping the blood pressure at less than the 90th percentile(25). Hypovolemic shock: This complication can occur due to unsupervised use of diuretics especially if accompanied by septicemia, diarrhea or vomiting. The diagnosis is suggested by moderate to severe abdominal pain, hypotension, tachycardia, cold extremities and poor capillary refill; hematocrit and blood levels of urea and uric acid are elevated. Management consists of rapid infusion of normal saline at a dose of 15-20 mL/kg over 20-30 minutes; this is repeated if clinical features of hypovolemia persist.

Infusion of 5% albumin (10-15 mL/kg) or 20% albumin (0.5-1 g/kg) may be used in subjects who do not respond despite two boluses of saline. Corticosteroid side effects: Prolonged steroid therapy may be associated with significant side effects. Patients (if they can understand) and the parents should be explained about the side effects of the medications, including increased appetite, impaired growth, behavioral changes, risk of infections, salt and water retention, hypertension and bone demineralization. All patients should be monitored for cushingoid features and blood pressure; six-monthly record of height and weight, and yearly evaluation for cataract should be done. Patients on prolonged (>3 months) treatment with steroids should receive daily supplements of oral calcium (250-500 mg daily) and vitamin D (125-250 IU)(19). Steroids during stress: Patients who have received high-dose steroids for more than 2 weeks in the past year are at risk of suppression of the hypothalamopituitary-adrenal axis. These children require supplementation of steroids during surgery, anesthesia or serious infections(26). Corticosteroids are supplemented, as parenteral hydrocortisone at a dose of 2-4

mg/kg/day, followed by oral prednisolone at 0.3-1 mg/kg/day. This is given for the duration of stress and then tapered rapidly.

CONCLUSIONS Recommendations on management of nephrotic syndrome, proposed in 2001, have been reexamined and revised based on systematic reviews, published studies and expert opinion of the members of the Indian Pediatric Nephrology Group. These guidelines are intended to familiarize physicians with principles of management of children with steroid sensitive nephrotic syndrome. Therapy needs to be individualized for each patient and optimal care will be achieved by combined inputs of the primary pediatrician and pediatric nephrologist. Further revisions of these guidelines, indicating best current practice, shall be periodically necessary.

Management of urinary tract infection in children

Urinary tract infection (UTI) is a common bacterial infection in infants and children. The risk of having a UTI before the age of14 years is approximately 1-3% in boys and 3-10% in girls. The diagnosis of UTI is often missed in infants and young children, as urinary symptoms are minimal and often non-specific. Rapid

evaluation and treatment of UTI is important toprevent renal parenchymal damage and renal scarring that can cause hypertension and progressive renal damage. Pediatricians should be aware of the clinical features, diagnosis, management and evaluation of children with UTI. Even a single confirmed UTI should be taken seriously, especially in young children, due to the potential for renal parenchymal damage**.**

Definitions

Infection of the urinary tract is identified by growth of a significant number of organisms of a single species in the urine, in the presence of symptoms. The diagnosis of UTI should be made only in patients with a positive urine culture, since this has implications for detailed evaluation and follow up. Recurrent UTI, defined as the recurrence of symptoms with significant bacteriuria in patients who have recovered clinically following treatment, is common in girls. Recurrent UTI add to parental anxiety, medical costs and the risk of renal parenchymal damage in young infants.

Clinical Features

UTI is an important cause for fever without a focus, especially in children less than 2 years old. In neonates, UTI is usually a part of septicemia and presents with fever, vomiting, lethargy, jaundice and seizures. Infants and young children present with recurrent fever, diarrhea, vomiting, abdominal pain and poor weight gain. Older children show fever, dysuria, urgency, frequency and abdominal or flank pain. Adolescents may have symptoms restricted to the lower tract, and fever may not be present.

The distinction between upper and lower UTI is difficult and not necessary. In view of risks of renal parenchymal damage associated with delayed treatment, UTI in children is considered to involve the upper tract and should be treated promptly. Patients with features of systemic toxicity are considered as having complicated UTI, while those without these features are referred to as simple UTI.

Diagnosis

The diagnosis of UTI is based on positive culture of a properly collected specimen of urine. While urinalysis enables a provisional diagnosis of UTI, a specimen must be obtained for culture prior to

therapy with antibiotics. Significant pyuria is defined as >10 leukocytes per mm3 in a fresh uncentrifuged sample, or >5 leukocytes per high power field in a centrifuged sample. Leukocyturia might occur in conditions such as fever, glomerulonephritis, renal stones or presence of foreign body in the urinary tract. The detection of leukocyturia in absence of significant bacteriuria is not sufficient to diagnose a UTI. Rapid dipstick based tests, which detect leukocyte esterase and nitrite, are useful in screening for UTI. A combination of these tests has moderate sensitivity and specificity for detecting UTI, and is diagnostically as useful as microscopy.

Collection of specimen for culture

A clean-catch midstream specimen is used to minimize contamination by periurethral flora. Contamination can be minimized by washing the genitalia with soap and water. Antiseptic washes and forced retraction of the prepuce are not advised. Inneonates and infants, urine sample is obtained by either suprapubic aspiration or transurethral bladder catheterization. Both techniques are safe and easy to perform.

The urine specimen should be promptly plated within one hour of collection. If delay is anticipated, the sample can be storedin a refrigerator at 4ºC for up to 12-24 hours. Cultures of specimens collected from urine bags have high false positive rates, and are not recommended.

A urine culture should be repeated in case contamination is suspected, e.g. mixed growth of two or more pathogens, or growth of organisms that normally constitute the periurethral flora (lacto-bacilli in healthy girls; enterococci in infants and toddlers). The culture should also be repeated in situations where UTI is strongly suspected but colony counts are equivocal. The number of bacteria required for defining UTI depends on the method of urine collection.

Initial Evaluation

The patient is examined for the degree of toxicity, dehydration and ability to retain oral intake. The blood pressure should berecorded and history regarding bowel and bladder habits elicited. The child is examined for features that suggest an underlying functional or urological abnormality.Complete blood counts, serum creatinine and a

blood culture should be done in infants and children with complicated UTI.I depends on the method of urine collection.

Immediate Treatment

The patient's age, features suggesting toxicity and dehydration, ability to retain oral intake and the likelihood of compliance with medication(s) help in deciding the need for hospitalization. Therapy should be prompt to reduce the morbidity of infection, minimize renal damage and subsequent complications.

Children less than 3 months of age and those with complicated UTI should be hospitalized and treated with parenteral antibiotics. The choice of antibiotic should be guided by local sensitivity patterns. A third generation cephalosporin is preferred. Therapy with a single daily dose of an aminoglycoside may be used in children with normal renal function. Once the result of antimicrobial sensitivity is available, the treatment may be modified. Intravenous therapy is given for the first 2-3 days followed by oral antibiotics once the clinical condition improves.

Children with simple UTI and those above 3 months of age are treated with oral antibiotics. With adequate therapy, there is resolution of fever and reduction of symptoms by 48-72 hours. Failure to respond may be due to presence of resistant pathogens, complicating factors or noncompliance; these patients require re-evaluation.

Duration of Treatment

The duration of therapy is 10-14 days for infants and children with complicated UTI, and 7-10 days for uncomplicated UTI.. Adolescents with cystitis may be treated with shorter duration of antibiotics, lasting 3 days. Following the treatment of the UTI, prophylactic antibiotic therapy is initiated in children below 1 year of age, until appropriate imaging of the urinary tract is completed.

Supportive Therapy

During an episode of UTI, it is important to maintain adequate hydration. A sick, febrile child with inadequate oral intake or dehydration may require parenteral fluids. Routine alkalization of the urine is not necessary. Paracetamol is used to relieve fever; therapy with non steroidal anti- inflammatory agents should be avoided. A

repeat urine culture is not necessary, unless there is persistence of fever and toxicity despite 72 hours of adequate antibiotic therapy.

Evaluation after the first UTI

The aim of investigations is to identify patients at high risk of renal damage, chiefly those below one year of age, and those with VUR or urinary tract obstruction. Evaluation includes ultrasonography, dimercaptosuccinic acid (DMSA) renal scan and micturating cystourethrography (MCU) performed judiciously. An ultrasonogram provides information on kidney size, number and location, presence of hydronephrosis, urinary bladder anomalies and post-void residual urine. DMSA scintigraphy is a sensitive technique for detecting renal parenchymal infection and cortical scarring. MCU detects VUR and provides anatomical details regarding the bladder and the urethra. Follow-up studies in patients with VUR can be performed using direct radionuclide cystography. There is limited evidence that intensive imaging and subsequent management alters the long-term outcome of children with reflux nephropathy diagnosed following a UTI. With availability of antenatal screening, most important anomalies have

already been detected and managed after birth. Therefore, there is considerable debate regarding the need and intensity of radiologic evaluation in children with UTI [1,9].

The Expert Group reviewed the current literature, keeping in view that in our country the diagnosis of UTI is often missed or delayed, and there are limitations of infrastructure and scarcity of resources for routine antenatal screening. Based on the above, it concluded that all children with the first UTI should undergo radiological evaluation. The detection of significant scarring, high grade VUR or obstructive uropathy might enable interventions that prevent progressive kidney damage in the long-term. Since infants and young children are at the highest risk for renal scarring, it is necessary that this group undergo focused evaluation.

It is recommended that all infants with UTI be screened by ultrasonography, followed by MCU and DMSA scintigraphy. Since older patients (1-5 year old) with significant reflux and scars or urinary tract anomalies are likely to show abnormalities on ultrasonography or scintigraphy, a MCU is advised in patients having

abnormalities on either of the above investigations. Children older than 5 years are screened by ultrasonography and further evaluated only if this is abnormal. It is emphasized that patients with recurrent UTI at any age should undergo detailed imaging with ultrasonography, MCU and DMSA scintigraphy. Ultrasonography should be done soon after the diagnosis of UTI. The MCU is recommended 2-3 weeks later, while the DMSA scan is carried out 2-3 months after treatment. An early DMSA scan, performed soon after a UTI, is not recommended in routine practice. Patients showing hydronephrosis in the absence of VUR should be evaluated by diureticrenography using 99mTc-labeled diethylenetriamine-pentaacetic acid (DTPA) or mercaptoacetylglycine (MAG-3). Thesetechniques provide quantitative assessment of renal function and drainage of the dilated collecting system.

Prevention of Recurrent UTI

General

Adequate fluid intake and frequent voiding is advised; constipation should be avoided. In children with VUR who are toilet trained,

regular and volitional low pressure voiding with complete bladder emptying is encouraged. Double voiding ensures emptying of the bladder of post void residual urine. Circumcision reduces the risk of recurrent UTI in infant boys, and might therefore have benefits in patients with high grade reflux .

Bowel bladder dysfunction

Children presenting with recurrent UTI or persistent VUR often have an associated voiding disorder, which are characterized by abnormal patterns of micturition in presence of intact neuronal pathways without congenital or anatomical abnormalities. Abnormal bladder pressure and urinary stasis predispose these children to recurrent UTI. There may be an abnormality either during the filling phase as in an overactive bladder, or the evacuation phase as in dysfunctional voiding.. Since constipation is often associated with a functional voiding disorder, the condition is referred to as Bowel bladder dysfunction(BBD). Children with recurrent UTI are likely to have dysfunctional voiding. Evaluation for a voiding disorder includes a record of frequency and voided volume and fluid intake for two to

three days. It is useful to watch the urinary stream, and for post void dribbling in boys. Urodynamic studies are done in selected cases. The management of voiding disorders should be carried out in collaboration with an expert. This includes the exclusion of neurological causes, institution of structured voiding patterns and management of constipation. In patients with an overactive bladder, therapy with anticholinergic medications (e.g.,oxybutinin) is effective. Patients with bowel bladder dysfunction and large post void residues, benefit from timely voiding, bladder retraining, and clean intermittent catheterization.

Antibiotic Prophylaxis

Long-term, low dose, antibacterial prophylaxis is used to prevent recurrent, febrile UTI. The antibiotic used should be effective, non-toxic with few side effects and should Indications and Duration of Prophylaxis

The indications and duration of prophylaxis depend on patient age and presence or absence of VUR. Antibiotic prophylaxis is recommended for patients with UTI below 1-yr of age while awaiting

imaging studies, high grade VUR, frequent febrile UTI (3 or more episodes in a year) even if the urinary tract is normal. Antibiotic prophylaxis is not advised in patients with urinary tract obstruction (e.g. posterior urethral valves), urolithiasis and neurogenic bladder, and inpatients on clean intermittent catheterization.

Breakthrough UTI on Prophylactic Antibiotics

Breakthrough UTI results either from poor compliance or associated voiding dysfunction. The UTI should be treated with appropriate antibiotics. A change of the medication being used for prophylaxis is usually not necessary. There is no role for cyclic therapy, where the antibiotic used for prophylaxis is changed every 6-8 weeks.

Asymptomatic Bacteriuria

Asymptomatic bacteriuria is the presence of significant bacteriuria in the absence of symptoms of UTI. Its frequency is 1-2% in girls and 0.2% in boys. Asymptomatic bacteriuria is a benign condition, which does not cause renal injury and requires no treatment. The organism isolated in most instances is E. coli, which is of low virulence. Eradication of these organisms isoften followed by symptomatic

infection with more virulent strains. Therapy of asymptomatic bacteriuria or antibiotic prophylaxis is not required . The presence of asymptomatic bacteriuria in a patient previously treated for UTI should not be considered as recurrent UTI

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LIST OF STUDENTS ENROLLED IN VALUE ADDED COURSE ON OFFICE PRACTICE IN PEDIATRIC NEPHROLOGY

S.No	Register No	Students List	Signature
2019	U16MB271	AVIDI VENKATA SAISUSHMA	
2019	U16MB272	AVIRAL PATPATIA	
2019	U16MB273	BALACHANDRAN .A	
2019	U16MB274	BALAJI .S	
2019	U16MB275	BHASKARAN .K.C	
2019	U16MB276	BHAVANI . K.M	
2019	U16MB277	BLESSY AMALA RISHA .J	
2019	U16MB278	CAREENA DANIEL	
2019	U16MB279	CHANDRA PRAKASH.M	
2019	U16MB280	CHINJU S.R	
2019	U16MB281	DASARI VENKATA SAI MOUNISH	
2019	U16MB282	DEBARPITA NATH	
2019	U16MB283	DEEBAK .I	
2019	U16MB284	DEEKSHITH D.R	
2019	U16MB285	DEEPIKAA D.V	
2019	U16MB286	DELFI MARY .E	
2019	U16MB287	DEVIKA.U.M	
2019	U16MB288	DHAKSHANA .M	
2019	U16MB289	EDA SAI VENKATA TEJA	
2019	U16MB290	GAURAV KUMAR	

ASSISTANT PROFESSOR
DEPARTMENT OF PAEDIATRICS
SRI LAKSHMI NARAYANA INSTITUTE OF
MEDICAL SCIENCES

PAEDIATRICS HEAD
DEPT. OF PAEDIATRICS
SRI LAKSHMI NARAYANA INSTITUTE OF
MEDICAL SCIENCES
OSUDU, PUDUCHERRY

Resource Person

Dr Karuppiah Pandi

Course Co Ordinator

Dr V. Raghavendran

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - III

OFFICE PRACTICE IN PEDIATRIC NEPHROLOGY

MULTIPLE CHOICE QUESTIONS

Course Code: PECO11

Name: CHANDRAPRAKASH. M

Roll No: VKMB279

I. ANSWER ALL THE QUESTIONS

1. The Indian guidelines for management of steroid sensitive nephrotic syndrome was updated in

   a. 2001

   b. 2004

   c. 2008

   d. 2012

2. How many percentage of children with nephrotic syndrome respond to steroids?

   a. 100%

   b. 90%

   c. 80%

   d. 70%

3. What is the dose of prednisolone for first episode of nephrotic syndrome?

   a. 1 mg/kg till remission then on alternate days for total 3 months

   b. 2mg/kg for 6 weeks followed by alternate day 1.5 mg/kg for another 6 weeks

   c. 2mg/kg for 4 weeks followed by alternate day 1.5 mg/kg for another 4 weeks

   d. None of the above

4. Which of the following are not complications of long term prednisolone therapy?

   a. Hypertension

   b. Leucopenia

   c. Obesity

-1-

d. Avascular necrosis of femoral head

5. Cyclophosphamide therapy should be discontinued in which of the following conditions?

a. Deranged LFT

b. Deranged RFT

c. Both A & B are Correct

d. WBC count less than 4000/cu.mm

6. Which of the vaccines is contraindicated when a child is on daily prednisolone therapy?

a. Killed influenza vaccine

b. DPT vaccine

c. OPV

d. Hepatitis B vaccine

7. Which of the following does not required treatment with antibiotic?

a. An asymptomatic 2 yr old male with urine culture showing growth of E.coli>10^5 CFU/ml

b. A symptomatic 2 yr old male child with urine routine showing >10/hpf pus cells and positive leucocyte esterase and positive nitrite.

c. Both require antibiotic

d. None require antibiotic

8. Which of the following investigations is not routinely done in an infant with UTI?

a. USG KUB

b. MCU

c. DMSA

d. None of the above

9. Antibiotic prophylaxis is not indicated in which of the following?

a. Grade II VUR

b. Grade V VUR

c. Recurrent febrile UTI

d. Infant with UTI awaiting further investigations

10. What is the gold standard for diagnosis of UTI?

a. Urine routine

b. Urine culture

c. USG KUB

d. DMSA

11. Which of the following is not a risk factor for UTI?

a. Male child more than 1 year old

b. Presence of high grade VUR

c. Constipation

d. Uncircumcised male child

12. What is the duration of antibiotic therapy is a child with complicated UTI?

a. 5 days

b. 7 days

c. 10 days

d. 14 days

8/12

Signature of Student:

Signature of Assessor:

Date: 21.11.2019

-3-

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - III

OFFICE PRACTICE IN PEDIATRIC NEPHROLOGY

MULTIPLE CHOICE QUESTIONS

Course Code: PECO11

Name: Chinju S.R

Roll No: U16MB280

I. ANSWER ALL THE QUESTIONS

1. The Indian guidelines for management of steroid sensitive nephrotic syndrome was updated in

   a. 2001

   b. 2004

   c. 2008 (1)

   d. 2012

2. How many percentage of children with nephrotic syndrome respond to steroids?

   a. 100%

   b. 90%

   c. 80% (1)

   d. 70%

3. What is the dose of prednisolone for first episode of nephrotic syndrome?

   a. 1 mg/kg till remission then on alternate days for total 3 months

   b. 2mg/kg for 6 weeks followed by alternate day 1.5 mg/kg for another 6 weeks

   c. 2mg/kg for 4 weeks followed by alternate day 1.5 mg/kg for another 4 weeks

   d. None of the above (1)

4. Which of the following are not complications of long term prednisolone therapy?

   a. Hypertension

   b. Leucopenia (1)

   c. Obesity

d. Avascular necrosis of femoral head

5. Cyclophosphamide therapy should be discontinued in which of the following conditions?

a. Deranged LFT

b. Deranged RFT

c. Both A & B are Correct

d. WBC count less than 4000/cu.mm

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b. 7 days

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Signature of Student:

Signature of Assessor:

11/12

Date: 21.11.19

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that _ABHIJITH.K_has actively participated in the Value Added Course on *Office Practice In Pediatric Nephrology* held during November – December 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. Karuppiah Pandi

RESOURCE PERSON

Dr. V. Raghavendran

COORDINATOR

Annexure- V

Student Feedback Form

Course Name: Office Practice in Pediatric Nephrology

Subject Code: PECO11

Name of Student: Abhijith K Roll No.: U17MB254

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Feedback Form
FIVE POINT LIKERT SCALE

1. All the Sessions covered all the competencies like knowledge, analysis, training, practical Demonstration, Performance skill on your own and all other aspects related to overall global skills.

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, ~~4~~. Agree, 5. Strongly Agree

2. The content, method of delivery and ambience in the lecture session will help you to develop an overall performer?

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, ~~5~~. Strongly Agree

3. Procedural skill by Tutor demonstration was done with clarity and made you to understand thoroughly.

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, ~~4~~. Agree, 5. Strongly Agree

4. This Methodology of Teaching Learning method made you to understand all aspects of Technical skill thoroughly.

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, ~~4~~. Agree, 5. Strongly Agree

5. You really feel that this method is good and there is increase in the self-confidence?

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, ~~5~~. Strongly Agree

6. This method of Teaching Learning method is comprehensive in developing all competencies.

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

7. By DOPS Assessment method your knowledge, performance general skills and overall ability were completely assessed?

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

8. This method of assessment is Transparent?

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

9. You were given chance to analyze your mistakes and rectify in future in the form of feedback from Examinee?

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

10. Though it is elaborate and time consuming we can apply in future?

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

11. It would be liked and supported by you to have such comprehensive competency testing assessment methods in future?

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

12. It would be liked, supported and strongly recommended by you if this type of TL Method and assessment method is implemented in future.

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

Signature of the CRRI:

Date:

Date: 06.12.2019

From

Dr. V. Raghavendran
Professor and Head,
Department of Pediatrics,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To

The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: Office Practice In Pediatric Nephrology

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: Office Practice In Pediatric Nephrology from November to December 2019 for 20 final year MBBS students. We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards,

Dr. V. Raghavendran

PAEDIATRICS HEAD
DEPT. OF PAEDIATRICS
SRI LAKSHMI NARAYANA INSTITUTE OF
MEDICAL SCIENCES
OSUDU, PUDUCHERRY

Encl: Certificates

Photograph



Sri Lakshmi Narayana Institute of Medical Sciences

Date:5-10-2019

From
DR.Senthil kumar,
Professor and Head,
Department of Physiology,
SLIMS
Bharath Institute of Higher Education and Research,
Chennai.

To
The Dean,
SLIMS
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: Certificate course in role of music in emotional well being

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: Certificate course in Role of music in emotional well being on November 2019. We solicit your kind permission for the same.

Kind Regards

Dr.Senthil kumar

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean:Dr.Balagurunathan

The HOD:Dr.Senthil kumar

The Expert:Dr.B.Deivanayagame

The committee has discussed about the course and is approved.

Dean	Subject Expert	HOD
(Sign & Seal)	(Sign & Seal)	(Sign & Seal)

DEAN
Prof.K.BALAGURUNATHAN,M.S
(General surgeon)
SRI LAKSHMI NARAYANA
INSTITUTE OF MEDICAL SCIENCES
OSUDU PONDICHERRY

PROFESSOR & HOD
DEPARTMENT OF PHYSIOLOGY
Sri Lakshmi Narayana Institute Of Medical Sciences
PONDICHERRY - 605 502.

Circular

10.10.2019

Sub: Organising Value-added Course: reg Certificate course in Role of music in emotional well being

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research**, is organising "_Certificate course in Role of music in emotional well being
". The course content and registration form is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before 1 NOVEMBER 2020. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

DEAN
Prof.K.BALAGURUNATHAN,M.S
(General surgeon)
SRI LAKSHMI NARAYANA
INSTITUTE OF MEDICAL SCIENCES
OSUDU PONDICHERRY

Encl: Copy of Course content and Registration form.

Course Proposal

Course Title: Certificate course in Role of music in emotional well being

Course Objective: Develop skill in music therapy

Course Outcome:Students should know the different types of music which influence health

Course Audience: medical undergraduates

Course Coordinator: Dr.B.Deivanayagame

Course Faculties with Qualification and Designation:

1.Dr.senthil kumar

2.Dr.B.Deivanayagame

3.Dr.Vijayakumar

Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Time	Hours
1	1-11-2019	1. Introduction	2-4PM	2hrs
2	10.11.2019	2. History and origin	2-4PM	2hr
3	12.11.2019	3. Benefits of music	2-4PM	2hrs
4.	14.11.2019	4. How does music therapy work?	1-4PM	3hrs
5	24.11.2019	5. How does music listening produce emotions and pleasure in listeners?	1-4PM	3hr
6	10.12.2019 And 13-12.2019	6. music therapy techniques	1-4PM 2-4pm	5hrs
7	19.12.2019	7. How it work	2-4PM	2hr
8	24.12.2019	8. Practicals	1-4pm	4hrs
			Total Hours	22

REFERENCE BOOKS: (Minimum 2)

1. Bennett, V. (1942). Music and Emotion. The Musical Quarterly, 28(4), 406-414

2. Bisquerra, R. (2003). Educación emocional y competencias básicas para la vida. Revista de Investigación Educativa, 21(1), 7-43

VALUE ADDED COURSE

1. Name of the programme & Code

Certificate course in Role of music in emotional well being PHYC13

2. Duration & Period

30 hrs & November 2019– January 2020

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Multiple choice questions- *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

2 – nov 2019 & - feb 2020

8. Year of discontinuation: 2020

9. Summary report of each program year-wise

Value Added Course- November2019 -January 2020					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	PHYC13	Certificate course in Role of music in emotional well being	Dr.B.Deivanayagame	1st MBBS	20(Nov 19 – Jan 20)

10. Course Feed Back

Enclosed as Annexure- V

RESOURCE PERSON

PROFESSOR & HOD
DEPARTMENT OF PHYSIOLOGY
Sri Lakshmi Narayana Institute Of Medical Sciences
PONDICHERRY - 605 502.

COORDINATOR

COURSE DETAILS

Particulars	Description
Course Title	Certificate course in Role of music in emotional well being
Course Code	PHYC13
Objective	1. Introduction 2. History and origin 3. Benefits of music 4. How does music therapy work? 5. How does music listening produce emotions and pleasure in listeners? 6. music therapy techniques 7. How it work
Further learning opportunities	Music and its application in mental health in old age
Key Competencies	On successful completion of the course the students should have the skill to implement different music therapy to improve the psychological health of the patients
Target Student	1st MBBS Students
Duration	30hrs November 2019– January 2020
Theory Session	18 hrs
Practical Session	4hrs
Assessment Procedure	Multiple choice questions

INTRODUCTION: Music has a remarkable ability to conjure up emotions in individuals. According to Pereira, Teixeira, Figueiredo, Xavier, Castro and Brattico it has been found to be one of —the most pleasurable human experiences". It has the ability to evoke feelings of happiness, sadness and even fear to name but a few (Goycoolea, Levy & Ramirez, 2013). It can even be said that music has a mood altering effect on people, sometimes positive, and sometimes negative. But the correlation between music and emotion is a complex one. For each individual will have differing responses to music based on their own individual musical preference. It can produce different emotions for different individuals and even different emotions in the same individual at different times (Rana & Akhtar, 2011). For the purposes of this study, a musical experience can include (but is not limited to), listening to live music, listening to pre-recorded music, playing a musical instrument and/or singing. Whether an individual chooses to listen to music, play music or sing, the music can have differing effects on people. One reason for this is perhaps that individuals engage with music both consciously and subconsciously, both actively and passively. The level of exposure to music may be by choice or indeed without choice. When an individual organises their music collection on a shelf or on a music device such as an mp3 player and consciously selects a preferred track to listen to, they are actively engaging in their music by organising it, choosing a preferring track and listening to that piece of music (Greasley, Lamont & Sloboda, 2013). Comparatively the exposure to music may also be thrust upon an individual through daily activities. Individuals are indirectly exposed to music in public spaces. For example: a supermarket playing music over an intercom system. Also through the medium of radio, television, a church choir, or even a child's toy, individuals are exposed to music in their

History and origins

Music has been a part of human life for thousands of years. Specifically, experts have found instruments dating back to over 40,000 years ago, suggesting that humans' desire to express themselves or communicate through music is deep rooted. The use of music for therapy and healing dates back to Ancient Greece, but its therapeutic use today began in the 20th century, after World War II had ended. The earliest reference to music therapy comes from a 1789 article called "Music physically considered." The 1800s saw medical research into the therapeutic nature of music grow, and by the 1940s, universities were offering music therapy programs. E. Thayer Gaston, one of three men who pioneered the use of music as a therapeutic tool, had organized and promoted the practice so that it would become an accepted type of therapy. Now, there are many music therapy associations around the world, and music therapists work in private care, education, and social care.

BENEFITS OF MUSIC

1. Improves your cognitive performance
2. Helps boost your mood
3. Promotes weight loss
4. Relieves depression
5. Increases your workout endurance
6. Speeds up post workout recovery
7. Helps ease pain
8. Improves motivation to exercise
9. Higher quality of sleep
10. Induces a meditative state
11. Reduces anxiety
12. Relaxes patients before & after surgery
13. Elevates your mood whilst driving

How does music listening produce emotions and pleasure in listeners?

1. Musical pleasure. The enjoyment of music appears to involve the same pleasure center in the brain as other forms of pleasure, such as food, sex, and drugs. Evidence shows that an aesthetic stimulus, such as music, can naturally target the dopamine systems of the brain that are typically involved in highly reinforcing and addictive behaviors.

In one study, participants listened to their favorite songs after taking naltrexone. Naltrexone is a widely prescribed drug for treating addiction disorders. The researchers found that when study subjects took naltrexone, they reported that their favorite songs were no longer pleasurable (Malik et al., 2017). However, not everyone experiences intense emotional responses to music. Roughly 5% of the populations do not experience chills. This incapacity to derive pleasure specifically from music has been called musical anhedonia.

2. Musical anticipation. Music can be experienced as pleasurable both when it fulfills and violates expectations. The more unexpected the events in music, the

more surprising is the musical experience (Gebauer & Kringelbach, 2012). We appreciate music that is less predictable and slightly more complex.

3. Refined emotions. There is also an intellectual component to the appreciation for music. The dopamine systems do not work in isolation, and their influence will be largely dependent on their interaction with other regions of the brain. That is, our ability to enjoy music can be seen as the outcome of our human emotional brain and its more recently evolved neocortex. Evidence shows that people who consistently respond emotionally to aesthetic musical stimuli possess stronger white matter connectivity between their auditory cortex and the areas associated with emotional processing, which means the two areas communicate more efficiently (Sachs et al., 2016).

4. Memories. Memories are one of the important ways in which musical events evoke emotions. As the late physician Oliver Sacks has noted, musical emotions and musical memory can survive long after other forms of memory have disappeared. Part of the reason for the durable power of music appears to be that listening to music engages many parts of the brain, triggering connections and creating associations.

5. Action tendency. Music often creates strong action tendencies to move in coordination with the music (e.g., dancing, foot-tapping). Our internal rhythms (e.g., heart rate) speed up or slow down to become one with the music. We float and move with the music.

6. Emotional Mimicry. Music doesn't only evoke emotions at the individual level, but also at the interpersonal and intergroup level. Listeners mirror their reactions to what the music expresses, such as sadness from sad music, or cheer from happy music. Similarly, ambient music affects shoppers' and diners' moods.

7. Consumer behavior. Background music has a surprisingly strong influence on consumer behavior. For example, one study (North, et al., 1999) exposed customers in a supermarket drinks section to either French music or German music. The results showed that French wine outsold German wine when French music was played, whereas German wine outsold French wine when German music was played.

8. Mood regulation. People crave 'escapism' during uncertain times to avoid their woes and troubles. Music offers a resource for emotion regulation. People use

music to achieve various goals, such as to energize, maintain focus on a task, and reduce boredom. For instance, sad music enables the listener to disengage from the distressing situations (breakup, death, etc.), and focus instead on the beauty of the music. Further, lyrics that resonate with the listener's personal experience can give voice to feelings or experiences that one might not be able to express oneself.

9. **Time perception**. Music is a powerful emotional stimulus that changes our relationship with time. Time does indeed seem to fly when listening to pleasant music. Music is therefore used in waiting rooms to reduce the subjective duration of time spent waiting and in supermarkets to encourage people to stay for longer and buy more (Droit-Volet, et al., 2013). Hearing pleasant music seems to divert attention away from time processing. Moreover, this attention-related shortening effect appears to be greater in the case of calm music with a slow tempo.

10. **Identity development.** Music can be a powerful tool for identity development (Lidskog, 2016). Young people derive a sense of identity from music. For example, the movie *Blinded by the Light* shows the power of Springsteen songs to speak to Javed's experience on a personal level. The lyrics help him to find a voice he never knew he had, and the courage to follow his dreams, find love, and assert himself.

How does music therapy work?

The way that music affects the brain is very complex. All aspects of music — including pitch, tempo, and melody — are processed by different areas of the brain. For instance, the cerebellum processes rhythm, the frontal lobes decode the emotional signals created by the music, and a small portion of the right temporal lobe helps understand pitch. The reward center of the brain, called the nucleus accumbens, can even produce strong physical signs of pleasure, such as goosebumps, when it hears powerful music. Music therapy can use these deep physical reactions the body has to music to help people with mental health conditions.

When It's Used

Music therapy can be used for a variety of conditions, and with adults or children. The practice can help people suffering from anxiety, depression, and trauma to illuminate or express underlying sources of pain. Those with autism can improve the ability to communicate and socialize through music therapy's structured setting, activities, and relationship. The therapy is also practiced with patients in psychiatric facilities and those in hospice, as well as with their caregivers.

Music therapy can be especially powerful for individuals with Alzheimer's disease, dementia, and brain damage due to stroke or traumatic brain injury. Musical experiences—particularly singing songs from the past—can open a window to expression and emotional awareness, temporarily allowing those clients to express themselves, gain awareness of their emotions, and make connections with their loved ones.

Music Therapy Techniques

Music therapy is an evidence-based intervention for many mental health problems. Therapists can use specialized music therapy techniques to help patients with stress, chronic pain, difficulty communicating, and emotional disorders.

The following methods are some of the most popular with music therapists today.

Singing

When illnesses like stroke and aphasia take away a person's physical ability to speak, singing can provide the first step toward regaining that skill. Music therapists use a method called melodic intonation therapy for these patients. Clients start by singing sounds, then move on to reciting jingles, eventually trying to sing full songs. This process helps the muscles regain the ability to speak.Just as songs help school children learn new information, singing can help patients with memory issues — including dementia — recover information. Catchy tunes can help patients remember important details and can sometimes repair brain damage

.

Playing Instruments

Learning to play an instrument can instill a sense of confidence and self-esteem in a patient. Music counselors can help both children and adults learn new skills, even if they have never played music before. This music therapy technique not only allows patients to feel accomplished, but also gives people a constructive hobby that helps them cope with emotions.

Playing an instrument can help patients with depression learn to enjoy a hobby again and look forward to something. People who have trouble expressing their feelings through words can play melodies that communicate these emotions.

Listening to Music

Patients do not need to write or play music to reap the benefits of music therapy. Listening to music can also provide significant therapeutic benefits. The emotion that music evokes can help clients process their feelings. However, listening to songs in music therapy requires significant, intentional effort. Music counselors have their patients practice receptive listening, which can help people cope with difficult emotions.

Songwriting

Songwriting helps people process difficult and intense emotions. As a music therapy technique, songwriting gives patients a coping mechanism that is both challenging and constructive. Sometimes, it can prove difficult to express intense emotions in talk therapy. Songwriting gives patients a task that can help them process trauma.Clients with musical skills may write both the lyrics and music for a song. Those with less musical background can write lyrics to pre-written music to experience the same benefits. Both methods require that patients name and process difficult emotions.

Drumming

Music counselors use drumming to help people who experience difficulty communicating or suffer from anxiety in social situations. For example, counselors

may use this music therapy technique to help patients on the autism spectrum.Therapists bring several clients together, each with drums in front of them. Patients then hit their drums all together. Sometimes, the counselor adds accompanying music, but not always. Clients use the beat of the drum to communicate with others in the room, who then return the favor. This technique gives people who feel uncomfortable with verbal communication a chance to connect with others in a new way.

Moving to Music

Dancing in music therapy blends receptive listening with more creative music therapy techniques. Clients listen to music and emotionally connect with it. They can then express those emotions through movement. This method can have several positive outcomes, including better mood, improved communication, and heightened self-esteem.

The act of moving the body and getting some exercise can improve a person's mood. This also serves as a healthy coping mechanism for people with mood disorders. By interpreting music and using nonverbal communication, clients improve their communication skills.

Discussing Song Lyrics

Like poetry, song lyrics can evoke strong emotional reactions. Music therapists sometimes lead discussions about song lyrics to help clients. Through this discussion, several topics can arise, giving patients opportunities to talk about difficult elements of their personal lives.

Trying to interpret lyrics also teaches empathy. Furthermore, if two people disagree on the meaning of the words, the therapist can use the disagreement as a chance to show how to resolve conflict.

Materials & Measures

As the research conducted was of a quantitative nature a questionnaire was used to collect the necessary data. The questionnaire consisted of a total of 73 questions divided into four sections which participants of the present research were asked completed. The four sections comprised of two pre-existing questionnaires and two

original questionnaires created for the purpose of this study. Appendix 1. shows the complete questionnaire completed by participants. The online survey tool _Survey Monkey' was utilised for the purpose of gathering data. Survey Monkey allows a user to create a customised survey online and to share a link to that same survey with an audience of their choice. The 73 questions were input into Survey Monkey and a customised survey was created. At the header of the survey a note was added to brief participants of the purpose of the study. At the footer of the survey another note was added containing information on organisations which participants could contact if they were

1 Questionnaire – Section 1 Section 1 of the questionnaire consisted of The Oxford Happiness Questionnaire

Questionnaire – Section 2 Section 2 of the questionnaire consisted of the STOMP test.

Questionnaire – Section 3 Section 3 of the questionnaire consisted of 9 questions relating to engagement and emotional response to music. Questionnaire – Section 4 Section 4 of the questionnaire consisted of 7 questions created by the researcher for the purposes of the present research. The first 3 questions were demographic questions which related to the participants involvement with music, one of which included a subsequent question allowing the participant to enter free-text if they answered _Yes' to that same question. The demographic questions were _Do you play a musical instrument?', _Are you in a band?', _Are you in a choir?'. The last 4 questions of this section related to the importance of music in the participants life, three of which included a subsequent question allowing the participant to enter free-text if they answered _Yes' to that same question. Answers were measured using a measurement of numbers 1 and 2 where 1 equals _Yes' and 2 equals _No'.

ANNEXURE 2

Bharath Institute of Higher Education and Research (SLIMS)

LIST OF STUDENTS ENROLLED

Participant list of Value added course: **Certificate course on role of music on emotional well being**

Sl.No	Reg.No	Name of the candidate	Signature
1	U19MB381	SUGANTHI CLARET D	
2	U19MB382	SUJANA P	
3	U19MB383	SURYAKANT BHARDWAJ	
4	U19MB384	SUSHREE SANGEETA	
5	U19MB385	SWATHI V	
6	U19MB386	SWETHA HARIKUMAR	
7	U19MB387	TANYA PACHORY	
8	U19MB388	THENNARASU V A	
9	U19MB389	TRIYAN HARSHIL SINGH	
10	U19MB390	UBANISHA A	
11	U19MB391	UGARSAN P	
12	U19MB392	VAISNAVI R	
13	U19MB393	VIJAY A M	
14	U19MB394	VIJITHA VIJAYAN	
15	U19MB395	VIMALAN D	
16	U19MB396	VISHNUDEVAN V	
17	U19MB397	R VISHVESHWER	
18	U19MB398	XAVIER VASANTHA MARTINO P	
19	U19MB399	YUKESH KANNA T	
20	U19MB400	ZABIULLAH K A	

ANNEXURE-3

5/8

MCQ

1) In an Orchestra, which is the largest brass section instrument?
   a.Trumpet
   b. Tenor
   c. French horns
   d. Tuba
2) Name the band having its name after a scientist from the movie Barbarella?
   a. Duran Duran
   b. A Ha
   c. Nile Rodgers
   d. Tears for fears
3) The Clawhammer is a playing style associated with an instrument, what is it?
   a. Ukulele
   b. Banjo
   c. Mandolin
   d. Fiddle

4) 27) vName the lead singer born Farrokh Bulsara?
   a. Brian May
   b. Rami Malek
   c. Freddie Mercury
   d. Jim Hutton

5) The famous hymn written by Julia Ward Howe is?
   a. "Battle Hymn of the Republic"
   b. Mine eyes have seen the glory
   c. How Great Thou Art
   d. Here, I am Lord

6) A music therapist working with a group of clients who are depressed has chosen a songwriting experience. To establish trust within the group, the therapist should

A. Compose a song using input from group members who participate.

B.emphasize proper use of rhyme schemes and musical form to provide structure.

C. Encourage each client to contribute a personal thought for use in the lyrics

.D. Instruct each client to write and sing a solo verse for the song.

7. A music therapist has recently started to work in a forensic setting. The music therapist was given very clear instructions concerning safety of the clients: no instruments can be brought onto the unit, including guitar, keyboard, and percussion instruments. Which of the following is the BEST action for the therapist to take?

A. Request permission to bring in small instruments.B. Adhere to the instructions C. Bring in small instruments based on best professional judgement.D. Question the administration about the severe restrictions

8. A 7-year-old girl with a severe developmental disability is receiving music therapy in a residential setting. She is nonverbal and *prone to* be fearful and anxious in new situations. When brought into the therapy room for her first session, she actively resists and begins to cry. The music therapist, working in an improvisational model, might do which of the following? 1. Meet the child by playing music to express the intensity of her crying.2. Reflect the child's sound and breathing with careful musical phrasing.3. Comfort the child by holding and rocking her while singing soothing lyrics.4. Sing without words so the child hears another voice that corresponds to how she is feeling.

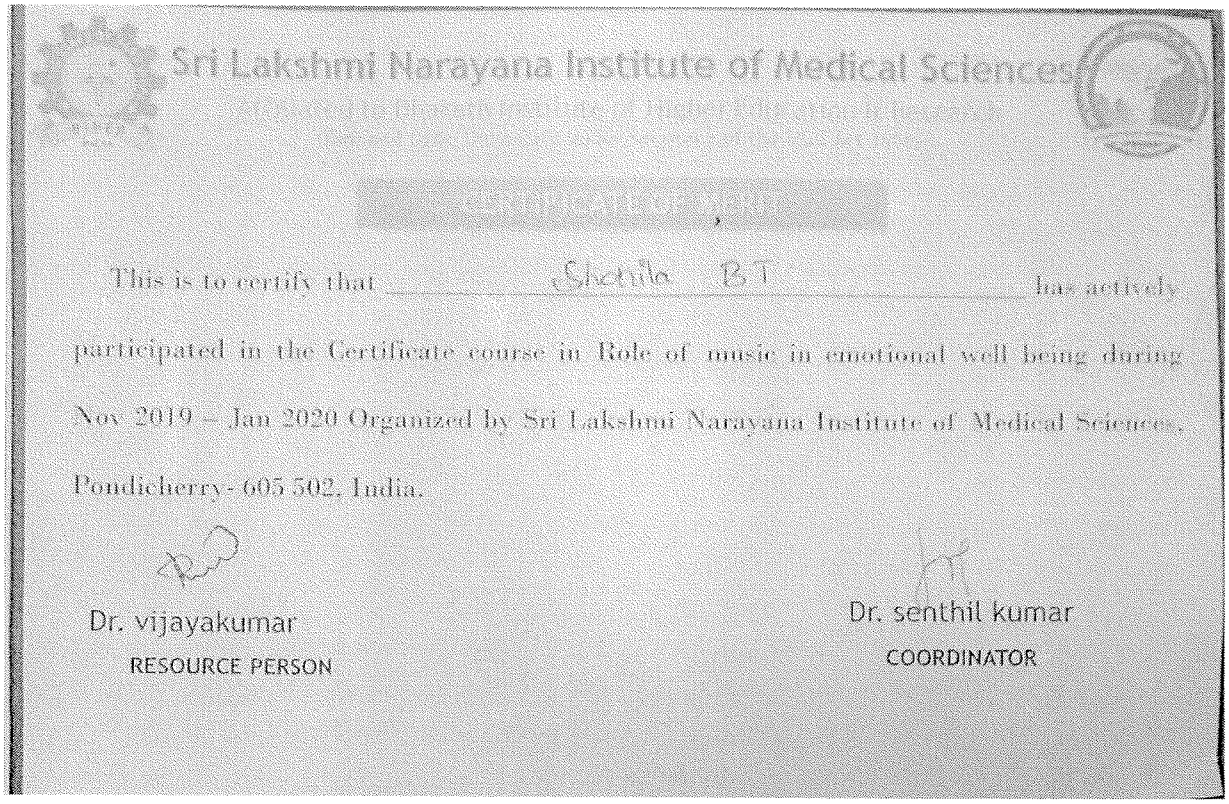
A. 2, 3, and 4 only

B. 1, 2, and 3 only 1, 2, and 3 onlY

C. 1, 3, and 4 only

D. 1, 2, and 4 only

Annexure 4



Sri Lakshmi Narayana Institute of Medical Sciences

This is to certify that Shetila BT has actively participated in the Certificate course in Role of music in emotional well being during Nov 2019 – Jan 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry - 605 502, India.

Dr. vijayakumar
RESOURCE PERSON

Dr. senthil kumar
COORDINATOR

ANNEXURE 5

Course/Training Feedback Form

Course: Certificate Course in Role of Music in Emotional well being
Date: 24/11/2019
Name: Vaishnavi
Reg NO. U19MB392
Department: physiology

Q 1: Please rate your overall satisfaction with the format of the course:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 2: Please rate course notes:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 3: The lecture sequence was well planned

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 4: The lectures were clear and easy to understand

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 5: Please rate the quality of pre-course administration and information:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 6: Any other suggestions: Nil

Comments: Class was very useful

Thank you for taking the time to complete this survey, your comments are much appreciated.

***OPTIONAL Section*:** Name Vaishnav
Signature Vaishnavi Date 24/11/2019

COURSE COMPLETION LETTER

Date6.01.2020

From
B.Deivanayagame,
Department of physiology,
SLIMS
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To
The Dean,
SLIMS
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: Certificate course in Role of music in emotional well being

Dear Sir,

With reference to the subject mentioned above, the department has conducted thevalue-added course titled: _ Certificate course in Role of music in emotional well being on 6th january 2020. We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.
Kind Regards

Dr.B.Deivanayagame

Encl: Certificates

Photographs

PHOTOGRAPHS



Sri Lakshmi Narayana Institute of Medical Sciences

Date: 04.05.2019

From

Dr.Jansi Rani
Professor and Head,
Department of Biochemistry,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

To

The Dean,
Sri Lakshmi Narayana Institute of Medical College
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: Quality control in clinical laboratory

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: Quality control in clinical laboratory for interns November to December 2019. We solicit your kind permission for the same.

Kind Regards

Dr. Jansi Rani

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean:

The HOD: Dr. Jansi Rani

The Expert: Dr. Kajalakshmy

The committee has discussed about the course and is approved.

Dean
(Sign & Seal)

Subject Expert
(Sign & Seal)

DEPARTMENT OF BIOCHEMISTRY
Sri Lakshmi Narayana Institute Of Medical Sciences
PONDICHERRY - 605 502.

HOD
(Sign & Seal)

PROFESSOR & HOD
DEPARTMENT OF BIOCHEMISTRY
Sri Lakshmi Narayana Institute Of Medical Sciences
PONDICHERRY - 605 502.

Dr. G. JAYALAKSHMI, BSC.,MBBS.,D.C.D.,M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Ageram Kudapakkam, Post,
Villanur Commune Puducherry 605 502.

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affliated to Bharath University, Chennai - TN]

Circular

07.04.2018

Sub: Organising Value-added Course: Quality control in clinical Biochemistry. reg

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Quality control in clinical biochemistry"**. The course content and registration form is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before April and May -2018. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

Dr. G. JAYALAKSHMI, BSC.,MBBS.,DTCD.,M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Agaram Kudapakkam, Post,
Villanur Commune Puducherry-605 502.

Encl: Copy of Course content

VALUE ADDED COURSE

1. Name of the programme & Code

Quality control in clinical Biochemistry-BIO-12

2. Duration & Period

30 hrs & November – December 2019

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Assessment closed

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

1 time Nov- Dec 2020

8. Year of discontinuation: 2020

9. Summary report of each program year-wise

Value Added Course- May –June 2020					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	BIO 12	**Quality control in clinical laboratory**	Dr. Jansi Rani Dr.Kajalaksmy	MBBS Students	20 students MAY-JUNE 2019)

10. Course Feed Back

Enclosed as Annexure- V

RESOURCE PERSON

1. **Dr.Jansi Rani**
2. **Dr. Kajalakshmy**

COORDINATOR

Dr.Jansi Rani

PROFESSOR & HOD
DEPARTMENT OF BIOCHEMISTRY
Sri Lakshmi Narayana Institute Of Medical Sciences
PONDICHERRY 605 502

Course Proposal

Course Title: **Quality control in clinical Biochemistry**

Course Objectives:

- To understand about quality management to MBBS students
- Quality control in the medical laboratory is a statistical **process** used to monitor and evaluate the analytical **process** that produces patient results
- To control off pre-analytical and analytical variable

Course Outcome: To improvement of quality control in clinical laboratory and helpful for MBBS students

Course Audience: MBBS students 2019 Batch

Course Coordinator: Dr.Jansi Rani

Course Faculties with Qualification and Designation:

1.Dr.Jansi Rani, Professor & HOD

2.Dr.Kajalakshmy, Assistant Professor

Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Time	Hours
1.	3-11-2019	Introduction to quality control biochemistry	2-3p.m	1
2.	4-11-2019	Introduction to quality control biochemistry	4-6p.m	2
3.	5-11-2019	1. Quality Control a. What is Quality Control? b. Quality Control Products c. Regular Testing	4-6p.m	2
4.	6-11-2019	2. Quality Control d. What is Quality Control? e. Quality Control Products	4-6p.m	2

		3. Regular Testing		
5.	8-11-2019	Pre analytical errors	4-6p.m	2
6.	10-11-2019	Pre analytical errors	4-6p.m	2
7.	12-11-2019	Internal quality control	4-6p.m	2
8.	13-11-2019	Internal quality control	4-6p.m	2
9.	14-11-2019	External quality assessment	4-6p.m	2
10.	15-11-2019	External quality assessment	4-6p.m	2
11.	18-11-2019	Levey-Jennings Charts & Westgard Rules.	4-6p.m	2
12.	19-11-2019	Levey-Jennings Charts & Westgard Rules.	4-6p.m	2
13.	21-11-2019	Levey-Jennings Charts & Westgard Rules.	4-5p.m	1
14.	22-11-2019	Six sigma in clinical laboratory	4-6p.m	2
15.	23-11-2019	Six sigma in clinical laboratory	4-6p.m	2
16.	25-11-2019	Six sigma in clinical laboratory	4-5p.m	1
17.	26-11-2019	Practical section- Quality control	4-6p.m	2
		Total		31hrs

REFERENCE BOOKS:

1. Briggs, R. 1996 Analytical Quality Assurance in Water Quality Monitoring. World Health Organization, Geneva

2. HMSO 1994 The Microbiology of Drinking Waters. Report 71. Her Majesty's Stationery Office, London
3. ISO 1984 Development and Operations of Laboratory Proficiency Testing Guide 43(E), International Organization for Standardization, Geneva.

Annexure- I

COURSE DETAILS

Particulars	**Description**
Course Title	**QUALITY CONTROL IN CCLINICAL**
Course Code	BIO02
Topics and content of the course in the Hand book	1. Introduction to quality control biochemistry 2. Quality Control a. What is Quality Control? b. Quality Control Products c. Regular Testing 3. Preanalytical errors 4. Internal quality control 5. External quality assessment 6. Levey-Jennings Charts & Westgard Rules 7. Six sigma in clinical laboratory
Advantages of learning and evaluation	• serve accountability and accreditation requirements; • enhance the reputation of the faculty/department/school/university, and meet external demands for demonstrating quality, quality assurance and quality enhancement • continuously improve themselves, the students and the work of the university. Continuous improvement is both the medium and outcome of quality assurance;
Further learning Opportunities	To development of quality control in clinical laboratory

Course Proposal

Course Title: **Quality control in clinical Biochemistry**

Course Objectives:

- To understand about quality management to MBBS students
- Quality control in the medical laboratory is a statistical **process** used to monitor and evaluate the analytical **process** that produces patient results
- To control off pre-analytical and analytical variable

Course Outcome: To improvement of quality control in clinical laboratory and helpful for MBBS students

Course Audience: MBBS students 2018 Batch

Course Coordinator: Dr.Jansi Rani

Course Faculties with Qualification and Designation:

1.Dr.Jansi Rani, Professor & HOD

2.Dr.Kajalakshmy, Assistant Professor

Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Time	Hours
1.	3-4-2018	Introduction to quality control biochemistry	2-3p.m	1
2.	4-4-2018	Introduction to quality control biochemistry	4-6p.m	2
3.	5-4-2018	1. Quality Control a. What is Quality Control? b. Quality Control Products c. Regular Testing	4-6p.m	2
4.	6-4-2018	2. Quality Control d. What is Quality Control? e. Quality Control Products	4-6p.m	2

		3. Regular Testing		
5.	8-4-2018	Pre analytical errors	4-6p.m	2
6.	10-4-2018	Pre analytical errors	4-6p.m	2
7.	12-4-2018	Internal quality control	4-6p.m	2
8.	13-4-2018	Internal quality control	4-6p.m	2
9.	14-4-2018	External quality assessment	4-6p.m	2
10.	15-4-3028	External quality assessment	4-6p.m	2
11.	18-4-2018	Levey-Jennings Charts & Westgard Rules.	4-6p.m	2
12.	19-4-2018	Levey-Jennings Charts & Westgard Rules.	4-6p.m	2
13.	21-4-2018	Levey-Jennings Charts & Westgard Rules.	4-5p.m	1
14.	22-4-2018	Six sigma in clinical laboratory	4-6p.m	2
15.	23-4-2018	Six sigma in clinical laboratory	4-6p.m	2
16.	25-4-2018	Six sigma in clinical laboratory	4-5p.m	1
17.	26-4-2018	Practical section- Quality control	4-6p.m	2
		Total		31hrs

Key Competencies	Quality improvement
Target Student	MBBS students
Duration	
Theory Session	31 hours
Assessment Procedure	Multiple choice questions

REFERENCE BOOKS:

1. Briggs, R. 1996 Analytical Quality Assurance in Water Quality Monitoring. World Health Organization, Geneva

2. HMSO 1994 The Microbiology of Drinking Waters. Report 71. Her Majesty's Stationery Office, London
3. ISO 1984 Development and Operations of Laboratory Proficiency Testing Guide 43(E), International Organization for Standardization, Geneva.

QUALITY CONTROL IN CLINICAL LABORATORY



PARTICIPANT HAND BOOK

3. SHARPS: These are the items that could cause cuts or puncture wounds, including; □Needles, □Scalpel and other blades, □Knives, □Infusion sets, □Saws, □Broken glass, and nails.

4.PHARMACEUTICAL WASTE: It includes expired, unused, spilt, and contaminated □Pharmaceutical products, □Drugs, □Vaccines, and sera

5. GENOTOXIC WASTE: • Genotoxic waste is highly hazardous and may have; □Mutagenic, □Teratogenic, or □Carcinogenic properties.

• It raises serious safety problems, both inside hospitals and after disposal, and should be given special attention. • It includes certain cytostatic drugs, vomit, urine, or feces from patients treated with cytostatic drugs, chemicals, and radioactive material.

6. CHEMICAL WASTE: It consists of discarded □Solid, □Liquid, and □Gaseous chemicals

Chemical waste may be hazardous or nonhazardous. It is considered to be hazardous if it has at least one of the following properties: □Toxic, □Corrosive (acids of pH < 2 and bases of pH> 12) □Flammable, □Reactive □Genotoxic

7. WASTES WITH HIGH CONTENT OF HEAVY METALS: It represents a subcategory of hazardous chemical waste, and is usually highly toxic. It includes □Batteries, □Broken thermometer, □Blood-pressure gauges.

8. PRESSURIZED CONTAINERS: Many types of gas are used in health care, and are often stored in pressurized cylinders, cartridges, and aerosol cans. Most

common gases used in health care includes: □Anesthetic gases □Ethylene oxide □Oxygen □Compressed air

9. RADIOACTIVE WASTE: It includes the X- rays, α- and β- particles, and γ- rays emitted by radioactive substances. • α-particles, are heavy positively charged, and include protons and neutrons. • They have low penetration power, and are hazardous to humans mostly when inhaled or ingested.

• β- Particles, are negatively or positively charged electrons with significant ability to penetrate human skin, they affect health through ionization of intracellular proteins and proteinaceous components. • γ- Rays, are electromagnetic radiations similar to X- rays but to shorter wavelength. Their penetrating power is high and lead shielding is required to reduce their intensity.

5. SOURCES OF BIOMEDICAL WASTE: • It is generated primarily from health care establishments, including • Hospitals, • Nursing homes, • Veterinary hospitals, • Clinics and general practitioners, • Dispensaries, • Blood blanks, • Animal houses and research institute.

OTHER SOURCES:

1. Households: The domestic sector generates biomedical waste to a small extent which is less than about 0.5% of the total waste generated in a household. The type of biomedical waste generated in a household are syringes, cotton swabs, discarded medicines, bandages, plaster, sanitary napkins, diapers etc.

INDUSTRIES, EDUCATION INSTITUTES AND RESEARCH CENTERS: These also generate bio- medical waste in substantial quantities.

The type of waste generated from an animal houses is typically animal tissues, organs, body parts, carcasses, body fluids, blood etc., of experimental animals.

3. BLOOD BANKS AND CLINICAL LABORATORIES: Blood banks and laboratories generate most of the categories of biomedical waste.

4.HEALTH CARE ESTABLISHMENTS:

The sources of bio-medical waste generated in health care setting.

6. EFFECTS OF BIOMEDICAL WASTE: - The improper management of biomedical waste causes serious environmental problems in terms of □Air, Water and Land pollution.

1. AIR POLLUTION: • Air pollution can be caused in both indoors and outdoors.
2. • Biomedical waste that generates air pollution is of three types- • Biological, • Chemical and • Radioactive.

A. Indoor air pollution:- Hospital Acquired Infections (Nosocomial infection). Indoor air pollution can caused due to:

B. • Poor ventilation • The paints, carpet, furniture, equipment's, etc., used in the rooms. • Use of chemicals, disinfectants, fumigants etc.

C. Outdoor air pollution:

D. Outdoor air pollution can be caused by pathogens. □When waste without pretreatment is being transported outside the institution, or if it is dumped openly, pathogens can enter the atmosphere i.e. drinking water, food stuff, soil etc.

WATER POLLUTION:

Biomedical waste can cause water pollution. If the waste is dumped in low-lying areas, or into lakes and water bodies, can cause severe water pollution. • Treatment or disposal option can also cause water pollution. • Water pollution can either be caused due to biological, chemicals or radioactive substances.

LAND POLLUTION:

Open dumping of biomedical waste is the greatest cause for land pollution. • Soil pollution from bio-medical waste is caused due to infectious waste, discarded medicines, chemicals.

• Heavy metals such as cadmium, lead, mercury, etc., which are present in the waste will get absorbed by plants and can then enter the food chain.

7. Methods of disposal of bio-medical waste and their segregation WASTE CATEGORY TYPE OF WASTE TREATMENT AND DISPOSAL OPTION Category No. 1 Human Anatomical Waste (Human tissues, organs, body parts) Category No. 2 Animal Waste (Animal tissues, organs, body parts, carcasses, bleeding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals and colleges, discharge from hospitals,) Category No. 3 Microbiology & Biotechnology Waste (Wastes from laboratory cultures, stocks or specimen of live microorganisms, human and animal cell cultures used in research and infectious agents from research and industrial laboratories, wastes from production of biological, toxins and devices used for transfer of cultures) Local autoclaving/ microwaving / incineration@

Category No. 4 Waste Sharps (Needles, syringes, scalpels, blades, glass, etc. that may cause puncture and cuts. This includes both used and unused sharps)

Category No. 5 Discarded Medicine and Cytotoxic drugs (Wastes comprising of outdated, contaminated and discarded medicines) Incineration@ / destruction and drugs disposal in secured landfills

Category No. 6 Soiled Waste (Items contaminated with body fluids including cotton, dressings, soiled plaster casts, lines, bedding and other materials contaminated with blood.) Incineration@ / autoclaving / microwaving

Category No. 7 Solid Waste (Waste generated from disposable items other than the waste sharps such as tubing, catheters, intravenous sets, etc.)

Category No. 8 Liquid Waste (Waste generated from the laboratory and washing, cleaning, housekeeping and disinfecting activities)

Category No.10 Chemical Waste (Chemicals used in production of biological, chemicals used in disinfecting, as insecticides, etc.)

STEPS IN THE MANAGEMENT OF BIOMEDICAL WASTE:- Survey of waste generated. Segregation of hospital waste. Collection & Categorization of waste. Storage of waste (Not beyond 48 hrs.) Transportation of waste. Treatment of waste.

8. COLOR CODING FOR SEGREGATION OF BIOMEDICAL WASTE: -

COLOR WASTE TREATMENT

Yellow - Human & Animal anatomical waste / Micro-biology waste and soiled cotton/dressings/linen/beddings etc. Incineration / Deep burial

Red - Tubing's, Catheters, IV sets. Autoclaving / Microwaving / Chemical treatment

Blue / White - Waste sharps (Needles, Syringes, Scalpels, blades etc.) Autoclaving / Microwaving / Chemical treatment & Destruction / Shredding

Black - Discarded medicines/cytotoxic drugs, Incineration ash, Chemical waste. Disposal in secured landfill

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

DEPARTMENT OF BIOCHEMISTRY (2018-2019) (VAC -2)

S.No	Register No.	Student List	Signature
1	U18MB352	RAJU .S	
2	U18MB361	SANJEEV KUMAR G.S	
3	U18MB359	SAIPURNNIMA R.K	
4	U18MB363	SAURABH SINGH	
5	U18MB358	SAI SRI MUTYALA	
6	U18MB366	SHASHANK RITU RAJ	
7	U18MB368	SHLOKA SHAW	
8	U18MB354	RIDDHI RAJESH PRASAD	
9	U18MB367	SHEETAL SHRIVASTAVA	
10	U18MB371	SHREYASEE CHATTOPADHYAY	
11	U18MB374	SONALI HESSA	
12	U18MB355	ROHINI V	
13	U18MB369	SHRABASTI CHATTOPADHYAY	
14	U18MB372	SHRI KIRTI RAAJA	
15	U18MB360	SAMIKSHA DUBEY	
16	U18MB375	SOUMITRA MOHANTY	
17	U18MB373	SNEKA SE	
18	U18MB356	S.R.HEENA FEEMISHNEE	
19	U18MB370	SHREYA GUMBER	
20	U18MB357	SABARISH K S	

PROFESSOR & HOD
DEPARTMENT OF BIOCHEMISTRY
Sri Lakshmi Narayana Institute of Medical Sciences

INTRODUCTION:

Annexure- I

BIO-MEDICAL WASTE MANAGEMENT

1. WASTES Wastes Solid waste Household waste Industrial waste Biomedical waste or hospital waste Liquid Waste Gaseous Waste WASTES "Something which is not put into proper usage at a given time".
2. BIO-MEDICAL WASTE: - Any waste which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities pertaining thereto or in the production or testing of biological.
3. Improper:- □Packaging □Segregation □Treatment and disposal of biomedical waste. CAUSES
4. CLASSIFICATION OF BIOMEDICAL WASTE:

   1. INFECTIOUS WASTE: Infectious waste suspected to contain pathogens (bacteria, viruses, parasites, or fungi) in sufficient quantity to cause diseases in susceptible hosts.

   This category includes:- • Cultures and stocks of infectious agents from laboratory work. • Waste from surgery on patients with infectious disease. • Infected animals from laboratories.

   2.PATHOLOGICAL WASTE: It consists of tissues, organs, body parts, human fetuses, and animal carcasses, blood, and body fluids.

SRI LAKSHMI NARAYANA INSTITITE OF MEDICAL SCIECNES

QULITY CONTROL IN CLINICAL LABBORATORY

1. Which of the following Westgard Rules primarily detect Random Error?

a.10x

b. 10x

c. 1_{3s}

d.2 of 3_{2s}

2. Given a QC procedure 12s as a Warning rule - what does that mean?

a. Reject the run whenever one value is out 2s control limits

b. Repeat the control whenever one value is out 2s control limits

c. Warning of possible problems if one value is beyond 2s control limits

d. Reject the run whenever two values are in 1s control limits

3. Which of the following Westgard Rules primarily detect Systematic Error?

a. 1_{2s}

b 2_{2s}

C.1_{3s}

d.All the above

4. "Westgard Rules" include a 1_{2s}"warning rule." When the warning rule is violated, what action do you take?

a. Repeat the control

b. Run a new control

c. Check the other "Westgard Rules"

d. Accept and run "Warning Rules"

5. What does QA and QC stand for?

a. Quality Assurance and Queuing Control

b. Quality Adjustment and Quality completion

C Quality Assurance and Quality control

D. Quality Assurance and Quality control

6. Which of the following option is not correct regarding QA and QC?

a. QA depends on the activities of the entire company

b. Process capabilities should be monitored on intermittent basis

c. Measuring equipment's must have a calibration certificate

.d. Normally many inspections are done during the process of manufacturing

7. Who is considered to be the father of Six Sigma?

(A) Bill Smith

(B) Walter Shewhart

(C) Jack Welch

(D) None of the above

8. Six Sigma strategies seek to improve the quality of the output of a process by

(A) identifying the causes of defects

(B) removing the causes of defects

(C) minimizing variability in manufacturing

(D) all of the above

9. -Six Sigma is applicable to

(A) Finance

(B) Supply chain

(C) Healthcare

(D) All of the above

10. The concept of Six Sigma was developed by the following company.

(A) General Electric

(B) Motorola

(C) Honeywell

(D) DuPont

SRI LAKSHMI NARAYANA INSTITITE OF MEDICAL SCIECNES

QULITY CONTROL IN CLINICAL LABBORATORY

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(C) Healthcare

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(A) General Electric

(B) Motorola

(C) Honeywell

(D) DuPont

Annexure- V

Course feedback form

Course title: Date :

Course code:

Department: BIOCHEMISTRY

S.no	Design of the course	1	2	3	4	5
1	The objective of the course clear to you	✓				
2	The course contents met with your expectations			✓		
3	The lecture sequence were well planned		✓			
4	The lectures were clear and easy to understand	✓				
5	The audiovisual teaching aids were effectively used		✓			
6	The instructor's encouraged interaction and was it helpful	✓				
7	The contents were illustrated with examples		✓			
8	Overall Rating of the course		✓			

*** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory**

Suggestions if any:

– Satisfactory –

Signature

Date: 09.01.2020

From

Dr. Pannerselvam
Professor and Head,
Department of Microbiology,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To

The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course:

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: **Quality control in clinical laboratory** We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards,

Dr. Jansi Rani

Encl: Certificates

Photographs

Annexure- V

Course feedback form

Course title: Date :

Course code:

Department: BIOCHEMISTRY

S.no	Design of the course	1	2	3	4	5
1	The objective of the course clear to you		✓			
2	The course contents met with your expectations	✓	.			
3	The lecture sequence were well planned	✓	✓			
4	The lectures were clear and easy to understand		✓			
5	The audiovisual teaching aids were effectively used		✓			
6	The instructor's encouraged interaction and was it helpful		✓			
7	The contents were illustrated with examples	✓				
8	Overall Rating of the course		✓			

*** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory**

Suggestions if any:

– Good –

Signature

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that SHLOKA SHAW has actively participated in the Value Added Course on **QUALITY CONTROL IN CLINICAL LABORATORY** April– May 2018 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. Kajalakshmy

RESOURCE PERSON

Dr. Jansi Rani

COORDINATOR

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that SONALI HESSA has actively participated in the Value Added Course on **QUALITY CONTROL IN CLINICAL LABORATORY** April – May 2018 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. Kajalakshmy

RESOURCE PERSON

DEPARTMENT OF BIOCHEMISTRY
Sri Lakshmi Narayana Institute Of Medical Sciences
PONDICHERRY - 605 502.

Dr. Jansi Rani

COORDINATOR

PROFESSOR & HOD
DEPARTMENT OF BIOCHEMISTRY



SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

OSSUDU AGARAM VILLAGE; KUDAPAKKAM POST,PONDICHERRY - 605003

Date 1.10.2019

From
Dr. PAMMY SINHA ,
HOD
Pathology
SriLakshmiNarayanaInstituteofMedicalSciences,Puducherry
Bharath Institute of Higher Education and Research,
Chennai.

To
The Dean,
SriLakshmiNarayanaInstituteofMedicalSciences,Puducherry
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: Automation in hematology

Dear madam,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: Automation in hematology on November 2019–Januuary 2020. We solicit your kind permission for the same.

Kind Regard

Dr. PAMMY SINHA

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: Dr.G. JAYALAKSHMI

The HOD: Dr. PAMMY SINHA

The Expert: Dr. V.SARAVANAKUMARI

The committee has discussed about the course and is approved.

Dean
(Sign &Seal)

Subject Expert
(Sign &Seal)

HOD
(Sign &Seal)

Dr. G. JAYALAKSHMI, BSC.,MBBS.,DTCD.,M
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Agaram Kudapakkam Post,
Villianur, Puducherry - 605 502.

DEPARTMENT OF PATHOLOGY
Sri Lakshmi Narayana Institute of Medical Sciences
PONDICHERRY 605 502.

PROFESSOR & HEAD, DEPT. OF PATHOLOGY
SRI LAKSHMI NARAYAN INSTITUTE OF
MEDICAL SCIENCES,
PUDUCHERRY - 605 502.

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

OSSUDU AGARAM VILLAGE; KUDAPAKKAM POST,PONDICHERRY - 605003

Circular

11.10.19

Sub: Organizing Value-added Course: Automation in hematology

With reference to the above mentioned subject, it is to bring to your notice that **SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES Bharath Institute of Higher Education and Research**, is organizing"Automation in hematology _"**from November 2019**. The course content is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before 30.10.2019. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

Encl: Copy of Course content

Dr. G. JAYALAKSHMI, BSC.,MBBS.,DTCD.,M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Ageram Kudapakkam, Post,
Villanur Commune Puducherry-605 502.

Course Proposal

Course Title: Automation in hematology

Course Objective:

1. To define the automation and shall be able to discuss the principle and procedure to be followed in analyzer.
2. Should know about the parts and principle of Analyzer
3. Should be able to run analyzer and should also know about the trouble shooting

Course Outcome: Should know about the tissue processing in detail
Course Audience: IInd year MBBS
Course Coordinator: Dr.Pammy sinha
Course Faculties with Qualification and Designation:
1. Dr.V.Saravanakumari, Assistant Professor
2. Dr.Pammy sinha, Professor
Course Curriculum/Topics with schedule :

SlNo	Date	Topic	Time	Hours	Faculty
1.	2.11.2019	Automated techniques of blood counting	1.30-4 pm	2.5 hrs	**Dr.Pammy sinha**
2.	9.11.2019	Automated instruments	1.30-4 pm	2.5 hrs	**Dr.V.Saravanakumari,**
3.	16.11.2019	PRINCIPLE	1.30-4 pm	2.5 hrs	**Dr.V.Saravanakumari,**
4.	23.11.2019	Coulter principle-electrical impedance	1.30-4 pm	2.5 hrs	**Dr.Pammy sinha**
5.	30.11.2019	Histograms of Coulter S Plus IV	1.30-4 pm	2.5 hrs	**Dr.V.Saravanakumari,**
6.	7.12.2019	OPTICAL METHOD , Reliability of electronic counters	1.30-4 pm	2.5 hrs	**Dr.Pammy sinha**
7.	14.12.2019	Hemoglobin concentration RBC COUNTING	1.30-4 pm	2.5 hrs	**Dr.V.Saravanakumari,**
8.	21.12.2019	Red cell distribution	1.30-4 pm	2.5 hrs	**Dr.V.Saravanakumari,**

		histograms			
		Practical Class			**Dr.V.Saravanakumari,**
9.	28.12.2019	Reticulocyte count	1.30-4 pm	2.5 hrs	**Dr.Pammy sinha**
10.	4.01.2020	PCV, Red cell indices MCV ,Redcell distribution width (RDW)	1.30-4 pm	2.5 hrs	**Dr.V.Saravanakumari,**
11.	11.01.2020	Platelet count,	1.30-4 pm	2.5 hrs	**Dr.V.Saravanakumari,**
12	18.01.2020	Assessment and giving feedback	1.30-4 pm	2.5 hrs	**Dr.V.Saravanakumari,**
		Total		30 hrs	

REFERENCE BOOKS:

1.Automation in Hematology Dennis W. Ross ,George Brecher ,Marcel Bessis

2.Automated Hematology Analyzers: State of the Art, An Issue of Clinics in Laboratory Medicine, E-Book (The Clinics: Internal Medicine) by CarloBrugnara (Author)

VALUE ADDED COURSE

1. Name of the programme & Code

Automation in hematology & PA012

2. Duration & Period

30 hrs Nov2019-Jan 2020

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Short notes questions- *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

1 time Nov2019-Jan 2020

8. Year of discontinuation: 2021

9. Summary report of each program year-wise

Value Added Course- Nov2019-Jan 2020					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	PA012	Automation in hematology	Dr. V.Saravanakumari	IInd MBBS	Nov2019-Jan 2020

10. Course Feed Back

Enclosed as Annexure- V

RESOURCE PERSON

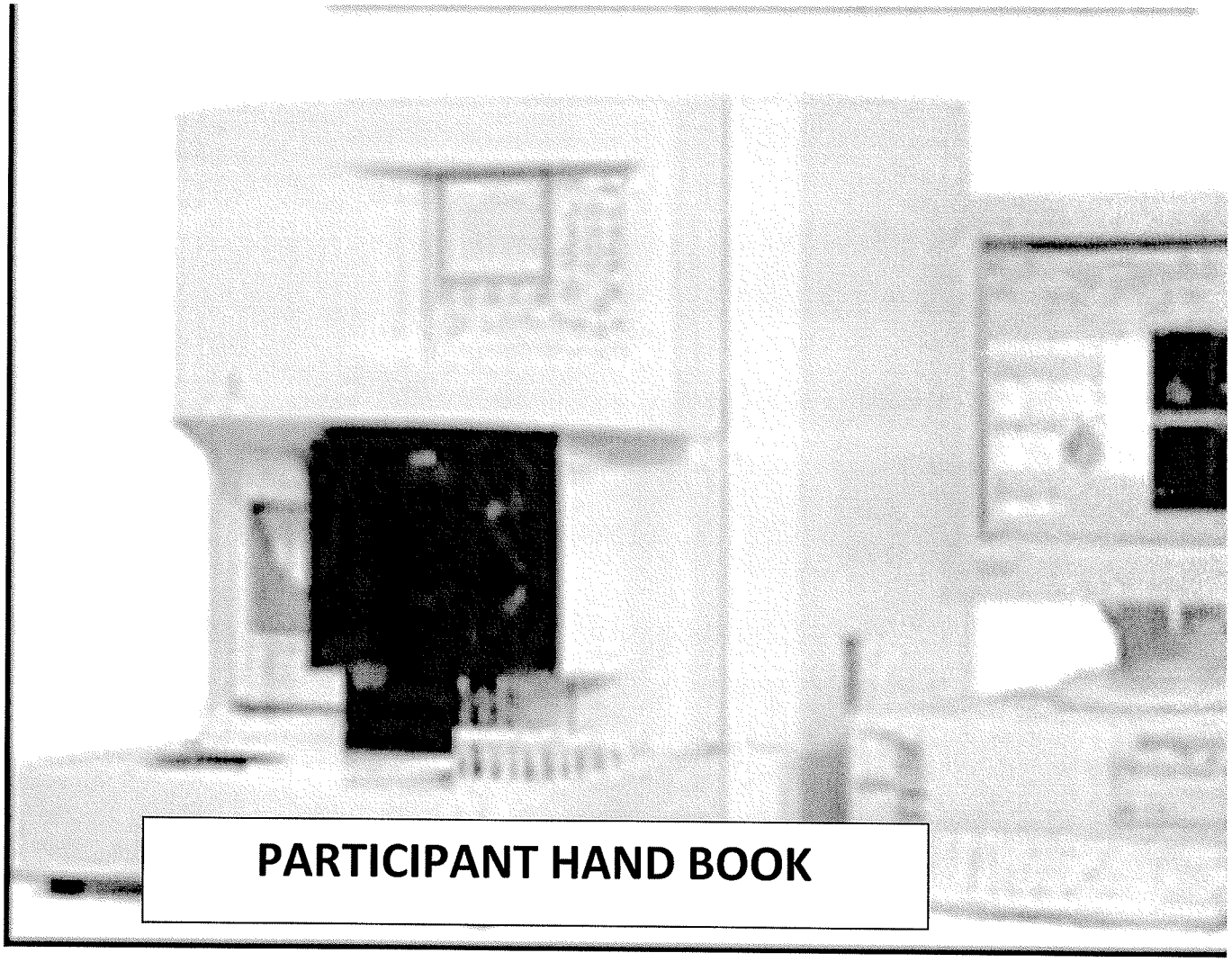
DR.V.SARAVANAKUMARI

COORDINATOR

Dr. Pammy Sinha

PROFESSOR & HEAD, DEPT. OF PATHOLOGY
SRI LAKSHMI NARAYAN INSTITUTE OF
MEDICAL SCIENCES,
PUDUCHERRY - 605 502.

Automation in haematology



PARTICIPANT HAND BOOK

COURSE DETAILS

Particulars	Description
Course Title	Automation in haematology
Course Code	PA012
Objective	1. Automated techniques of blood counting 2. Automated instruments 3. PRINCIPLE 4. Coulter principle-electrical impedance 5. Histograms of Coulter S Plus IV 6. OPTICAL METHOD 7. Reliability of electronic counters 8. Hemoglobin concentration 9. RBC COUNTING 10. Red cell distribution histograms 11. Reticulocyte count 12. PCV and red cell indices 13. MCV, Red cell distribution width (RDW) 14. Platelet count 15. Automated differential count
Further learning opportunities	Learn automation in hematology
Key Competencies	On successful completion of the course the students will have skill in handling & understanding automated instruments
Target Student	II MBBS Students
Duration	30hrs Every Nov2019-Jan2020
Theory Session	20hrs
Practical Session	10hrs

Assessment Procedure	Short notes

Automated techniques of blood counting

- **Semi-automated instruments**

Require some steps, as dilution of blood samples

Often measure only a small number of variables

- **Fully automated instruments**

Require only that an appropriate blood sample is presented to the instrument.

They can measure 8-20 variables including some new parameters which do not have any equivalent in manual methods.

Automated instruments

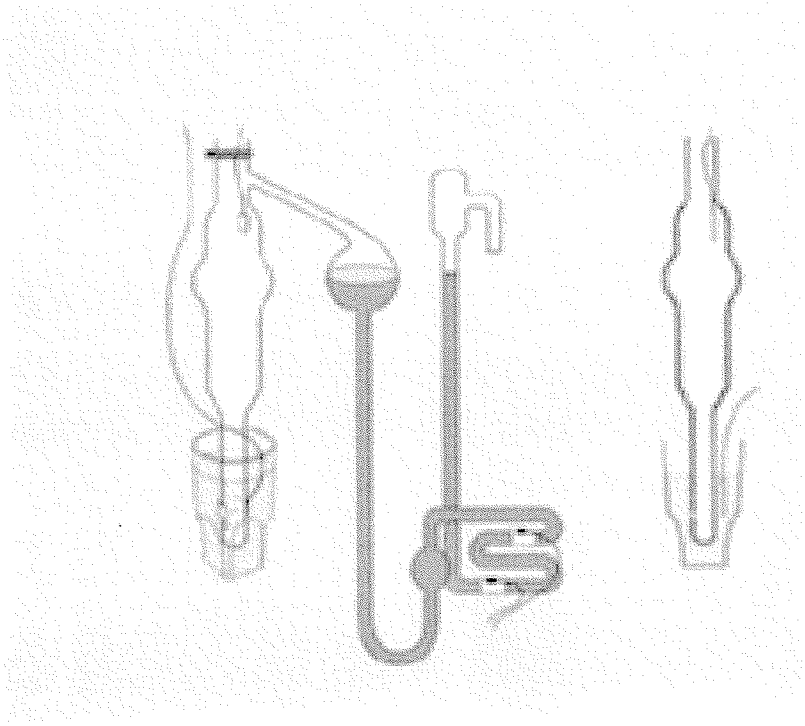
- **They have a high level of precision for cell counting and cell sizing greatly superior to that of the manual tech.**
- **The results are generally accurate.**
- **Aberrant results consequent on unusual characteristics of blood are "flagged" for subsequent review.**
- **In general automated differential counters are favourable to the manual in 2 conditions**
  - **Exam of normal blood samples**
  - **Flagging of abnormal samples**

PRINCIPLE:

- **1.ELECTRICAL IMPEDANCE**
- **2.LIGHT SCATTERING**
- **3.CENTRIFUGATION AND QUANTITATIVE BUFFY COAT ANALYSIS**

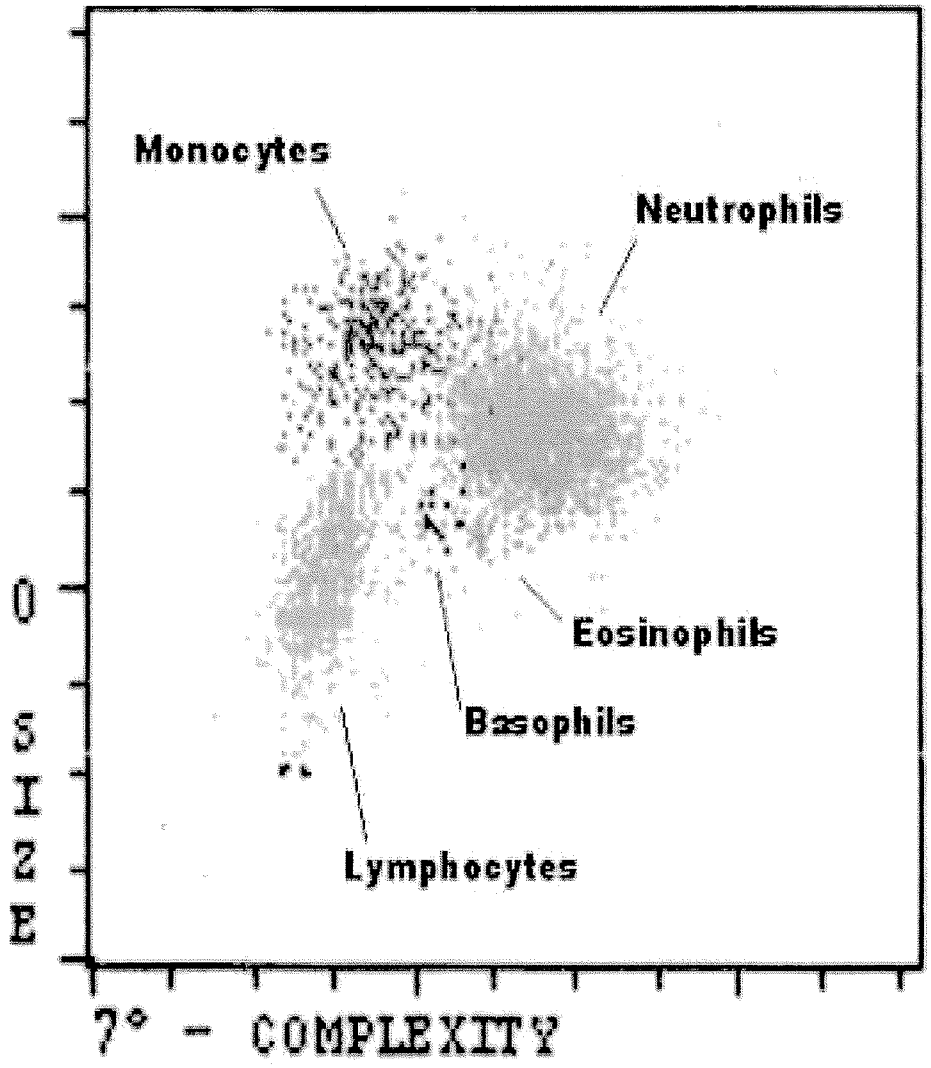
Coulter principle-electrical impedance

- **. A stream of cells in suspension passes through a small aperture across which an electrical current is applied. Each cell that passes alters the electrical impedance and can thus be counted and sized.**

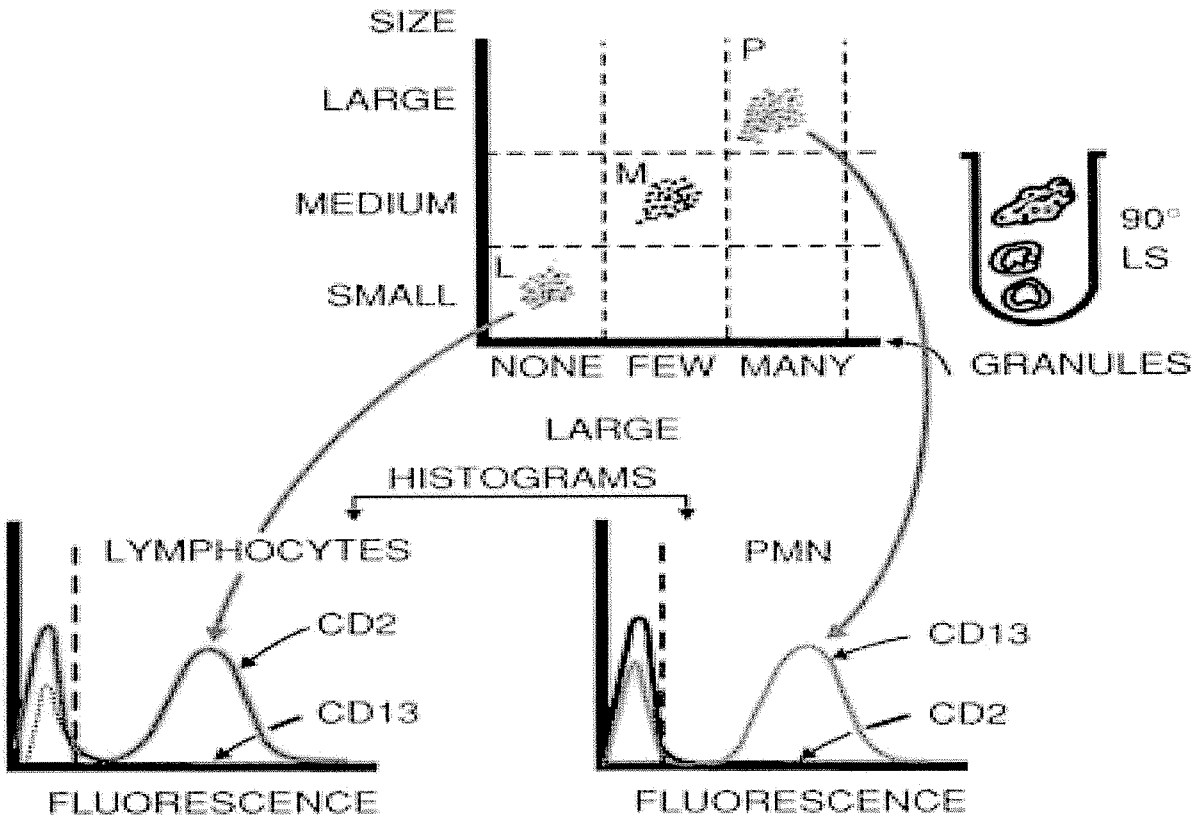


Histograms of Coulter S Plus IV

Scatterplot obtained from laser light scatter analysis of white blood cells. y-axis represents data obtained by light scatter at 0° (measure of cell size), while x-axis represents laser light scatter at 7° (cell internal complexity). Each "dot" represents data from a single cell



- **Lymphocytes (L) (small and nongranular) occupy the lower left area of the screen; polymorphonuclear leukocytes (P) (large with many granules), the upper right.**
- **The monocytes (M) are detected in an intermediate position.**
- **Identification of these populations is achieved with monoclonal antibodies specific for markers present .**



4-1 MULTIPARAMETER ANALYSIS

Reliability of electronic counters:

- **They are precise but care should be taken so that they are also accurate.**
- **Some problems which could be faced:**

Two cells passing through the orifice at the same time, counted as one cell.

RBC agglutination(clump of cells)

Counting bubbles or other particles as cells.

Hemoglobin concentration

Hb is measured automatically by a modification of the manual (cyanide) method.

To reduce toxicity of Cyanide some systems replace it by a non-toxic material Na- lauryl sulphate.

RBC COUNTING

- **The RBCs are counted automatically by two methods**
  - **Aperture impedance: where cells are counted as they pass in a stream through an aperture.**
  - **Or by light scattering technology**

Red cell distribution histograms

- In these histograms, RBC volume (x-axis) is plotted vs. the cell count (number of events counted (y-axis).
- The mean corpuscular volume (MCV) is the median value of the histogram distribution.
- The red cell distribution width (RDW) is the coefficient of variation of the curve.

Microcytic red cells (a) fall to the left portion of the curve, while macrocytic red cells fall to the right (c). The histogram in the center is from a normocytic, normochromic specimen with an MCV of 88 fL.

Reticulocyte count

- **An automated retic count can be performed using the fact that various fluoro-chromes combine with the RNA of the reticulocytes. Fluorescent cells can then be enumerated using a flowcytometer.**
- **An automated retic counter also permits the assessment of retic maturity since the more immature reticulocytes have more RNA→fluoresce more strongly than the mature retics found normally in PB.**

PCV and red cell indices

- **Pulse height analysis allows either the PCV or the MCV to be determined.**
- **MCV=PCV/RBC count**
- **MCH= Hb/RBC count**
- **MCHC= Hb/PCV**

MCH & MCHC are derived parameters

MCV

The MCV is the median value of the histogram distribution obtained when red blood cell size is plotted against the number of cells ("red cell histogram")

- **The MCV, measured in femtoliters (fL, or 10^{-15} L), is the most important of the red cell indices.**

Red cell distribution width (RDW)

- **Automated instruments produce volume distribution histograms which allow the presence of more than one population of cells to be appreciated.**
- **Most instrument produce a quantitative measurement of variation in cell volume, an equivalent of the microscopic assessment of the degree of anisocytosis. - known as the RDW.**
- **A quantitative measure of variation in red blood cell size (anisocytosis),**
- **RDW- elevated in iron deficiency anemia, myelodysplastic syndromes, macrocytic anemia secondary to vitamin B12 or folate deficiency, and some malignancies**
- **RDW is usually normal or only mildly elevated in the microcytic anemia of thalassemia**

Platelet count

- **Platelets can be counted in whole blood using the same tech-of electrical or electro-optical detection as are employed for RBCs.**
- **Other parameters include**
  - **MPV**
  - **PDW**
  - **Plateletcrit= MPV x platelet count.**
- **mean platelet volume (MPV), based on a platelet distribution histogram.**
- **The MPV is increased in patients with peripheral platelet destructive processes, - young, large platelets are rapidly released from the bone marrow.**
- **The MPV is decreased in thrombocytopenia due to marrow suppression.**

Total WBC count

- **The total WBC count is determined in whole blood in which red cells have been lysed.**
- **Fully automated multichannel instruments perform WBC counting by either**
  - **Impedance**
  - **Or light scattering**
  - **Or both.**

Automated differential count

- Automated differential counters which are available now generally use flow cytometry incorporated into a full blood counter rather than being standard alone differential counters
- Automated counters provide a three-part or five- to seven-part differential count.
- 3-part differential
- Granulocytes or large cells
- Lymphocytes or small cells
- Monocytes(mononuclear cells) or (middle cells)
- 5-part classify cells to
- Neutrophils
- Eosinophils
- Basophils
- Lymphocytes
- Monocytes
- A sixth category designated "large unstained cells" include cells larger than normal and lack the peroxidase activity this include
    - Atypical lymphocytes
    - Various other abnormal cells.
- Other counters identifies 7 categories including
    - Large immature cells(composed of blasts and immature granulocytes)
    - Atypical lymphocytes(including blast cells).
- Analysis may be dependant on:
    - Volume of the cell
    - Other physical characteristics of the cells
    - Sometimes the activity of cellular enzymes such as peroxidase.
- technologies used
    - Light scattering and absorbance
    - Impedance measurement
- Automated differential counters employing flow cytometry classify far more cells than is possible with a manual differential count.

- **Lymphocytes (L) (small and nongranular) occupy the lower left area of the screen; polymorphonuclear leukocytes (P) (large with many granules), the upper right.**
- **The monocytes (M) are detected in an intermediate position.**

Identification of these populations is achieved with monoclonal antibodies specific for markers present

VALUE ADDED COURSE

Automation in haematology, PA012

List of Students Enrolled November 2019-January 2020

2nd Year MBBS Student			Signature
Sl. No	**Name of the Student**	**Roll No**	
1	FAUSTINA BAJWIN .S	U18MB291	
2	G SRI SAI NITISH	U18MB292	
3	GAUR DARSHANA PURUSHOTTAM GAUR	U18MB293	
4	GHATKAR SAYALL KRISHNA	U18MB294	
5	GOKUL M S	U18MB295	
6	GOPIKA .P	U18MB296	
7	HARI BALA SIDDHARTH T.R	U18MB297	
8	HARSHINI R C	U18MB298	
9	HIBA MOIDEEN .K	U18MB299	
10	INDHU S	U18MB300	
11	INDU V	U18MB301	
12	INDUKURI SAI AKANKSHA	U18MB302	
13	IPSITA SETHY	U18MB303	
14	JAGADEESAN S.R	U18MB304	
15	JAHNAVI REDDY .M	U18MB305	
16	JAISHREE .S	U18MB306	
17	JANANI V	U18MB307	
18	JASMEET NIRANJAN	U18MB308	
19	JAYALAKSHMI S	U18MB309	
20	JAYAREDDYGARI SAI RUCHITHA	U18MB310	

RESOURCE PERSON

DR. V. SARAVANAKUMARI

DEPARTMENT OF PATHOLOGY
Sri Lakshmi Narayana Institute Of Medical Sciences
PONDICHERRY 605 502.

COORDINATOR

D. Pammy Sinha

PROFESSOR & HEAD, DEPT. OF PATHOLOGY
SRI LAKSHMI NARAYAN INSTITUTE OF
MEDICAL SCIENCES,
PUDUCHERRY - 605 502.

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Automation in haematology PA012

Course Code: PA12

I. ANSWER ANY 6 QUESTIONS

1. PRINCIPLE of Automated instruments
2. Red cell distribution histograms
3. Reticulocyte count
4. PCV and red cell indices
5. MCV,Red cell distribution width (RDW)
6. Platelet count
7. Automated differential count

Name : Indu

Automation in Haematology

21/30

3. Reticulocyte count:

A reticulocyte count is a test used to measure the level of reticulocytes in the blood. It's also known as a retic count, corrected reticulocyte count or reticulocyte index.

The reticulocyte count can help to learn if your bone marrow is producing enough red blood cells.

4. PCV - Packed cell Volume:

Blood is a mixture of cells and plasma. The PCV is a measurement of the proportion of blood that is made up of cells. The value is expressed as a percentage or fraction of cells in blood.

Red Cell Indices:

Red cell indices are blood tests that provide information about the hemoglobin content and size of red blood cells.

Red cell indices can be calculated if the values of hemoglobin, hematocrit and red blood cell count are known.

6. Platelet count:

Platelets are the smallest of blood cells and can only be seen under a microscope.

AUTOMATION IN HEMATOLOGY

GOKULM.S
Roll no: 5

22/30

① Principle of Automated Instruments

- An essential Principle of SFA is the introduction of air bubbles.
- The air bubbles segment each sample in to discrete packets and act as barrier b/w packets to prevent cross-contamination as they travel down the length of glass tubing
- It is the medical laboratory instrument designed to measure different chemicals and other characteristic

② Red cell distribution histograms

- Red DW is one of numbers or blood cell indices included as part of a complete blood count & describes varies in size of RBC in a sample of Blood.
- A higher RDW means that there is a greater variation in the size of RBC than excepted
- It is a graphic representation of particle size distribution now routinely availble on automated cell analyzer as standard part of automated complete blood count analysis

③ Reticulocyte Count

- To measure level of reticulocytes in your blood.
- It is known as a retic count, corrected reticulocyte or reticulocyte index

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that GOKUL M.S has actively participated in the Value Added Course on Automation in hematology held during Nov2019 – Jan 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. V.SARAVANAKUMARI
RESOURCE PERSON

DEPARTMENT OF PATHOLOGY
Sri Lakshmi Narayana Institute Of Medical Sciences
PONDICHERRY 605 502

Dr. PAMMY SINHA
COORDINATOR

PROFESSOR & HEAD, DEPT. OF PATHOLOGY
SRI LAKSHMI NARAYAN INSTITUTE OF
MEDICAL SCIENCES,
PUDUCHERRY - 605 502.

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that G. SRI SAI NITISH has actively participated in the Value Added Course on **Automation in hematology** held during Nov2019 – Jan 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. V.SARAVANAKUMARI

RESOURCE PERSON

DEPARTMENT OF PATHOLOGY
Sri Lakshmi Narayana Institute Of Medical Sciences
PONDICHERRY 605 502

Dr. PAMMY SINHA

COORDINATOR

PROFESSOR & HEAD, DEPT. OF PATHOLOGY
SRI LAKSHMI NARAYAN INSTITUTE OF
MEDICAL SCIENCES,
PUDUCHERRY - 605 502.

Student Feedback Form

Course Name: **Automation in hematology**

Subject Code: **PA12**

Name of Student: Jayashree. S Roll No.: U18MB306

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear			✓		
2	Course contents met with your expectations				✓	
3	Lecturer sequence was well planned				✓	
4	Lectures were clear and easy to understand			✓	✓	
5	Teaching aids were effective					✓
6	Instructors encourage interaction and were helpful				✓	
7	The level of the course					✓
8	Overall rating of the course	1	2	3	4	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

Nil.

Signature

Date: 18.1

Student Feedback Form

Course Name: **Automation in hematology**

Subject Code: **PA12**

Name of Student: Jayalakshmi Roll No.: UIBMB 309

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear				✓	
2	Course contents met with your expectations					✓
3	Lecturer sequence was well planned				✓	
4	Lectures were clear and easy to understand					✓
5	Teaching aids were effective					✓
6	Instructors encourage interaction and were helpful				✓	
7	The level of the course					✓
8	Overall rating of the course	1	2	3	4	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

Nil

Jayalakshmi.
Signature

Date: 18.1.20

Date: 25.01.2020

From

Dr.Pammy sinha
Professor and Head,
Department of pathology
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To

The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: Automation in hematology

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: Automation in hematology in IInd MBBS **Nov2019** - Jan 2020 for 20 students . We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

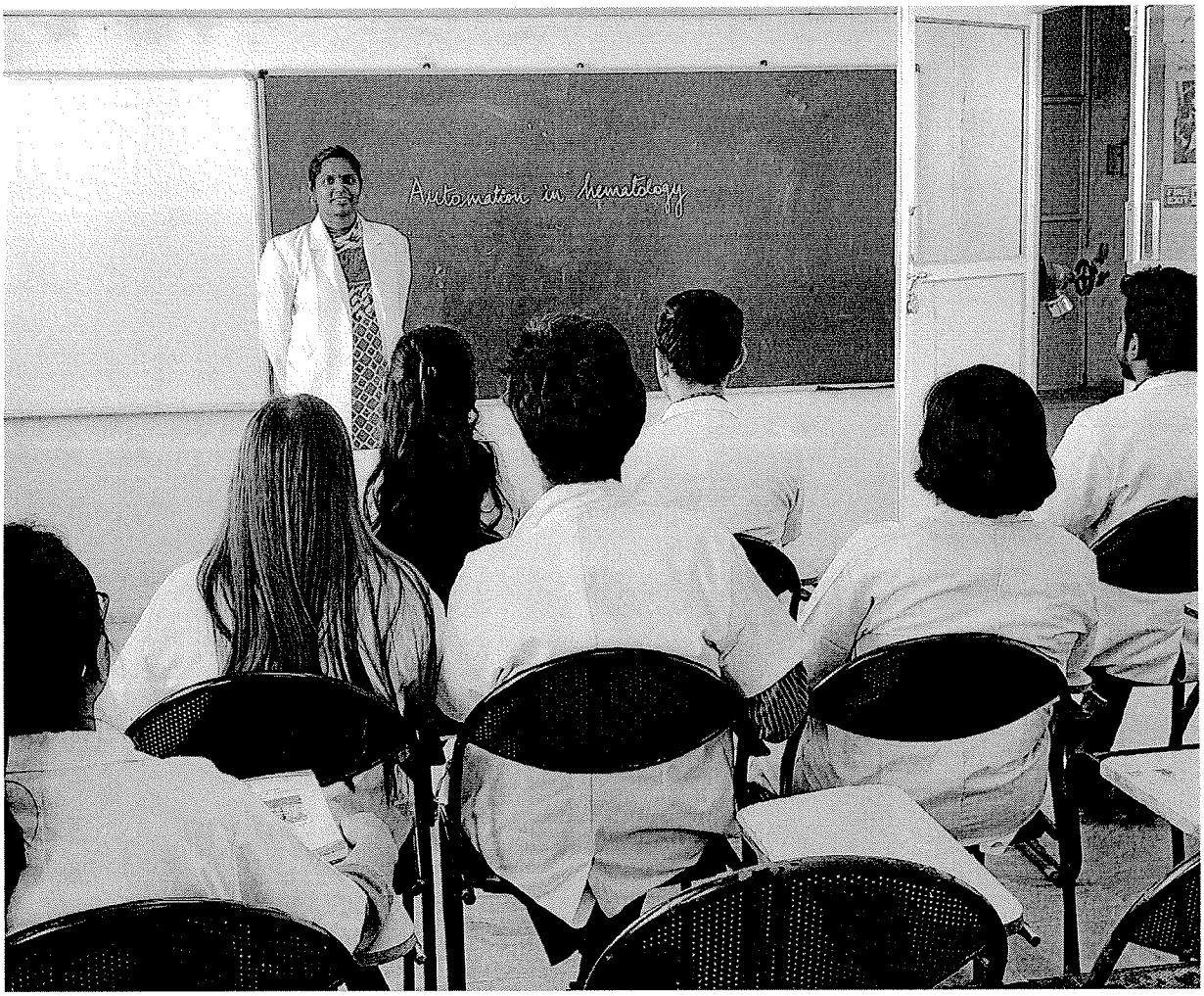
Kind Regards,

Dr. Pammy sinha

PROFESSOR & HEAD, DEPT. OF PATHOLOGY
SRI LAKSHMI NARAYAN INSTITUTE OF
MEDICAL SCIENCES,
PUDUCHERRY - 605 502.

Encl: Certificates

Photographs


Automation in hematology

Sri Lakshmi Narayana Institute of Medical Sciences

Osudu, Agaram Village, Kudapakkam post, Puducherry – 605 502

Department of Anatomy

Date:23.11.2019

From

Dr. Vijisha Phalgunan
Professor and Head,
Department of Anatomy,
Sri Lakshmi Narayana Institute of Medical Sciences
BIHER
Puducherry

To

The Dean,
Sri Lakshmi Narayana Institute of Medical sciences
BIHER
Puducherry

Sub: Permission to conduct value-added course: Cytogenetics

Dear sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **cytogenetics for 1st year MBBS students** in December 2019. We solicit your kind permission for the same.

Kind Regards

Dr. Vijisha Phalgunan

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: **Dr. Balagurunathan.S**

The HOD: **Dr. Vijisha Phalgunan**

The Expert: **Dr. Vijisha Phalgunan**

The committee has discussed about the course and is approved.



Dean



Subject Expert



HOD

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affiliated to Bharath University, Chennai - TN]

Circular

30.11.2019

Sub: Organising Value-added Course on Cytogenetics. reg

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry affiliated by Bharath Institute of Higher Education and Research is organizing a value added course on **"Cytogenetics" during Dec 2019 for 1st year MBBS students(2019-2020)**. The course content for the same is enclosed below."

Dean

(Dr.Balagurunathan.S)

Encl: Copy of Course content

COURSE CONTENT

Particulars	Description
Course Title	Cytogenetics
Course Code	ANA01
Topics and content of the course in the Hand book	1. Introduction to genetics 2. Cell & organelles 3. mitosis 4. meiosis 5. Modes of inheritance 6. Morphology of chromosomes 7. Classification of chromosomes 8. Karyotyping - I 9. Karyotyping -II 10.Karyotyping – skill training 11.Molecular cytogenetics techniques _I 12.Molecular cytogenetics techniques -II 13.Cytogenetic nomenclature 14.Pedigree analysis-I 15.Pedigree analysis - II 16.Structural chromosomal abnormalities

	17.Numerical chromosomal abnormalities 18.Prenatal diagnosis 19.Genetic counselling 20.Gene therapy 21.Recent advancements in Cytogenetics
Advantages of learning and evaluation	In-depth knowledge of genetics and its application
Further learning Opportunities	Advanced techniques cytogenetics
Key Competencies	On successful completion of the course the students will have skill in karyotyping
Target Student	1st MBBS
Duration	30 hours, Dec-Jan2020
Theory Session	28hrs
Practical Session	2 hrs
Assessment Procedure	Short answer questions

COURSE PROPOSAL

Course Title: CYTOGENETICS

Course Objective:

1. Introduce the students to different fields of research
2. To learn basic principles of genetics
3. To learn the basic skills involved in karyotyping

Course Outcome: knowledge on the various aspects of cytogenetics and the prospects of research

Course Audience: Medical undergraduates

Course Coordinator: Dr.Vijisha Phalgunan

Course Faculties with Qualification and Designation:

1.Dr.Vijisha Phalgunan

2.Dr.Rajesh.B

Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Time	Hours
1.	02.12.19	Introduction to genetics	4-5p.m	1
2.	03.12.19	Cell & organelles	4-5p.m	1
3.	04.12.19	mitosis	4-5p.m	1
4.	05.12.19	meiosis	4-5p.m	1
5.	06.12.19	Modes of inheritance	4-5p.m	1
6.	07.12.19	Morphology of chromosomes	4-5p.m	1
7.	09.12.19	Classification of chromosomes	4-5p.m	1
8.	10.12.19	Karyotyping - I	4-6p.m	2
9.	11.12.19	Karyotyping -II	4-6p.m	2
10.	12.12.19	Karyotyping – skill training	4-6p.m	2
11.	13.12.19	Molecular cytogenetics techniques _I	4-6p.m	2
12.	14.12.19	Molecular cytogenetics techniques -II	4-6p.m	2
13.	16.12.19	Cytogenetic nomenclature	4-5p.m	1
14.	17.12.19	Pedigree analysis-I	4-5p.m	1
15.	18.12.192	Pedigree analysis - II	4-5p.m	1
16.	19.12.19	Structural chromosomal abnormalities	4-6p.m	2
17.	20.12.19	Numerical chromosomal abnormalities	4-6p.m	2
18.	21.12.19	Prenatal diagnosis	4-5p.m	1
19.	23.12.19	Genetic counselling	4-6p.m	2
20.	03.01.20	Gene therapy	4-6p.m	2
21.	04.01.20	Recent advancements in Cytogenetics	4-5p.m	1
			Total Hours	30

REFERENCE BOOKS:

1.Emery's elements of medical genetics – 14th edition -elsivier publications

2.Human genetics by SD Gangane – 4th edition- elsivier publications

3.Thompson & Thompson genetics in medicine – 5th edition

4.yogesh Ashok Sontakke-Principles of clinical genetics

VALUE ADDED COURSE

1. Name of the programme & Code

Cytogenetics ANA01

2. Duration & Period

(30 hrs)from December 2019– Ist week January 2020

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

SAQ's - *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

once– December 2019 – Ist week January2020

8. Year of discontinuation: 2020

9. Summary report of each program year-wise

Value Added Course					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	ANA01	**cytogenetics**	**Dr.Vijisha Phalgunan**	1st MBBS	20 (December – Jan 20)

10. Course Feed Back

Enclosed as Annexure- V

RESOURCE PERSON

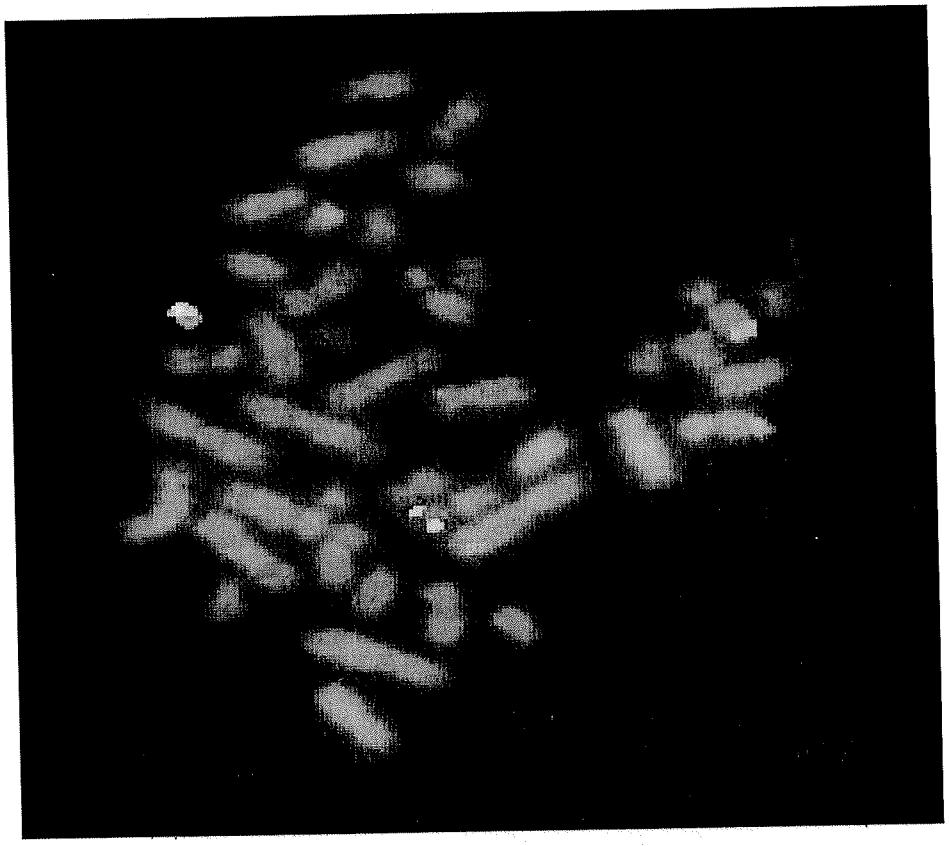
1.Dr.Vijisha P

2.Dr.Rajesh.B

COORDINATOR

Dr.Vijisha P

CYTOGENETICS



PARTICIPANT HAND BOOK

BIHER

SLIMS

COURSE DETAILS

Particulars	Description
Course Title	Cytogenetics
Course Code	ANA01
Objective	Introduction to genetics Cell & organelles mitosis meiosis Modes of inheritance Morphology of chromosomes Classification of chromosomes Karyotyping - I Karyotyping -II Karyotyping – skill training Molecular cytogenetics techniques _I Molecular cytogenetics techniques -II Cytogenetic nomenclature Pedigree analysis-I Pedigree analysis - II Structural chromosomal abnormalities Numerical chromosomal abnormalities Prenatal diagnosis Genetic counselling Gene therapy Recent advancements in Cytogenetics
Further learning opportunities	Molecular genetics
Key Competencies	Demonstration of karyotyping Pedigree analysis
Target Student	1st MBBS Students
Duration	30hrs Every December 2019– Ist week January 2020
Theory Session	20hrs
Practical Session	10hrs
Assessment Procedure	Short answer questions

Cytogenetics is essentially a branch of genetics, but is also a part of cell biology/cytology (a subdivision of human anatomy), that is concerned with how the chromosomes relate to cell behaviour, particularly to their behaviour during mitosis and meiosis.[1] Techniques used include karyotyping, analysis of G-banded chromosomes, other cytogenetic banding techniques, as well as molecular cytogenetics such as fluorescent *in situ* hybridization (FISH) and comparative genomic hybridization (CGH).

Chromosomes were first observed in plant cells by Karl Wilhelm von Nägeli in 1842. Their behavior in animal (salamander) cells was described by Walther Flemming, the discoverer of mitosis, in 1882. The name was coined by another German anatomist, von Waldeyer in 1888.

The next stage took place after the development of genetics in the early 20th century, when it was appreciated that the set of chromosomes (the karyotype) was the carrier of the genes. Levitsky seems to have been the first to define the karyotype as the phenotypic appearance of the somatic chromosomes, in contrast to their genic contents. Investigation into the human karyotype took many years to settle the most basic question: how many chromosomes does a normal diploid human cell contain?[4] In 1912, Hans von Winiwarter reported 47 chromosomes in spermatogonia and 48 in oogonia, concluding an XX/XO sex determination mechanism.[5] Painter in 1922 was not certain whether the diploid number of humans was 46 or 48, at first favoring 46.[6] He revised his opinion later from 46 to 48, and he correctly insisted on humans having an XX/XY system of sex-determination.[7] Considering their techniques, these results were quite remarkable. In science books, the number of human chromosomes remained at 48 for over thirty years. New techniques were needed to correct this error. Joe Hin Tjio working in Albert Levan's lab[8][9] was responsible for finding the approach:

1. Using cells in culture
2. Pre-treating cells in a hypotonic solution, which swells them and spreads the chromosomes
3. Arresting mitosis in metaphase by a solution of colchicine
4. Squashing the preparation on the slide forcing the chromosomes into a single plane
5. Cutting up a photomicrograph and arranging the result into an indisputable karyogram.

It took until 1956 for it to be generally accepted that the karyotype of man included only 46 chromosomes.[10][11][12] The great apes have 48 chromosomes. Human chromosome 2 was formed by a merger of ancestral chromosomes, reducing the number.

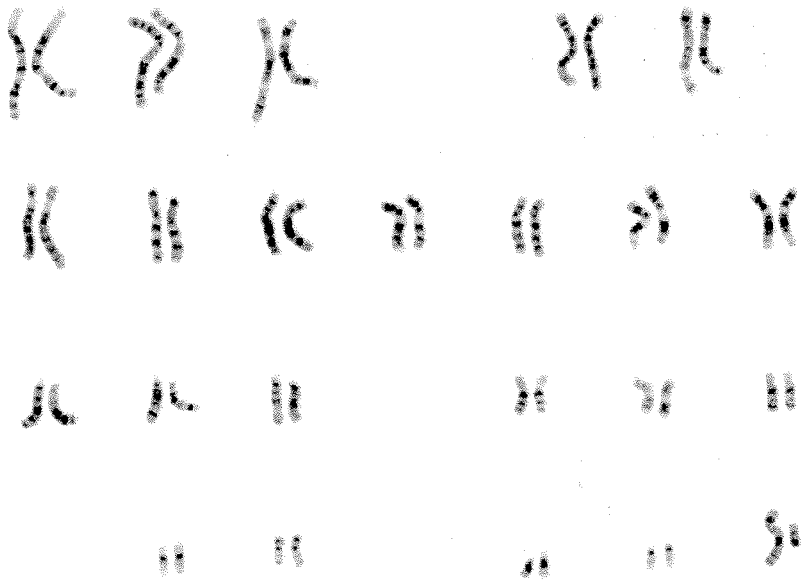
Karyotyping

The routine chromosome analysis (Karyotyping) refers to analysis of metaphase chromosomes which have been banded using trypsin followed by Giemsa, Leishmanns, or a mixture of the two. This creates unique banding patterns on the

chromosomes. The molecular mechanism and reason for these patterns is unknown, although it likely related to replication timing and chromatin packing.

Several chromosome-banding techniques are used in cytogenetics laboratories. Quinacrine banding (Q-banding) was the first staining method used to produce specific banding patterns. This method requires a fluorescence microscope and is no longer as widely used as Giemsa banding (G-banding). Reverse banding, or R-banding, requires heat treatment and reverses the usual black-and-white pattern that is seen in G-bands and Q-bands. This method is particularly helpful for staining the distal ends of chromosomes. Other staining techniques include C-banding and nucleolar organizing region stains (NOR stains). These latter methods specifically stain certain portions of the chromosome. C-banding stains the constitutive heterochromatin, which usually lies near the centromere, and NOR staining highlights the satellites and stalks of acrocentric chromosomes.

High-resolution banding involves the staining of chromosomes during prophase or early metaphase (prometaphase), before they reach maximal condensation. Because prophase and prometaphase chromosomes are more extended than metaphase chromosomes, the number of bands observable for all chromosomes increases from about 300 to 450 to as many as 800. This allows the detection of less obvious abnormalities usually not seen with conventional banding.



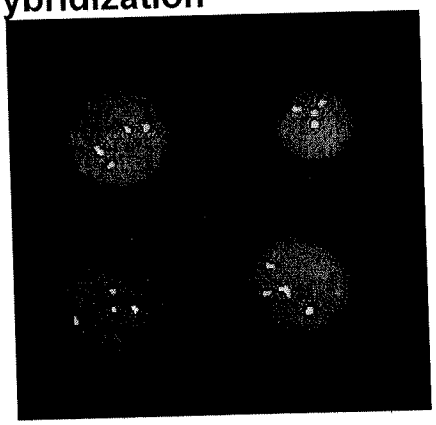
Slide preparation

Cells from bone marrow, blood, amniotic fluid, cord blood, tumor, and tissues (including skin, umbilical cord, chorionic villi, liver, and many other organs) can be cultured using standard cell culture techniques in order to increase their number. A mitotic inhibitor (colchicine, colcemid) is then added to the culture. This stops cell division at mitosis which allows an increased yield of mitotic cells for analysis. The cells are then centrifuged and media and mitotic inhibitor are removed, and replaced with a hypotonic solution. This causes the white blood cells or fibroblasts to swell so that the chromosomes will spread when added to a slide as well as lyses the red blood cells. After the cells have been allowed to sit in hypotonic solution, Carnoy's fixative (3:1 methanol to glacial acetic acid) is added. This kills the cells and hardens the nuclei of the remaining white blood cells. The cells are generally fixed repeatedly to remove any debris or remaining red blood cells. The cell suspension is then dropped onto specimen slides. After aging the slides in an oven or waiting a few days they are ready for banding and analysis.

Analysis

Analysis of banded chromosomes is done at a microscope by a clinical laboratory specialist in cytogenetics (CLSp(CG)). Generally 20 cells are analyzed which is enough to rule out mosaicism to an acceptable level. The results are summarized and given to a board-certified cytogeneticist for review, and to write an interpretation taking into account the patient's previous history and other clinical findings. The results are then given out reported in an *International System for Human Cytogenetic Nomenclature 2009* (ISCN2009).

Fluorescent in situ hybridization



Interphase cells positive for a t(9;22) rearrangement

Fluorescent in situ hybridization (FISH) refers to using fluorescently labeled probe to hybridize to cytogenetic cell preparations.

In addition to standard preparations FISH can also be performed on:

- bone marrow smears
- blood smears
- paraffin embedded tissue preparations
- enzymatically dissociated tissue samples
- uncultured bone marrow

- uncultured amniocytes
- Cytospin preparations

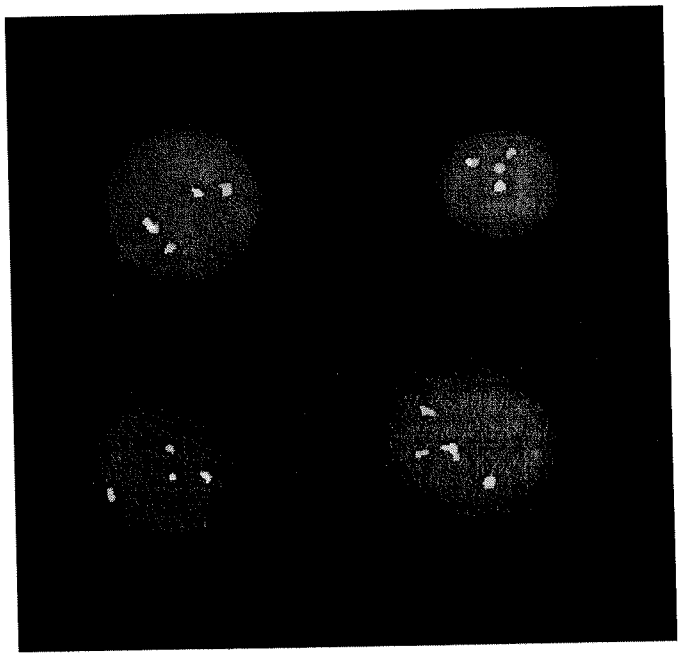
Slide preparation

This section refers to preparation of standard cytogenetic preparations

The slide is aged using a salt solution usually consisting of 2X SSC (salt, sodium citrate). The slides are then dehydrated in ethanol, and the probe mixture is added. The sample DNA and the probe DNA are then co-denatured using a heated plate and allowed to re-anneal for at least 4 hours. The slides are then washed to remove excess unbound probe, and counterstained with 4',6-Diamidino-2-phenylindole (DAPI) or propidium iodide.

Analysis

Analysis of FISH specimens is done by fluorescence microscopy by a clinical laboratory specialist in cytogenetics. For oncology generally a large number of interphase cells are scored in order to rule out low-level residual disease, generally between 200 and 1,000 cells are counted and scored. For congenital problems usually 20 metaphase cells are scored.



Future of cytogenetics

Advances now focus on molecular cytogenetics including automated systems for counting the results of standard FISH preparations and techniques for virtual karyotyping, such as comparative genomic hybridization arrays, CGH and Single nucleotide polymorphism arrays.

References:

1. Rieger, R.; Michaelis, A.; Green, M.M. (1968), A glossary of genetics and cytogenetics: Classical and molecular, New York: Springer-Verlag, ISBN 978-0-387-07668-3
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4. ^ Kottler, Malcolm Jay (1974). "From 48 to 46: cytological technique, preconception, and the counting of human chromosomes". Bulletin of the History of Medicine. 48 (4): 465–502. JSTOR 44450164. PMID 4618149. ProQuest 1296285397.
5. ^ von Winiwarter H (1912). "Études sur la spermatogenese humaine" [Human spermatogenesis studies]. Arch. Biologie (in French). 27 (93): 147–149.
6. ^ Painter T.S. "The spermatogenesis of man" p. 129 in "Abstracts". The Anatomical Record. 23 (1): 89–132. January 1922. doi:10.1002/ar.1090230111.
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8. ^ Wright, Pearce (11 December 2001). "Joe Hin Tjio The man who cracked the chromosome count". The Guardian. Archived from the original on 25 August 2017.
9. ^ Saxon, Wolfgang (7 December 2001). "Joe Hin Tjio, 82; Research Biologist Counted Chromosomes". The New York Times. Archived from the original on 12 May 2013.
10. ^ Tjio, Joe Hin; Levan, Albert (9 July 2010). "The chromosome number of man". Hereditas. 42 (1–2): 723–4. doi:10.1111/j.1601-5223.1956.tb03010.x. PMID 345813.

Annexure- II

VALUE ADDED COURSE

Cytogenetics and ANA01

List of Students Enrolled – Dec-Jan 2020

2019	U19MB251	AAYESHA TAUHEED	Anatomy
2019	U19MB252	ABHIJITH A	Anatomy
2019	U19MB253	ABIHA SHERIN M	Anatomy
2019	U19MB254	ABINAYA SHANMUGAM	Anatomy
2019	U19MB255	ADHITI PRAKASH	Anatomy
2019	U19MB256	ADITHYA S KUMAR	Anatomy
2019	U19MB257	S M AISHMEKA SAIRA	Anatomy
2019	U19MB258	AISHU MUPPANENI	Anatomy
2019	U19MB259	AJETH R	Anatomy
2019	U19MB260	AKASH P	Anatomy
2019	U19MB261	AMIR FAJURA A	Anatomy
2019	U19MB262	AMLAN KUMAR KAR	Anatomy
2019	U19MB263	ANANDHA VIGNESHVAR A	Anatomy
2019	U19MB264	ANISHA C	Anatomy
2019	U19MB265	ANMOL KAUL	Anatomy
2019	U19MB266	ANNET GERIZIM	Anatomy
2019	U19MB267	ANUSHA MOL VINCENT VJP	Anatomy
2019	U19MB268	ARAVIND N	Anatomy
2019	U19MB269	ARNAB ADHIKARI	Anatomy
2019	U19MB270	ARNAB JYOTI DAS	Anatomy
2019	U19MB271	ARTHY M	Anatomy
2019	U19MB272	ARUNESHWARAN N	Anatomy

RESOURCE PERSON

1. Dr. Vijisha P

2. Dr. B. Rajesh

COORDINATOR

Dr. Vijisha P

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - III

VALUE ADDED COURSES

CYTOGENETICS

Short answer questions

Course code:ANA01

Answer all the questions (10x2 = 20)

1. Define cytogenetics
2. Mitosis & meiosis
3. Modes of inheritance
4. Karyotyping
5. Pedigree analysis
6. Gene therapy
7. Recent trends in genetics
8. Prenatal diagnosis
9. genetic counselling
10. chromosomal aberrations

Value added exam

cytogenetics - branch of genetics that studies the structure of DNA within the cell nucleus

Mitosis - Process single cell divides into two identical daughter cells

Meiosis - Single cell divides twice to produce 4 cells containing half the original amount of genetic information

Modes of inheritance - Is the manner in which a genetic trait or disorder is passed from one generation to the next

Karyotyping skill training: The skill training we underwent was very useful The basics were clear.

Pedigree analysis - Its useful when studying species with a long generation time

6. Gene therapy - [illegible]
patient to treat genetic disease

7. Recent trends
1. Increased focus on targeted cancer
treatment

8. Pre-natal diagnosis -
Amniocentesis and chorionic villous
sampling

9. Genetic counselling
Process through which knowledge abo
genetic aspects of illness is shared by
trained professionals

10. Chromosomal abnormalities
eg. Down syndrome, Trisomy 18, Trisomy
Klinefelter syndrome, XYY syndrome,
Turner syndrome, Triple X syndrome

Student Feedback Form

Course Name: cytogenetics
Subject Code: **ANA01**

Name of Student: Aayeesha J Roll No.: U19MB251

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear					✓
2	Course contents met with your expectations					✓
3	Lecturer sequence was well planned					✓
4	Lectures were clear and easy to understand					✓
5	Teaching aids were effective					✓
6	Instructors encourage interaction and were helpful					✓
7	The level of the course					✓
8	Overall rating of the course	1	2	3	4	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

Signature

Date:

Date: 05.01.2020

From

Dr. Vijisha Phalgunan
Professor and Head,
Department of Anatomy,
Sri Lakshmi Narayana Institute of Medical Sciences
BIHER
Puducherry

To

The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
BIHER
Puducherry

Sub: Completion of value-added course: Cytogenetics

Dear Sir,

With reference to the subject mentioned above, the department of Anatomy has conducted the value-added course titled: : Cytogeneticsfor the 1st MBBS students during Dec-Jan 2020 . We solicit your kind action to send certificates for the participants, whose list is attached with this letter. Also I am attaching the photographs captured during the conduct of the course.

Kind Regards,



Dr. Vijisha P

Encl: Participants list

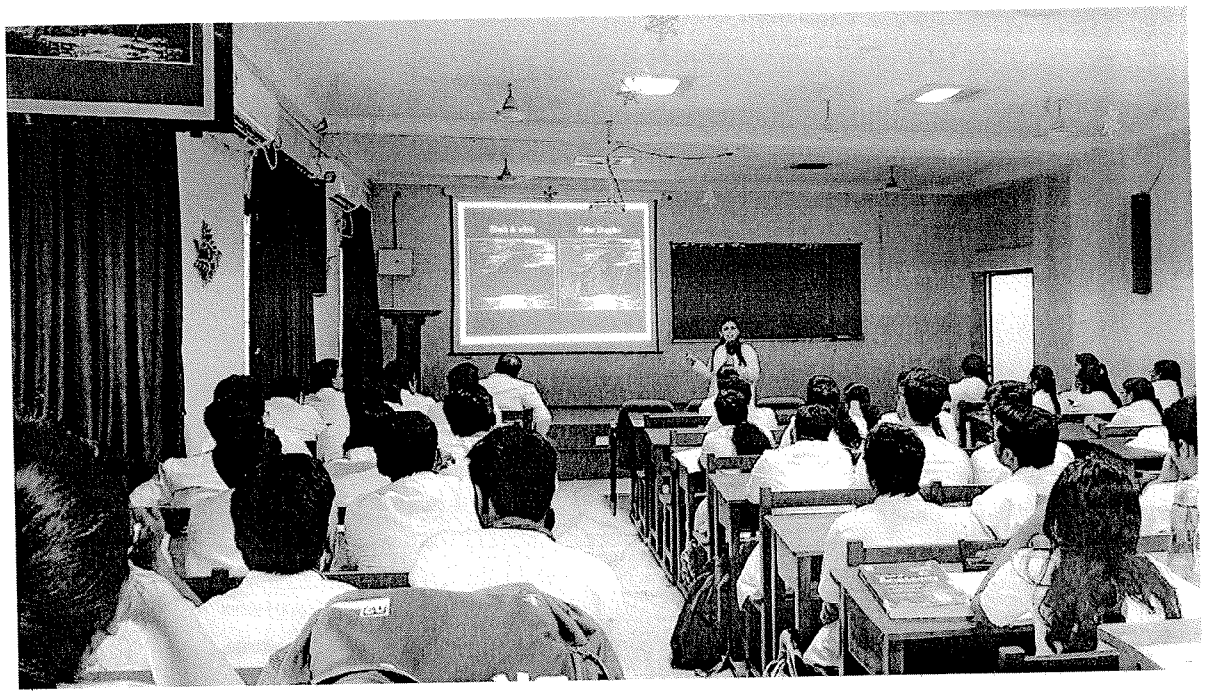
Photograph

VALUE ADDED COURSE

CYTOGENETICS

Participants list

2019	U19MB251	AAYESHA TAUHEED	Anatomy
2019	U19MB252	ABHIJITH A	Anatomy
2019	U19MB253	ABIHA SHERIN M	Anatomy
2019	U19MB254	ABINAYA SHANMUGAM	Anatomy
2019	U19MB255	ADHITI PRAKASH	Anatomy
2019	U19MB256	ADITHYA S KUMAR	Anatomy
2019	U19MB257	S M AISHMEKA SAIRA	Anatomy
2019	U19MB258	AISHU MUPPANENI	Anatomy
2019	U19MB259	AJETH R	Anatomy
2019	U19MB260	AKASH P	Anatomy
2019	U19MB261	AMIR FAJURA A	Anatomy
2019	U19MB262	AMLAN KUMAR KAR	Anatomy
2019	U19MB263	ANANDHA VIGNESHVAR A	Anatomy
2019	U19MB264	ANISHA C	Anatomy
2019	U19MB265	ANMOL KAUL	Anatomy
2019	U19MB266	ANNET GERIZIM	Anatomy
2019	U19MB267	ANUSHA MOL VINCENT VJP	Anatomy
2019	U19MB268	ARAVIND N	Anatomy
2019	U19MB269	ARNAB ADHIKARI	Anatomy
2019	U19MB270	ARNAB JYOTI DAS	Anatomy
2019	U19MB271	ARTHY M	Anatomy
2019	U19MB272	ARUNESHWARAN N	Anatomy



Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that Aayesha Tauheed has actively participated in the Value Added Course on Cytogenetics held during Dec-Jan 2020 Organized by Department of Anatomy, Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. Vijisha P	Dr. B. Rajesh	Dr.Vijisha P	Dr. S.Balagurunathan
RESOURCE PERSON	**RESOURCE PERSON**	**COORDINATOR**	**DEAN**

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that ASHA J has actively participated in the Value Added Course on Cytogenetics held during Dec-Jan 2020 Organized by Department of Anatomy, Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. Vijisha P	Dr. B. Rajesh	Dr.Vijisha P	Dr. S.Balagurunathan
RESOURCE PERSON	**RESOURCE PERSON**	**COORDINATOR**	**DEAN**

Sri Lakshmi Narayana Institute of Medical Sciences

Date 05/10/2019

From
Dr.V. Sivaprakasam
Professor and Head,
Department of Paediatrics,
Sri Lakshmi narayana institute of medical sciences,
Bharath Institute of Higher Education and Research,
Chennai.

To
The Dean,
Sri Lakshmi narayana institute of medical sciences,
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: Human Milk Banking Course

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **Human Milk Banking Course** from December 2019. We solicit your kind permission for the same.

Kind Regards

Dr. V. Sivaprakasam

PAEDIATRICS HEAD
DEPT. OF PAEDIATRICS
SRI LAKSHMI NARAYANA INSTITUTE OF
MEDICAL SCIENCES
OSUDU, PUDUCHERRY

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: Dr Jayalakshmi

The HOD: Dr V. Sivaprakasam

The Expert: Dr Kaurppaiah Pandi

The committee has discussed about the course and is approved.

Dean	Subject Expert	HOD
Dr. G. JAYALAKSHMI, BSC., MBBS., DTCD., M.D., DEAN Sri Lakshmi Narayana Institute of Medical Sciences Osudu, Agaram, Kudapakkam Post, Villianur Commune, Puducherry - 605502.	ASSISTANT PROFESSOR DEPARTMENT OF PAEDIATRICS SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES	PAEDIATRICS HEAD DEPT. OF PAEDIATRICS SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES OSUDU, PUDUCHERRY

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affliated to Bharath University, Chennai - TN]

Circular

10.11.2019

Sub: Organising Value-added Course: Human Milk Banking Course., reg

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi narayana institute of medical sciences, **Bharath Institute of Higher Education and Research**, is organising **"Human Milk Banking Course "**. The course content and registration form is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before 20 November 2019. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

Dr. G. JAYALAKSHMI, BSC., MBBS., DTCD., M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Agaram, Kudapakkam Post,
Villianur Commune, Puducherry - 605502.

Encl: Copy of Course content

Course Proposal

Course Title: Human Milk Banking Course

Course Objective: To understand the need, functioning and management of Human Milk Banks in a tertiary care hospital.

Course Outcome: On successful completion of the course the students will have in depth knowledge on Human milk banking and its functioning

Course Audience: Final year MBBS Students

Course Coordinator: Dr. V. Sivaprakasam

Course Faculties with Qualification and Designation:

1. **Dr. V. Sivaprakasam – MD Paediatrics – Head of Department**
2. **Dr. Karuppaiah Pandi - MD Paediatrics – Assistant professor**

Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Time	Hours	Resource person
1.	1.12.2019	Introduction to human milk banking	2-4 pm	2	Dr. V. Sivaprakasam
2.	2.12.2019	Equipments and infrastructure needed for a human milk bank	2-4 pm	2	Dr. Karuppaiah Pandi
3.	4.12.2019	Screening for Donors	2-4 pm	2	Dr. V. Sivaprakasam
4.	5.12.2019	Collection and Storage of milk	2-4 pm	2	Dr. Karuppaiah Pandi
5.	6.12.2019	Disbursal of milk	2-4 pm	2	Dr. V. Sivaprakasam
6.	7.12.2019	CLMCs and LMUs	2-4 pm	2	Dr. Karuppaiah Pandi
7.	8.12.2019	Human resource for milk banks	2-4 pm	2	Dr. V. Sivaprakasam
8.	9.12.2019	Record keeping for LMCs	2-4 pm	2	Dr. Karuppaiah Pandi
9.	11.12.2019	Monitoring and Quality Assurance	2-4 pm	2	Dr. V. Sivaprakasam

10.	12.12.2019	Technical guidelines	2-4 pm	2	Dr. Karuppaiah Pandi
11.	13.12.2019	Pasteurisation of donor human milk	2-4 pm	2	Dr. V. Sivaprakasam
12.	14.12.2019	Scope of milk banks in future	2-4 pm	2	Dr. V. Sivaprakasam
13.	15.12.2019	Virtual tour of Human milk bank at BJMC	2-4 pm	2	Dr. Karuppaiah Pandi
14.	16.12.2019	Summary and discussion	2-4 pm	2	Dr. V. Sivaprakasam
15.	18.12.2019	Assessment	2-4 pm	2	Dr. V. Sivaprakasam
			Total Hours	30	

REFERENCES:

1. **Child Y. Infant and Young Child Feeding Human Milk Banking Guidelines 2015. 2015**
2. **Guidelines on lactation management centres- NRHM**

VALUE ADDED COURSE ON HUMAN MILK BANKING

1. Name of the programme & Code

Human Milk Banking Course and PECO 12

2. Duration & Period

30 hrs (December 2019- January 2020)

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

One word question/answer - *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

Once (Decemberr 2019- January 2020)

8. Year of discontinuation: 2020

9. Summary report of each program year-wise

Value Added Course					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	PECO 12	Human Milk Banking Course	Dr. Karuppiah Pandi	Final year MBBS	20 (December2 019- January 2020)

10. Course Feed Back

Enclosed as Annexure- V

Dr. Karuppiah Pandi

RESOURCE PERSON

ASSISTANT PROFESSOR
DEPARTMENT OF PAEDIATRICS
SRI LAKSHMI NARAYANA INSTITUTE OF
MEDICAL SCIENCES

Dr.V. Sivaprakasam

COORDINATOR

PAEDIATRICS HEAD
DEPT. OF PAEDIATRICS
SRI LAKSHMI NARAYANA INSTITUTE OF
MEDICAL SCIENCES
OSUDU, PUDUCHERRY

Annexure- I

HUMAN MILK BANKING COURSE



PARTICIPANT HAND BOOK

COURSE DETAILS

Particulars	Description
Course Title	Human Milk Banking Course
Course Code	PECO 12
Objective	To understand the need, functioning and management of Human Milk Banks in a tertiary care hospital.
Further learning opportunities	Clinical benefits of Donor Human Milk in NICU
Key Competencies	On successful completion of the course the students will have in depth knowledge on Human milk banking and its functioning
Target Student	Final MBBS Students
Duration	30hrs November 2019- December 2019
Theory Session	10hrs
Practical Session	20hrs
Assessment Procedure	One word questions

B.2.1 Definition

Lactation Management Unit would be established in District Hospital/Sub district Hospital with functional SNCU with at least 12 beds where sick newborns are admitted for medical management. This unit should be established in vicinity of SNCU. The LMU would be set up with collection and storage facility of mother's own milk to fulfill the feeding requirement of their admitted sick babies.

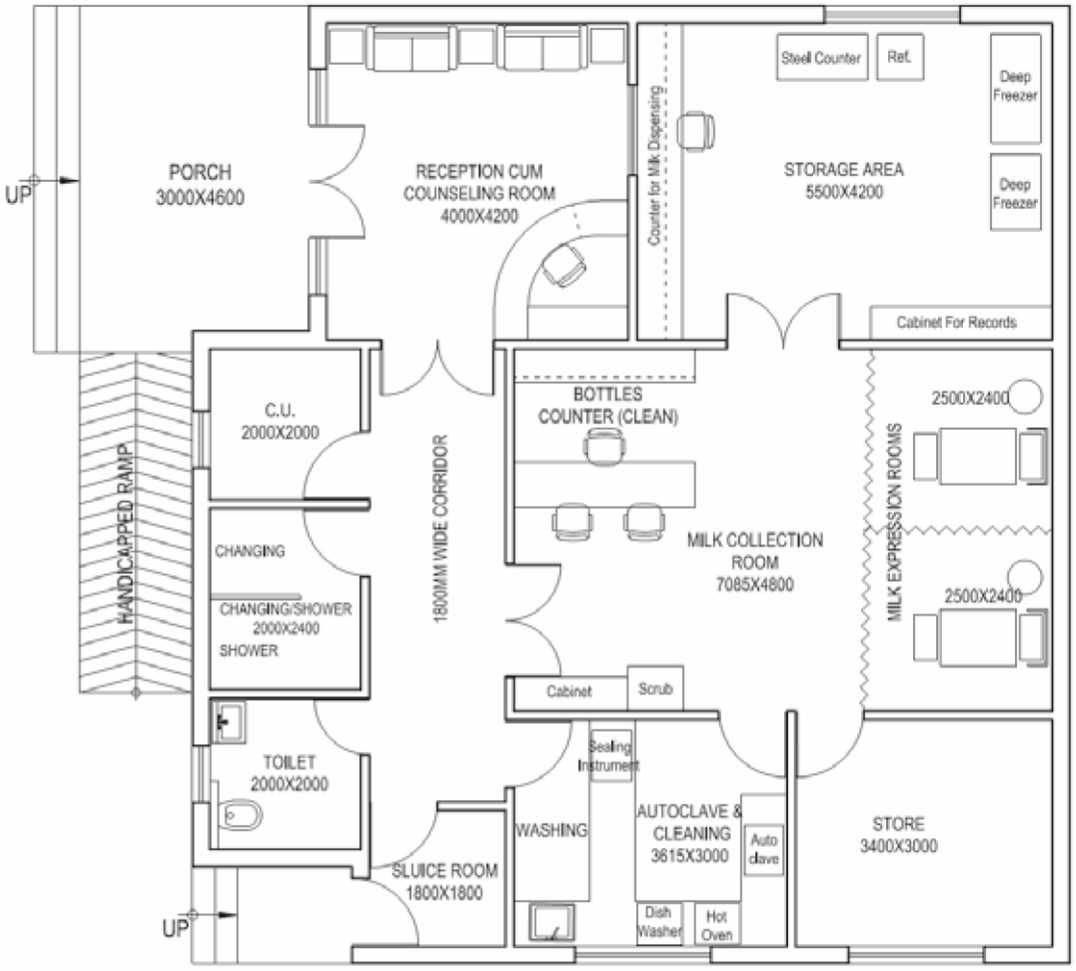
The salient features of Lactation Management Unit

- ⊙ No screening of mother is required as babies are fed by milk expressed by their own mothers.
- ⊙ Emphasis on milk expression, counseling and support for better let down along with use of electric and manual pumps.
- ⊙ Careful labeling of expressed milk and supervised dispensing.
- ⊙ Pasteurization and testing of milk is not required.

State and UTs need to prioritize establishing LMU in the district hospital where SNCU with high bed strength (20-30 beds) is operational. If the SNCU already has necessary facilities for milk expression, storage (refrigerator and deep freezer), cleaning of milk expression and feeding equipment along with hand washing area for mothers, establishment of LMU is not recommended.

B.2.2 Infrastructure Requirements

Optimum space requirement **for a LMU is approx. 160 Sq. Mts.** However, if the health facility with SNCU does not meet this minimum space requirement, facilities for milk expression, storage (refrigerator and deep freezer), cleaning of milk expression and feeding equipment along with hand washing for **figure 6:** Layout Design for LMU



AREA:-

BUILDING AREA = 139.0 SQ.MT.
PORCH AREA = 14.0 SQ.MT.
TOTAL AREA = 153.0 SQ.MT.

PROJECT:-	DRAWING TITLE:-	SR.ARCHITECT RAJEEV KANAUJIA	SCALE: NTS	DATE : 29/05/2017	NORTH	
CONCEPTUAL PROTOTYPE LAYOUT PLAN FOR PROPOSED LACTATION MANAGEMENT UNIT UNDER NHM	GROUND FLOOR PLAN	ARCHITECT SACHIN MAHINDRU	JOB NO.	DRG. NO. 01		
		CAD OPERATOR HARENDRA KUMAR	CENTRAL DESIGN BUREAU FOR MEDICAL & HEALTH BUILDINGS, MOHFW, NEW DELHI.			

mothers should be provided in SNCU/KMC area. Therefore, before establishing LMU, the district programme management unit must carry out an appropriate need assessment.

Following facilities should be available in the LMU:

- Machine pumping
- Milk Storage
- Thawing
- Washing facility
- Dispensing of milk
- Record keeping
- **Essential areas:**

The design of the LMU would be a simpler and smaller version of CLMC with following essential areas:

1. **Reception cum administrative area:** This would be a smaller room/space than that of CLMC.
2. **Counselling area:** Mothers of the new-borns admitted in SNCUs may be counselled in the postnatal ward. However, mothers of out born babies would require counselling for which a small counselling room would be dedicated.
3. **Milk expression area:** This area is similar to that of CLMC; however, would provide milk expression facility for fewer mothers (2-3).
4. **Cleaning area:** This area is similar to that of CLMC.
5. **Milk storage area:** This area would be equipped with horizontal deep freezer and a refrigerator with storage arrangement for collected Mother's Own Milk.
6. Shower and changing room for mothers and Sluice room A suggested layout for LMU is at Figure 6.

- No separate milk processing area and laboratory is required for the LMU
- For proper functioning of LMU one refrigerator exclusively for keeping human milk should be kept in theSNCU/KMC room as per existing GoI guidelines*.

B.2.3 Human Resource for LMU

The pediatrician in-charge of the SNCU/or any other full time available pediatrician in the health facility will be in-charge of the LMU. Staff in position in KMC and SNCU units as per respective GoI guidelines are to be deputed for operationalization of the LMUs after the prescribed orientation and skill training. However, in case of shortage of staff, the following staff are to be recruited for the LMU.

* Refer "Facility based Newborn Care Operational Guidelines, 2011" and "Kangaroo Mother Care and Optimal Feeding of Low Birth Weight Infants; Operational Guidelines" of MoHFW

Table B.3: Human Resource for LMU

Designation	Number of staff	Qualification	Responsibilities**
full-Time Post			
Lactation Support Staff (only female staff)	Two	ANM Essential Pre-requisite of selection: Candidates who have completed three months of hands- on training in Lactation Management in an established CLMC and at end of training cleared an skilled based examination conducted at the designated training centres.	Overall supervision of functioning of LMU. Routine rounds in SNCU including KMC ward for providing lactation support to mothers, motivating them to express milk and counselling. Facilitating and helping mothers in milk expression and providing sterile gowns, sterile bottles, and tubing for breast pump. Would carry out cleaning and autoclaving of the equipment and ensure proper storage and dispensing of milk. Bottle Labelling and record keeping.
Part Time Post			
Hygiene Helper (2 hrs for each shift: Morning and evening shift) Should utilize the existing staff working in the SNCU	Two	As per State norm	Over all cleaning of LMU as per standard hygiene protocol
Existing staff in the health facility to be utilised for LMU			
Neonatologist/ Paediatrician trained for SNCU/NICU	Two (One designated as main and another designated for additional charge)	MBBS, MD (Paediatrics/ Neonatology)	Overall supervision, ensure smooth functioning of LMU and ensuring in house expression and storage of human milk. Provide regular teaching to all staffs regarding lavational support and activities of LMU.

B.2.4. Cost of setting up for Lactation Management Unit (LMU)

Tables B.4 outlines the budget estimate for establishing a model LMU at a health facility. The indicative cost given below includes cost of LMU equipment, communication equipment including Computer, other electronic machines, furniture, recurring operational expenses per annum and HR salary for full time staff.

Table B.4: Budget Estimate to establish a LMU

Heads	one time cost	Recurrent cost (annual)
Human Resources		
Lactation support staff (2) @ 15,000/- P.M. each	15,000	3,60,000

Equipment		
LMU equipment (including cleaning and sterilization equipment)	7,10,000	
Heads	**one time cost**	**Recurrent cost (annual)**
Communication equipment (including computer)	30,000	
Other electronic machines	1,39,000	
furniture		
Furniture and miscellaneous items (including office utility items)	81,000	
Supplies, Cleaning materials, Consumables & Stationary		
LMU Supplies		25,000
Cleaning supplies and consumables		28,000
Office stationary and staff item (including miscellaneous items and registers)		16,000
Maintenance of equipment		36,000
Total	**9,75,000**	**4,65,000**
Grand Total		**14,40,000**

NoTE:

- All electronic and valuable equipment are to be maintained under Annual Maintenance contract and the contract to be managed by the health facility where LMU is located.
- Salary structure provided here is indicative and will vary as per State norm. In case part time HR is being provided, the cost for their salary is to be included in the total budget.
- As indicated under CLMC head, the budget of LMU also needs to be reflected in district/state plan.

Refer **Appendix 5** for detail equipment specifications.

C

Record Keeping for Lactation Management Centres (CLMC and LMU)



C.1 Donor Records

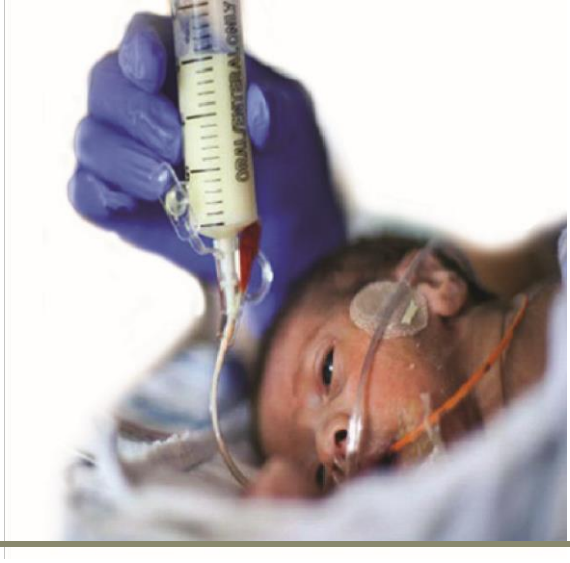
- Donor database which includes contact details and address for donor tracking.
- Initial donor screening form which includes:
  - Medical history
  - Birth history of infant (date, gestational age)
  - History of acute and chronic illnesses
  - Lifestyle choices (smoking, alcohol, drugs)
  - Physical examination
  - Antenatal records
  - Assessment of new-born health
  - HIV, Hepatitis, and VDRL screening results
  - Signed consent form agreeing to serological blood test, if needed
  - Signed consent form for the use of the DHM
- Donation log which includes:
  - Time and date
  - Volume of donation per donor
  - Receiving staff

C.2 Procedural Records

- Identification of milk donors comprising each pooled batch.
- Batch information should include:
  - Date and time of pooling and aliquoting
  - Containers per batch
  - Amount of milk pasteurised
  - Date and time of pasteurization
  - Heat treatment times and temperatures
  - Microbiological results post-pasteurization

D

Monitoring & Quality Assurance



- Date and time when DHM was moved to freezer for storage

- Freezer, refrigerator, incubator (in microbiology laboratory) and sterilization temperature records.
- Calibration records for all equipment

C.3 Administrative Records

- Financial Records
- Supplies inventory
- File folder for Annual Maintenance Contract (AMC) of equipment
- Attendance and minutes of administrative meetings
- Training and performance records of staff positioned in lactation management centre
- Register for audit/monitoring visit records/feedback records

C.4 Resource and reference documents

- National Guidelines on Comprehensive Lactation Centre Management
- Manual of Operations
- Preventive maintenance check book for equipment
- User manuals and manufacturers' instructional guides

Refer to **Appendix 6** for record keeping formats and auditing format.

D.1 Monitoring and Quality Assurance Mechanism

- Regular reporting for key indicators and supportive supervision visits are to be carried out for monitoring of CLMC and LMU functionality and outputs.

Key Indicators for National Reporting	Periodicity of Reporting		
	Monthly	Quarterly	Annually
Number of operational CLMCs in the State			√
Number of operational LMUs in the State			√
HR in position in CLMC/LMU		√	
Trained HR in position in CLMC/LMU		√	
Number of admitted sick babies who fed with donor human milk in health facility with CLMC	√		
Proportion of admitted sick babies who fed with donor human milk in health facility with CLMC	√		
Number of admitted sick babies who fed with expressed mother's own milk in health facility with CLMC	√		
Proportion of admitted sick babies who fed with expressed mother's own milk in health facility with CLMC	√		
Number of admitted sick babies who fed with expressed mother's own milk in health facility with LMU	√		
Proportion of admitted sick babies who fed with expressed mother's own milk health facility with LMU	√		
Number of supportive supervision visits made to CLMC			√
Number of supportive supervision visits made to LMU			√

D.1.1 Quality assurance

- For Quality Assurance (QA) and safety of DHM for consumption by babies, a robust quality assurance mechanism including Hazard Analysis and Critical Control Point (HACCP) system needs to be developed.
- Functional CLMCs and LMUs must be certified by quality assurance committees already established at State (SQAC), district (DQAC) levels and will be regularly audited to monitor the adherence and commitment to the national guidelines. A system for monitoring the quality of operations at CLMCs and LMUs would be operationalized by the SQAC and DQACs.
- The HACCP plan should be regularly audited and evaluated (annually) by a multi-disciplinary team consisting of facility based lactation management expert, quality assurance expert, neonatologist, microbiologist, etc.

Refer to **Appendix 4** for details on quality assurance mechanisms.

Things to Remember

1. The building should provide sufficient space for placement of equipment and storage of materials to permit sanitary operations for milk processing purposes.
2. Provision of proper precautions to reduce the potential for contamination of donated/collected milk, milk-contact surfaces and milk packaging materials.

3. Floors, walls and ceiling are constructed in a manner to permit adequate cleaning and maintained with good repair.
4. Droplets or condensate from fixtures, ducts and pipes does not contaminate milk, milk-contact surfaces or milk packaging materials.
5. Aisles or working spaces of adequate width are provided between equipment and walls to permit employees to perform duties unobstructed and to protect against milk, or milk- contact surfaces with clothing or personal contact.
6. Allow no pests in the area of milk processing. Effective measures are taken to exclude pests from the processing area and to protect against contamination of milk on the premises by the pests. The use of insecticides or rodenticides is permitted only under precautions and restrictions that will protect against the contamination of milk, milk-contact surfaces and milk packaging materials.
7. Persons unnecessary to milk processing area are not allowed in the milk handling area while open containers of milk are being processed.
8. Cleaners and sanitizers are properly identified, stored in dedicated containers and kept away from milk processing area.
9. Adequate hand washing facilities are provided including a sink/scrub with hot and cold running water, soap or detergent and individual sanitary towels.
10. Pasteurizing, pouring, cooling and labeling of milk to be carried out in one room with a separate door which is closed whenever milk containers are open.
11. Designated areas or rooms for the cleaning of equipment and containers are provided.
12. There are separate deep freezers to store raw, frozen donor milk and pasteurized milk.
13. Freezer temperature logs are maintained for all freezers.
14. Toilet facilities should not open directly into any room in which milk or milk products are processed. Toilets, changing and shower rooms must have tight fitting, self-closing doors. Mother's Hand washing areas must have signage.



Section 2

Step 1. Screening of Donor Mothers 30

Step 2. Milk Expression and Collection 33

Step 3. Processing of Donor Human Milk 38

Step 4. Post Pasteurization Testing of DHM 44

Step 5. Post Pasteurization Storage of DHM 47

Step 6. Dispensing of Processed Milk 48

TECHNICAL GUIDELINES

Functions of Comprehensive Lactation Management Centre (CLMC)

Comprehensive Lactation Management centre will undertake a range of facility based activities to promote and support breastfeeding for all newborns including preterm, low birth weight and sick newborns through support of breastfeeding by skilled counseling, lactation management through human milk donation and Kangaroo Mother Care.

The processes in CLMC have six basic steps:

1. Screening of donor mothers
2. Milk expression and Collection
3. Processing of DHM
4. Testing of DHM
5. Storage of Pasteurized DHM
6. Dispensing of Processed Milk

figure 7: Algorithm for CLMC Processes: Six Basic Steps

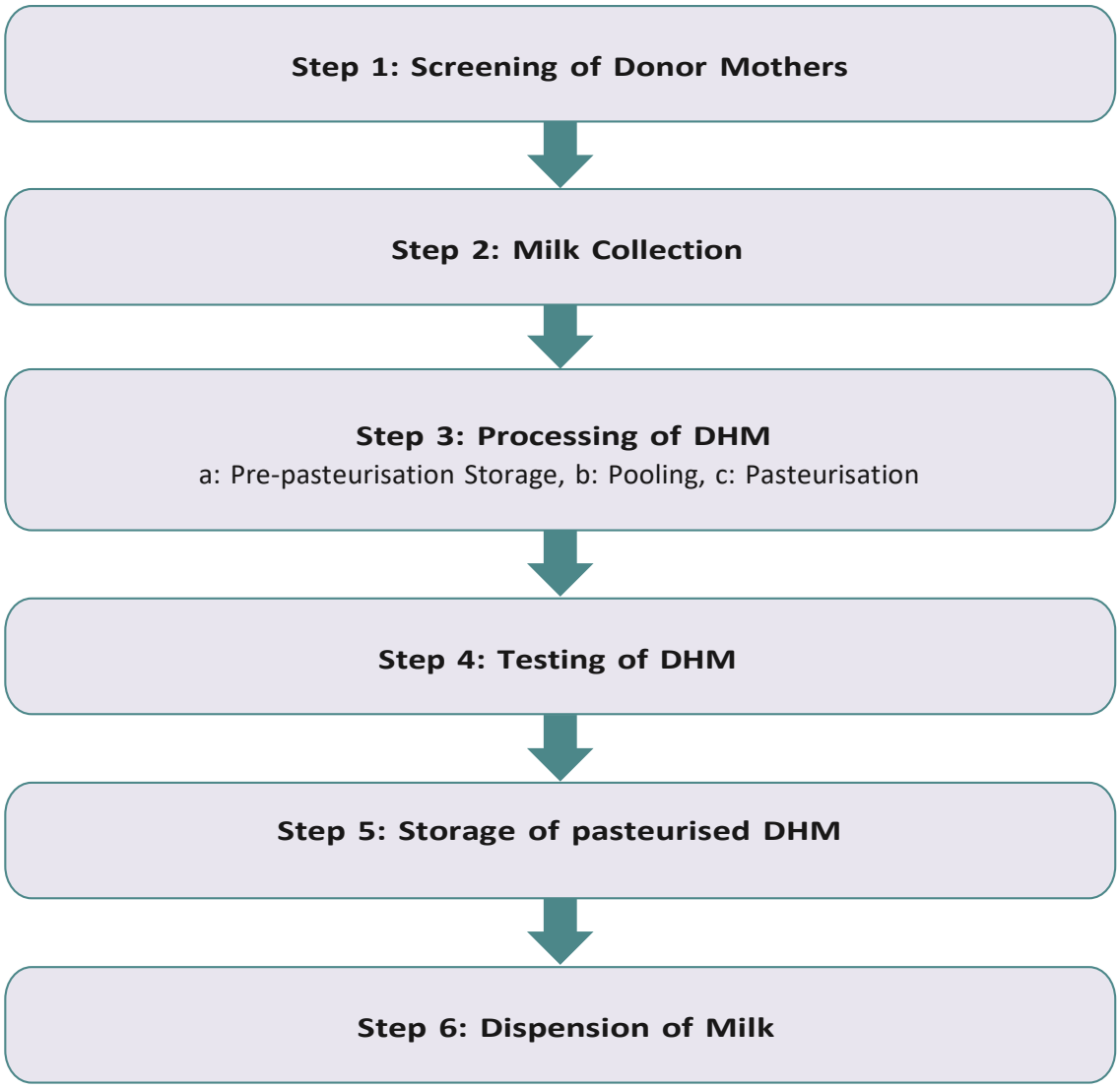
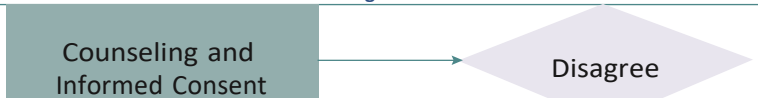


figure 8: Process Flow Chart for CLMC for donor milk utilization (Heterologous)


Counseling and Informed Consent
Disagree

STEP 1

1

Screening of Donor Mothers



1.1 Donor selection

A lactating woman who is willing to donate her surplus Expressed Breast Milk (EBM) should be considered as potential donor. Potential donors are screened verbally and in writing. The donors must be in good health as ascertained by history and physical examination.

For recruiting donors, following points must be adhered to:

- There should not be compromise on satiety for her own baby.
- Breast milk donation should be **voluntary and no incentive** should to be provided to the mothers.
- Mother should fulfil all donor eligibility criteria, as stated in the guidelines.
- The donation is to be **done only at health facility** and ***not*** promoted in community settings.

The potential donors could be:

- Mothers whose babies are in the NICU: Donors can be mothers whose babies are admitted in NICU and are not in a position to be fed or are on minimal enteral feeds. These mothers are encouraged to express milk frequently through the day to maintain their milk output and to donate excess of milk to the CLMC.
- Mothers in the postnatal wards and KMC wards: Within 48–72 hours after delivering, the milk production increases and mothers with a good milk output may be willing to donate their milk. Some mothers develop breast congestion and may need to express milk for relief. This expressed milk may then be utilized in CLMC.
- Mothers of babies visiting well-baby follow-up clinics/immunization sessions can be motivated to donate milk after ensuring they are in good health and complying with milk donation criteria.
- Lactating women among the staff of the hospital – Female staff of the health facility could be made aware about milk donation and encouraged to utilize the Lactation Management Centres (CLMC) as a location for pumping and expressing milk, thereby fostering a breastfeeding-friendly environment in the hospital.

1.2 Steps of screening at registration desk, before milk donation

- Mothers who volunteer to donate milk should be interviewed by the designated staff of CLMC using standard registration form which inclusion and exclusion criteria. The donor registration form needs to be in local language.
- Physical examination of the breast to check the presence of skin or breast lesions to be carried out.
- Informed written consent is to be obtained from the donor.

Refer to **Annexure 3** for format of Donor Registration cum Consent form.

1.3 Exclusion Criteria:

Potential donors are excluded based on following clinical issues unique to human milk and infants, including:

- Receipt of a blood transfusion/blood product within past 12 months.
- Receipt of an organ or tissue transplant, within past 12 months.
- Permanent *tattoo*/ears or other body piercing with other than single-use instruments within the last 12 months.
- Daily use of alcohol
- Donors must not be users of tobacco or nicotine products including gum or e-cigarettes. These include casual and occasional smokers.
- Chronic Infection (HIV, active TB etc.) relevant to breastfeeding, a history of hepatitis B, hepatitis C (optional), or a history of leukemia or lymphoma or treatment of any other cancer within the last 3 years.
- A sexual partner in the past 12 months who is suffering from/at risk for HBV, HCV (optional), HIV and venereal diseases or one who has high risk behavior for contracting them
- Use of medications: certain medications are permitted during milk donation and others are a cause for temporary referral and unacceptable donors.

  Prospective donors taking the following medications are allowed to donate milk:

  - Prenatal vitamins.
  - Hormonal replacement drugs that are normally found in breast milk; Human insulin, Thyroid replacement hormones, Hydrocortisone.
  - Nasal sprays
  - Asthma inhalers
  - Topical medications applied to the skin away from breast; topical medications applied to breast must be washed off thoroughly before expressing milk.
  - Eye drops
  - Progestin-only or low-dose oestrogen birth control products.
  - Inactivated vaccines, toxoids and allergy shots.
  - Selected human immune globulin products: Tetanus, Rabies etc.
  - Drugs given orally to mothers that are not absorbed (e.g. Aluminium, Calcium, Magnesium Antacids, Stool softeners, fibres, cymethicon).
  - Non-sedating anti-histamines.

Permissible medications are reviewed at least annually based on the latest available evidence and as per decision of the National Technical Resource group of GoI.

All other medications are contraindicated for human milk donation at CLMC (details in **Annexure 7**), though most will not be contraindicated when a mother is feeding her own baby.

1.4 Serological tests

Following screening blood tests are mandatory, if antenatal serological reports for them with in past 6 months are not available:

a. HIV 1 or 2

b. Hepatitis B

c. Syphilis/VDRL

d. Hepatitis C (optional)*

Antenatal serological tests conducted by a certified laboratory within the 6 months prior to donating milk will be considered and negative test results do not require confirmatory testing.

If lifestyle or medical issues suggest an increased risk of donation, deferral or retesting is at the discretion of the pediatrician/neonatologist in-charge of the CLMC.

There is no requirement of repeating these tests if the mother shows negative reports during her antenatal period done within 6 months from enrollment. However, the reports need to be seen and verified and in no case accepted on verbal basis.

1.5 Temporary Disqualification

Donors are instructed to report all illness in the household for evaluation of communicability and contamination of milk. Illnesses and exposures not related to milk safety do not require deferral periods such as common cold, conjunctivitis, and seasonal flu as long as medications are not needed. Potential donors with the following conditions should be temporary disqualified:

- If suffering from any acute infection or re-activation of a chronic illness (such as auto-immune disorder) that requires medication.
- Has cough for more than 2 weeks at the time of enrolment for donation.
- Has mastitis or fungal infection of the nipple or areola, herpes zoster of the breast and thorax.
- If suffering from active herpes simplex or has chicken pox infections.
- If received vaccinations for rubella, measles, mumps within past one month and Varicella vaccination within last three months.
- For one month following rubella or chicken pox infection in the household.

After a temporary disqualification, milk donation can resume at the discretion of qualified CLMC personnel.

If, the mother is not eligible, then she should be counselled about the importance of continued breastfeeding for her own baby or continuing to feed the baby with Expressed Breast Milk (EBM). These mothers should be provided with appropriate referral services for further diagnosis and management.

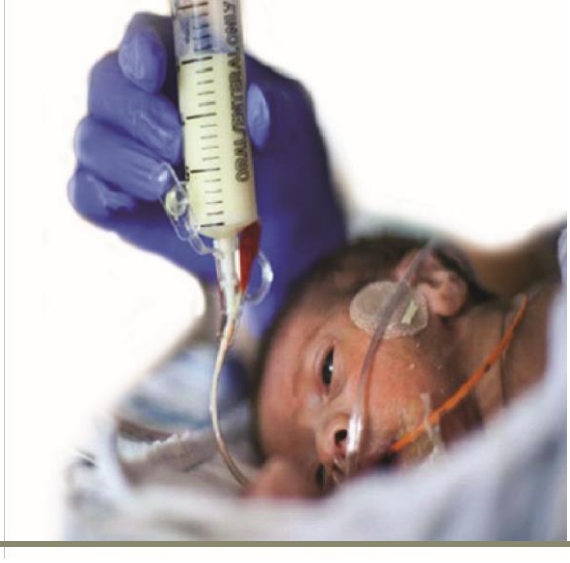
[*CDC Reference: Recommendations for prevention and Control of Hep C virus, MMWR, Oct 16, 1998, 47 (RR-19): 1-39]

Milk donation should be carried out for mothers who have completed donor screening. Sufficient care should be undertaken to properly label each bottle of donated human milk.

STEP

2

Milk Expression and Collection



2.1 Donor Counseling

Educating and sensitizing mothers as donors is most crucial aspect of milk donation and it is recommended as per the needs of the donor. They are given educational material informing them of characteristics of the high risk group or activities that might put them at risk for transmitting blood borne diseases. Making donors aware about proper methods and hygiene protocols to be followed during milk expression, collection, handling and storage is essential for safety and quality of DHM. The donor mother will be given specific verbal and written instructions in local language by the lactation counselor on the following:

- Hand washing and personal hygiene.
- Information on milk expression options, suitability of each method and collection techniques.
- Cleaning of breast pumps (detachable portions) and tubing.

Donor mother will also be encouraged to seek advice and support for lactation related problems

2.2 Preparatory activities

- **Shower:** The mother registered for donation should be greeted well, provided with autoclaved gown and asked to take a warm shower before entering milk collection room. For this purpose, dedicated shower rooms will be available. As the mother usually travel long distances and may be sweaty, it is preferable to take shower with plain liquid soap (and not antibacterial soap). For breast washing, no soap is prescribed other than daily shower as it may lead to cracked nipples. Showering serves two purposes- firstly to control milk contamination and secondly to have sufficient relaxation of the mother.
- Subsequently, the mother is then taken to milk collection room. Here the mother may consume food, if she is carrying it or else should be given hot drinks (milk based beverages) from the pantry.
- Ambience of milk collection room including privacy is an important factor influencing lactation process as Oxytocin modulated let-down effect plays a crucial role in the quantity of milk production.
- Donor Human Milk and Mother's Own Milk will be collected at CLMCs established at health facilities.
- At LMU only Mother's Own Milk will be collected and stored.
- Home collection of milk is not permissible.
- Lactation counselor would be actively involved during milk expression and collection, especially if the mother is donating milk for first time. The milk may be collected ideally by trained staff or the donor herself with assistance of a trained staff.

- If feasible, simultaneous expression from both breasts should be practiced as it is more efficient than sequential expression.
- Foremilk may not be discarded. However, drip milk i.e. milk passively collected from one breast while the baby feeds at the other, has been found to be nutritionally inferior and is thus not recommended for donation.
- Milk should be expressed by hand or using electric breast pumps which result in better volumes of expressed milk and are painless and comfortable to use when used appropriately.
- Mother should be provided with pre-labeled, sterile containers. The label should be waterproof and be able to withstand high and low temperatures.

2.3 Expression of Breast milk

There are two ways of expressing breast milk:

I. Manual Expression II. Expression using Breast Pumps

I. Manual Expression

Hand expression is usually gentler than a breast pump. Hand expression appears to produce a better Oxytocin response and milk ejection reflex. In a hospital setting, lactation counsellors/nurses should teach the mothers the art of hand expression of milk. Educate the mother to:

- Hold, handle, or cuddle the baby to stimulate the let-down reflex. Alternatively, take a few cleansing breaths and relax for at least five minutes.
- Sit comfortably and hold a clean container near the breast.
- Place the thumb and index figure on the breast around the areola, opposite each other.
- Support the breast with other three fingers.
- Press thumb and the index finger slightly inwards towards the chest wall.
- Press the breast between the fore-finger and thumb. Press and release. This should not hurt.
- Press areola in the same way from the sides, this ensures that milk is expressed from all segments of the breast.
- Avoid rubbing or sliding fingers along the skin.
- Express one breast for at least 3 to 5 minutes until the flow slows then express milk from the other side and repeat the process. To express breast milk adequately, it may take 20–30 minutes.

Before Manual Expression the Donor must

- Wash hands with soap and water
- Lather hand with soap and water for 15 seconds, paying particular attention to the area around and under fingernails.
- Dry hands with disposable paper towel or sterile single-use towel.

figure 9: Technique of manual expression of breast milk



II. Expression Using Electric Breast Pumps

- Hospital-grade electric breast pumps are recommended for use in Lactation Management Centres (CLMCs and LMUs).
- There are a number of designs, all of which have a funnel attachment which fits over the nipple and areola and work on a simple vacuum principle. Electric breast pumps are efficient and can be

adapted to allow single or double pumping. However, Bulb type pumps are strongly discouraged as they carry a high risk of contamination.

The technical specifications of electric breast pumps are at **Appendix 5.**

The user's guide book should be referred for instructions for using an electric pump.

- It is recommended that the baby should be kept close to the mother as this would help in let down reflex.
- Maintenance and cleaning of electric pumps and all of the accompanying accessories is critical to prevent contamination and potentially serious illness as a result.
- It is also important that mother is shown how to position and use the breast pump to avoid damaging her nipples or areola.
- Each mother should be provided sterilized tubing, funnel and milk container. This principle is to be strictly ensured. **There should be no sharing of breast pump tubing, funnel and milk containers among the donor mothers.**

Important instructions on use of Electric Breast Pumps

- Always remember to switch the pump off before removing the funnel from the breast.
- Double pumping reduces time of expression by 10-15 minutes and also allows for higher prolactin reflex which results in higher amount in less time. Pause for 30-60 seconds when the milk slows down.
- Stop pumping after 20-40 minutes or when the milk stops flowing.
- Milk donation should never be painful. Damaging of breast tissue should in no case be allowed by incorrect use of breast pump.
- If the mother has delivered the baby recently, and is secreting colostrum, it is advisable to express by manual expression only.
- Only electric breast pumps with an isolated motor, which does not connect with the tubing, are suitable for multiple use. Here each mother should have her own set of tubing.
- Express minimum 8 times/day or 100 minutes per 24 hours till baby starts to breastfeed.
- Mothers should be encouraged to express milk from both the breasts completely each time to maintain the milk output.
- In all cases the milk should be donated in the specified room in lactation management centres (CLMCs and LMUs).

2.4 Labeling of bottles at time of collection – Using Donor Human Milk at CLMC

All the expressed milk either using electric breast pumps or by manual expression to be used for should be clearly labeled with following information:

a. Name of the CLMC
b. Unique ID for the mother
c. Date of donation

d. Age of child- to know whether pre term/term milk
e. Date of collection
f. Site of collection

figure 10: Labeled milk bottles



g. Container number
h. Date of freezing
i. Date of pasteurization
j. Date of testing
k. Date of expiry

2.5 Labeling of bottles with mother's own milk at CLMC

All the expressed milk either using electric breast pumps or by manual expression,to be used only for her own baby and should be clearly labeled with following information:

a. Name of the CLMC
b. Unique ID for the mother
c. Date of donation
d. Age of child- to know whether pre term/term milk
e. Date of collection
f. Site of collection
g. Container number
h. Date of freezing
i. Date of expiry

2.6 Logging of DHM

All donated milk is identified as relating to a specific approved milk donor. Logging of incoming milk includes estimating the volume of milk as well as observing for foreign matter or others sources of contamination such as broken storage containers.

STEP

3

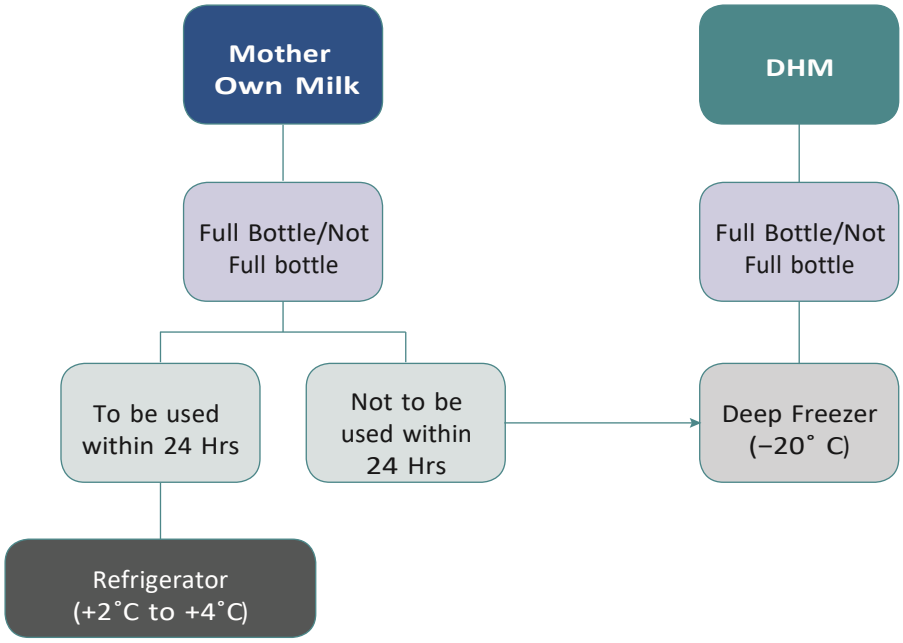
Processing of Donor Human Milk



3.1 Pre-Pasteurization-Storage of expressed breast milk

- Raw DHM awaiting pasteurization should be immediately transferred to a deep freezer at the temperature of (-) 20˚C for storage. Raw mother's own milk which will be utilized for feeding within 24 hrs. should be kept in refrigerator (+2˚C to +4˚C) and mother's own milk which is not expected to be fed within 24 hours should be immediately transferred to a separate deep freezer (–) 20˚C/in the deep freezer for DHM in separate racks labeled for MOM. This is to prevent bacteria multiplication and lipolysis. Raw DHM can be stored in a freezer (–20˚C) for a maximum of 3 months before it is pasteurized. It should not be stored for longer than this.

figure 11: Process Flow Chart for pre-pasteurization storage



No Shifting of container

The expressed milk should be stored in the specified container of donation and there should be no pouring of milk between containers as it leads to increased risk of contamination and loss of nutrients due to sticking to surface. The container should not be filled to brim, as milk expands while freezing.

Make of Container/Milk Bottle

- **BPA free hard plastic containers made from poly-propylene are to be used.**
- Ploy-carbonate containers are not recommended due to presence of BPA.

- Stainless steel containers are not recommended due to loss of cell counts during storage because of oligo dynamic effect of nickel.
- Soft polyethylene bags are not to be used.
- All containers should have tight fitting lids with capacity of **30ml and 100-110 ml.**

- The temperature of the freezer should be rigorously controlled i.e. in freezer equipped with recording thermometer and temperature sensitive audible and visual alarm. The recording of temperature of freezer and refrigerator should be done meticulously, twice a day. In case electricity fluctuations are reported, DHM should be discarded (if temperature cannot be maintained for 24 hrs.). Dedicated power backup must be ensured to maintain optimum temperatures.
- At the lactation management centres, freshly expressed MOTHER'S OWN MILK must be stored in a separate refrigerator or freezer as necessary.
- Also, frozen raw DHM should be kept separately from pasteurized DHM. The separation of frozen raw DHM from pasteurized DHM would be ensured by having deep freezers installed separately in processing room and storage room respectively.
- The DHM stored in refrigerator should be directly sent for pooling (after Donor clearance); however, the DHM which is frozen in the deep freezer has to be thawed.

There should be a separate compartment in the freezer and refrigerator for storage of per-term and term milk.

Don't

- Mixing of raw milk to frozen milk of the same mother is not allowed due to hydrolysis of lipids because of sudden decrease in temperature of frozen milk.
- Mixing of milk donated by same mother at different times should not be done. It should be collected in different containers, labeled with same container ID with different time and date.

3.2. Thawing of frozen raw DHM

- Shift the frozen DHM to a refrigerator overnight (not more than 24 hours) to allow milk to thaw slowly to 4°C.
- In case of an emergency, thawing can be done in a wide container of warm water (not to exceed 37°C) ensuring that water does not touch the lids of the containers and it does not fall over.
- Thawing should never be done in a microwave oven, as microwaving may destroy Immunoglobulin A and other antibacterial properties more than any other form of thawing.
- The outside of the container of DHM after thawing should be dried with clean paper towel. The content is gently agitated in order to uniformly distribute the constituents as protein, water and fat of expressed milk freezes and thaws at different rate.
- The time and date of the thawing should be documented accurately.
- Thawed milk should never be refrozen.
- Thawing should never be done in microwave oven, as microwaving may create 'hot spots' causing burn injury to the baby and it destroys IgA and other antibacterial properties more than any other form of thawing.

3.3 Pooling and Aliquoting of Milk

All persons working in direct contact with milk, milk contact surfaces and milk packaging materials conform to hygienic practices while on duty to the extent necessary to protect against contamination of milk.

Pooling

- The raw DHM bottles are taken from refrigerator for pooling and further pasteurization which should be done in the processing room.
- It is preferable to pool milk on steel slab in a laminar air flow system. However, a clean, hygienic working environment is also acceptable for pooling of raw DHM.
- A one liter sterilized conical flask made of borosilicate glass is to be used for pooling of DHM from preferably 3 mothers. The flask should be stirred with a sterile stirrer and swirled for homogeneity. This pooled raw DHM constitutes a batch (milk from 3 mothers). Each pooled batch should be provided a unique batch number (an alphanumeric code containing 8 letters) linked with registration number of all donors in that pool.

Aliquoting

- The pooled milk is then aliquoted into clean containers in a predetermined amount as per bottle size under all aseptic precautions, under laminar air flow.
- The containers shall be filled leaving adequate air space in the container to allow for expansion during freezing.
- All containers are filled to the same approx. level.
- The containers should be tightly sealed with sterilized caps to prevent contamination. Electronic sealing will be used. Sealing of DHM bottles is essential to control bacteriological contamination. Serial number should be allocated to each bottle after sealing the bottle.
- One sample of 10 ml of milk meant for pre-pasteurization microbiological culture will be collected in any sterile container/test tube.
- It is preferable to pool and label donor milk separately as colostrum, preterm, and mature milk. This will facilitate distribution of selected milk to different types of recipients based on their needs.
- During pooling, visual screening for hair/skin cells on the surface of each container may be undertaken. Use of fine sieve for segregating physical contaminants to be undertaken.

Pre-pasteurization Testing of Pooled DHM

- DHM is tested for microbial contamination to decide whether it is fit for consumption. Tests should

Do's

- Each pasteurization team member should thoroughly scrub her/his hands with liquid soap before wearing gloves.
- Gloves are always used when handling milk and changed between procedures and especially between handling raw and pasteurized DHM.
- All 'milk spills' should be immediately cleaned with soap and water.

Don'ts

- Pooling should not be undertaken for separate batches (each batch contains milk pooled by mixing DHM collected from 3 mothers not more then 5).

national Guidelines on Lactation Management and Milk Banking in Public health Facilities

be carried out twice, before and after pasteurization.

- Before pasteurization, sample from each batch of pooled raw donor milk is to be tested for Staphylococcus aureus colony count. Milk would be discarded if colony count is more than 10^4 CFU. Other microbes are accepted irrespective of colony count.
- Pre-pasteurization testing should be carried out after pooling of raw DHM. For this purpose, a sample of 10 ml of pooled raw DHM will be collected using sterile technique, in a sterile bottle used for pasteurization. This bottle will be marked **"P"** with its serial number.

3.4 Pasteurization of DHM

- Pasteurization eliminates bacteria while retaining the majority of the milk's beneficial components. This preserves Vitamin C content, prevents lipid peroxidation and inactivates CMV, HIV, and kills most pathogenic bacteria found in breast-milk.
- Pasteurization should ideally be undertaken each day. However, the frequency of pasteurization will depend on the quantity of milk collected.
- There are a number of methods of pasteurization/heat-treating of human milk. These fall broadly into two categories:
  - Low temperature, long time (LTLT)
  - High temperature, short time (HTST)
- For CLMC it is recommended to use a form of LTLT heat treatment also known as Holder Pasteurisation method. This method involves heating DHM to 62.5°C (+/–0.5°C) and holding at this temperature for 30 minutes. Following this, the temperature of the milk is then rapidly reduced to minimize heat damage to nutrients and provide a thermal shock to the organisms enhancing their destruction and preventing growth of spores. It is recommended that milk temperature of 25°C to be attained within 10 minutes of the completion of holding period of 30 minutes and that a final temperature of 4°C be attained prior to transferring the pasteurised milk to a freezer. The rate of cooling and the temperature of the milk at the end of the process affect the quality of the final product.

Choice of Pasteurizer

1. Fully-automated pasteurizer

- In this pasteurizer, the heating and cooling cycles are performed in same water bath. The heating cycle starts immediately after putting on the equipment and the milk is kept in the water bath once the temperature is achieved to 62.5°C. The timer starts counting for 30 min cycle once the temperature of 62.5°C is achieved in the sample container. It has a built-in cooling system that rapidly cools the milk after completion of 30 minutes holding at 62.5°C. It has temperature indication system to provide visual output of the temperature and data logger to record the temperature and time parameters throughout the process.
- The automated pasteurizer provides an integral system solution with less scope of human errors, an inbuilt standard cooling system, and a comprehensive solution for different types of bottles, sealing, level of submerging, automated time for heating and cooling etc.
- The automated pasteurizer has a comprehensive approach. This is advantageous in hot Indian climate, and in the context of variable competency of health staff in the country. However, it

involves much higher cost, large usage of RO water and non-availability of indigenous manufacturers for servicing facility.

Refer **Appendix 5** for specifications of pasteurizer.

2. Semi-automated

- This equipment has both heating and cooling inbuilt in the equipment with two separate baths for these operations. After completion of 30-minute heating cycle of pasteurisation, an alarm beeps and technician needs to manually lift and shift the milk tray in the cooling water bath compartment. It will also possess data display as well as recording facility to maintain all the records of process.

Indigenous make pasteurizers are available in India.

- A shaker water bath can also carry out holder pasteurization.
- While using a shaker water bath, it is recommended to run one test sample along with a batch of milk in a container containing the same volume of milk/water with a data logger (for recording temperature) immersed 2/3rd to the bottom of the container to ensure that the temperature of 62.5°C is achieved.

a) Heat Processing

- Aliquots of milk are processed by submerging the containers in the well-agitated or shaking water bath preheated to a minimum of 62.5°C.
- A control bottle containing the same amount of milk or water is also included for processing of every batch.
- It should have temperature probe (data logger) in the control container to document the process of pasteurization throughout the process. It is positioned such that approximately 25% of the milk volume is below the measuring point of the thermometer/probe, or according to manufacturers' instructions. Probe should not be touching the bottle in any way.
- The monitored aliquot is placed into the water bath with all other aliquots and is either positioned at the coldest area of the water bath, as identified during calibration checks, or positioned according to manufacturers' instructions.
- After the temperature of the monitored control bottle has reached 62.5°C the heat treatment continues for 30 minutes, maintaining the temperature and then ends immediately. Fluctuation during the heating process may be seen for short periods of adjustment where heat may briefly fluctuate between 62.5°C and 64.5°C.
- Milk temperature and bath temperature are monitored and recorded.
- Air bubbles released from milk containers indicate insecure caps/improper sealing – such bottles are discarded.

b) Repid Cooling

- In this process cooling needs to be done immediately. Following heat processing, the milk is rapidly cooled to 4°C using either the processing equipment manufactured to cool milk or ice baths within 10 minute.
- If ice baths for cooling are used, water source must be of adequate sanitary quality and equipment creating ice must be maintained as per manufacturers' instructions.

NoTE:

- Unless caps and equipment designed for submersion, caps need to remain above water level to prevent possible combination from water seepage.
- As processes are manual with this system, and might result in human error, **robust training** of the staff is essential.

3.5 Post Pasteurization Processing

- Randomly chosen aliquot of processed milk from each batch is labeled **"S"** and is sent immediately for culture to test bacteria count.
- Rest of the batch should be promptly stored in deep freezer (at –20°C). DHM awaiting culture report should be stored taking precaution that it is not dispensed until the culture reports are satisfactory.
- Cooled, heat processed milk can be stored sealed for up to 72 hours at 4°C for dispensing without freezing once bacteriological culture procedures and standards are met. Milk can then be frozen for later use if not needed immediately.

Labeling of milk

The containers are labeled for expiry date which should not be more than 6 month from date of expression of milk.

Caps of the milk containers need to remain above water level to prevent water seepage and bacterial contamination.

Do's

- Each pasteurization team member thoroughly scrubs her/his hands with antimicrobial soap before putting on gloves; gloves are always used when handling milk as part of the pasteurization process.
- The procedure to use the pasteurization machine should be followed as recommended by the manufacturer and hence should be well outlined in the SOP of lactation management centre.
- Irrespective of the type of pasteurizer being used, the data logger should be used that provides an electronic record of the heat treatment.

Don'ts

- There should be no exchange of milk between the bottles after pasteurization to reduce chances of contamination.
- Flash heating is not recommended.

STEP

4

Post Pasteurization Testing of DHM



- Microbiological testing of pasteurized DHM should be done after each cycle of pasteurization. There should be no growth on the plates of pasteurized DHM.
- Frequency of post pasteurization microbiological testing should be either at least once a month or every 10 cycles of pasteurization, depending on the date which comes first.
- Test should also be conducted on an ad-hoc basis if any new processes, equipment or staff are introduced, or if there are concerns about any part of the process.
- Any growth is not acceptable. In case of any growth reported, the entire should be discarded or used for research purposes.
- DHM should be discarded in the same way as any other clinical waste. Hence, local waste disposal policies should be followed.
- Tests for microbial contamination should also be investigated under instances of significant or unusual contamination.

Basic requirements of Testing DHM

I) Work area

A level II bio-safety cabinet or a level table with a Bunsen burner with ample surface area in a clean, well-lightedand ventilated room reasonably free of dust and draft.

(The microbial density of air in working area, measured in fallout pour plates taken during plating, should not exceed 15 colonies/plate during 15 min exposure.)

II) Rrequirements

Consumables	Instruments
Culture Media: CLED (cysteine lactose electrolyte deficient) or Columbia agar media	1. Incubator, 37°C 2. Refrigerator, to cool and maintain samples at 5°C. 3. Autoclave for sterilisation. 4. Water bath suitable for keeping melted agar media molten for use (at 50°C). 5. Petri dishes (glass or plastic). 6. Pipets with pipet aids (no mouth pipetting), glass spreading rods. 7. Dilution blanks, cotton etc.

If 1:10000 dilution contain “n” number of colonies, then CFUs in 1ml of the original sample (CFU/ml) should be = n x 10^4 (CFU/ml)

Interpretation of tests

I) For Raw donor milk before pasteurization

The milk is discarded if samples exceed a count of 10^4 CFU/ml for *Staphylococcus aureus*

II) For Pasteurized milk

Pasteurized milk that has a total viable microbial count of 10 CFU/ml or more should be discarded.

Process of Testing of DHM

General considerations

*All general safety measures of a microbiological laboratory should be followed

*Nutritional assessment of the DHM is not recommended.

- Pasteurised milk that has a total viable microbial count of 10 CFU/ml or more should be discarded. One ml of the pasteurized milk can be directly plated to count colonies (if, any) without dilution. Milk with more number of colonies will be automatically discarded.
- Plates and tubes should be appropriately labelled before starting the tests.

Serial dilution of milk

1. Sterile blanks are prepared containing 9 ml of sterile water or saline or PBS.
2. One ml of milk is transferred to the first sterile blank (this tube is labeled as 1:10).
3. The tube contents are mixed using the vortex mixer or by shaking properly.
4. Using another transfer pipette, one ml of the content of 1:10 tube is transferred to the next sterile blank tube (this tube is labeled as 1:100).
5. Content transfers are continued until 1:1000, 1:10000 dilutions (dilutions up to 10^{-4} are adequate).

After the dilutions are made the milk can be plated either by “spread plate” method or by “pour plate” method. Spread plate method is recommended because “pour plate” method may require expertise as the media can be poured only when appropriately cool.

Counting colonies

Colony forming units (CFU) in the sample should be determined by counting the colonies. Then a calculation of the viable cells in the original sample can be performed. Any plate containing less than 300 colonies but more than 30 colonies should be counted. This allows to estimate the number of cells or colony forming units (CFUs) in the original sample by counting the number of colonies and multiplying by the dilution factor of the plate.

Spread plate method

1. After all dilutions are completed; one ml of dilution is spread across the surface of the plate with a clean spreading rod.

2. The plates are placed inverted in a rack to be incubated.
3. The plates are examined after 24 hours for growth if any and identification (if necessary) is done by conventional methods.

Pour plate method

1. After all dilutions are completed; one ml of each dilution is added to a number of sterile petridishes and gently mixed with 15-18 ml of the appropriate molten, cool Columbia agar medium to ensure an even distribution of samples.
2. The medium is allowed to set on a cool horizontal surface.
3. The plates are placed inverted in a rack to be incubated.
4. The plates are examined after 24 hours for growth if any and identification (if necessary) is done by conventional methods.

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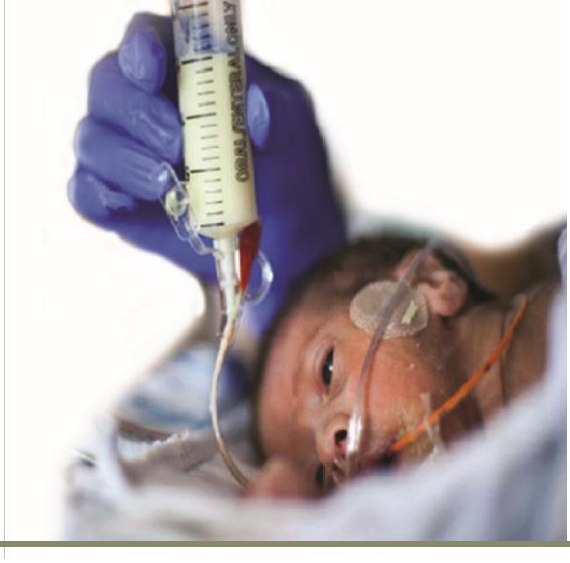
STEP

5

Post Pasteurization Storage of DHM



- Post pasteurized milk should be stored in deep freezer at -20°C. It is desirable to have deep freezers with a digital display of the temperature inside it with an alarm setting. Two deep freezers are required to store for processed milk. First for storage of the milk till the post-pasteurization milk culture reports are available. This freezer should be locked at all times with access only to the technician, so that no milk is accidentally used till the culture reports are available. The second deep freezer is use d for storage of the pasteurized milk once the culture reports are negative and the milk is considered safe for disbursement.
- Culture-negative pasteurized DHM kept at deep freezer –20°C can be preserved for 6 months. However, the milk may get rancid after 3 months due to lipolysis, but is still fit for consumption, though it would have altered taste.
- Cooled or thawed pasteurized milk can be stored in the refrigerator at + 4°C, and should be used within 24 hours.
- Lid of any pasteurized DHM bottle should not be opened until the milk is dispensed for use.
- It is advisable not to transfer pasteurized milk in other containers as it has risk of contamination.

Table B1: Critical Temperature and Time duration for storage of fresh raw milk, unpasteurized milk and Pasteurized milk.

LoCATIoN	TEMPERATURE	DURATIoN	REMARKS
fresh raw milk	Room temperature (≤ 25˚C)	Up to 6 hours	Containers should be covered and kept as cool as possible
Refrigerator (Unpasteurized milk)	4˚C (+2 to + 4˚C)	24 hours	Raw milk should be stored in the back of the main body of the refrigerator
freezers			DHM should be stored towards the back
Unpasteurized Milk		3 months	of the freezer, where temperature mostly remains constant
Pasteurized Milk	–20˚C	6 months	
PASTEURIzER (HoLDER PASTEURIzATIoN)			
a) Heat Processing	62.5°C	30 minutes	The temperature should be monitored continuously for any deviations from the norm
b) Rapid cooling built in cooling system	Final temperature of 4°C	To be attained within 10 minutes at the end of the holding temperature	Caps of the DHM containers need to remain above water level to prevent water seepage and bacterial contamination

Source :

1. Donor milk banks: the operation of donor milk bank services, Issued : February 2010, NICE Clinical guideline 93, guidance.nice.org.uk/cg93

STEP

6

Dispensing of Processed Milk



2. H uman Milk Banking Association of South Africa, Best practice for the collection, storage and handling of human milk, Compiled 2008 and Updated 2011

- Milk from the CLMC should be dispensed on first-in, first-out basis such that the oldest milk is used first.
- The recipient should be given milk from the same pooled batch as much as possible.
- Processed donor milk should be disbursed only by physician prescription (requisition form NICU/ SNCU) after informed consent from recipient's parents.
- Mother's own milk to be used on the same day of expression, milk stored in refrigerator (up to 24 hours) will be dispensed and for use in subsequent days, the frozen mother's own milk stored in deep freeze will be dispensed.

Refer to **Annexure 4** for format for recipient consent form

6.1 Recipients of Donor Human Milk

Newborns who represent one or more of the following indications will be selected as recipients:

1. Premature and low birth weight babies: The largest group of recipients of donor human milk is preterm babies especially in the first few days, till their mothers are able to secrete adequate milk.
2. Sick preterm newborns recovering from illnesses like necrotizing enterocolitis and GI surgeries
3. Severe IUGR.
4. Newborns not having access to their own mother's milk or when the mother has a contraindication to breastfeeding/expressing milk.
5. Babies of mothers with problems like eclampsia, PPH, febrile illnesses.
6. Babies admitted to the unit whose mothers are not available (due to physical absence or death).
7. Babies whose mothers have lactation failure.
8. Exceptional cases, with medical justification.
9. Multiple birth (if needed).

Preterm baby should receive processed donor milk of pre term donor.

6.2 Thawing before use of DHM

- Prior to use, the DHM should be thawed preferably by transferring initially to refrigerator (at +4˚C). It can be refrigerated for a maximum period of 24 hours. Before dispensing of DHM for use in the wards it should be brought to room temperature.

- Pasteurised frozen milk after bringing to room temperature should be used for feeding as soon as possible. DHM has to be consumed within two hrs preferably and latest by 4 hrs. of storing at room temperature. The excess thawed DHM left after feeding the babies should be discarded immediately.

Rapid Thawing

In paucity of time frozen DHM may be thawed quickly in a container of warm water not exceeding +37˚C and ensuring water does not touch the lid. Once the DHM comes to chilled liquid form, DHM bottle should be dried and refrigerated (at +40˚C) until used.

- DHM container should be gently shaken before use to distribute the heat more evenly and uniform distribution of fat and micronutrients.
- Thawed milk should never be refrigerated or frozen again as repeated freezing-thawing cycle increases risk of bacterial contamination as well as increases hydrolysis of triglycerides.

Thawed milk should never be kept under the radiant warmer.

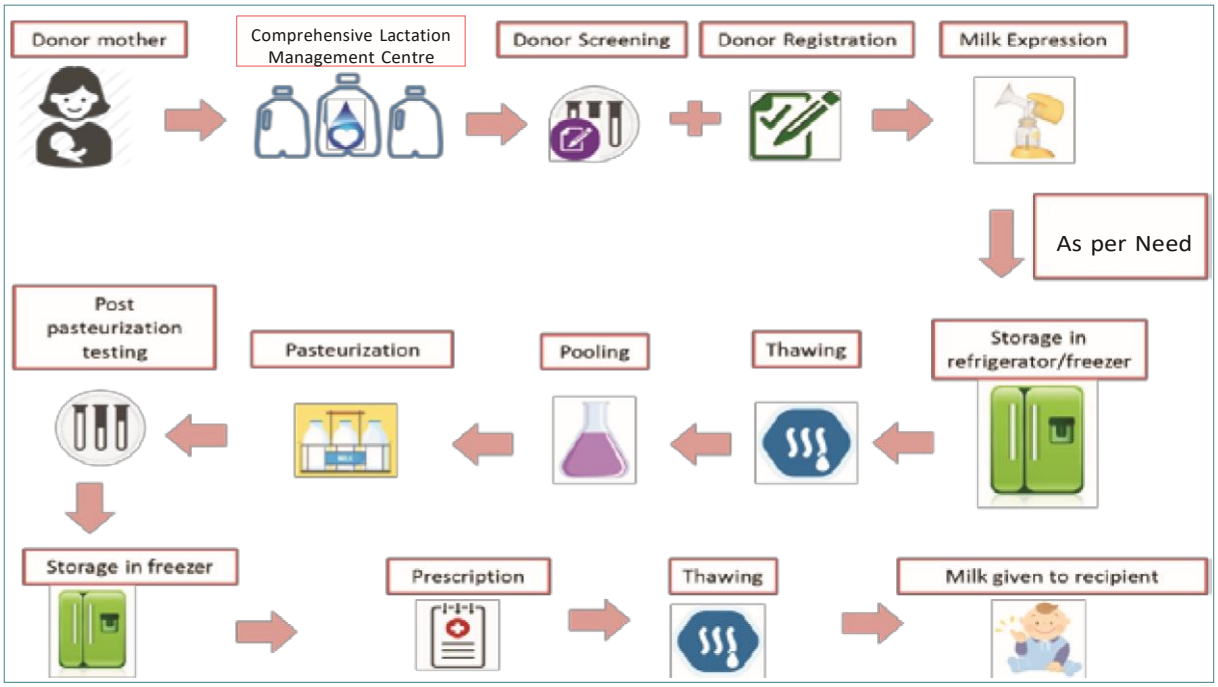
6.3 Estimation of DHM for dispensing from CLMC

- Amount of each feed volume of a newborn is calculated on the basis of her/his daily fluid requirement (for details please see FBNC guidelines of MoHFW).
- The NICU/SNCU nursing staff who is responsible for preparing feeding plans for the admitted babies will estimate the requirement of DHM in the NICU/SNCU on daily basis.
- Lactation support staff should coordinate with the NICU/SNCU nursing staff on daily basis to ensure that CLMC dispensing counter in-charge is in receipt of the estimated daily requirement of DHM one day prior to dispensing.
- Log needs to be maintained about the details of DHM disbursed and return of empty of bottles.

Feeding in NICU/SNCU: Points to remember

- Wash surface/counter top with antiseptic cleaner
- Wash hands
- Check labels of DHM container for appropriate and safe consumption (Term/Preterm, date of expiry, date of pasteurization, and time of dispensing etc).
- Appropriate labeling of syringes according to the newborns to be fed
- Tubing and syringes used for feeding should be changed every 4 hours
- Feeding tube should be labeled to ensure that feeding is not connected to IV port or vice versa

figure 12: Suggested Summary of Process for a CLMC



Hazard Analysis and Critical Control Point (HACCP) Practices in Lactation Management Centres

The day to day functioning of the lactation management centre is based on the principles of Hazard Analysis and Critical Control Point (HACCP) of the food safety industry, to ensure quality assurance at all steps followed in Lactation Management Centres. Quality assurance steps identified for the processes of Lactation Management Centre and SOPs are laid down to prevent the hazards to the maximum extent possible.

Table B.2: Possible Hazards and Critical Control Points

Sr. No.	Process	Hazard	CCP/GMP	Quality Assurance
1.	Donor Selection	Transmission of infections, especially viral infections like HIV, CMV, Hepatitis B, C, and other infections like syphilis. Other Infections like TB, acute febrile illnesses	Selection of donors based on history, examination and blood tests for HIV, Hepatitis B, VDRL within 6 months before milk donation Based on maternal history and examination	Levels of Assurance: ⊙ Donor selection criteria based on negative tests ⊙ Holder Pasteurization which destroys CMV, HIV. Prevention of other infections like TB, bacteremia in acute infections
2.	Donor Consent	Medico legal		Written donor consent

3.	Milk Expression and Collection	Potential for contamination especially bacterial contamination	GMP: training donors for safe expression of milk CCP: Milk Pump and container sterilization	⊙ Lactation counselors to train mothers in hand washing, clean expression and handling of expressed milk. ⊙ Training of lactation management centre personnel regarding cleaning and sterilization of containers and disinfection of milk pumps. ⊙ Ensuring sterilization temperature for equipment as per manufacturer guidelines

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Sr. No.	Process	Hazard	CCP/GMP	Quality Assurance
				⊙ Pasteurization of all milk containers before use. ⊙ Utilization of DHM only if post pasteurization culture is negative.
4.	Temperature maintenance in CLMC and during transport to the ward	Potential for contamination especially bacterial	CCP: Temperature maintenance at 4°C in fridge at CLMC Storage in icebox with cold gel packs up to 2 hours	⊙ Ensure refrigerator temperature is appropriate with thermometer/external digital read out of temperature. ⊙ Automatic switch to Generator/UPS/ invertors facility in case of power failure.
5.	Temperature Maintenance in Lactation Management Centres	Potential for contamination especially bacterial contamination	CCP Pre pasteurization temperature maintenance at 4°C if stored in refrigerator. Store for maximum 24 hours. Store in deep freezer at –20°C if pasteurization is planned after 24 hours	Ensure refrigerator and freezer temperature is appropriate with thermometer/external digital read out of temperature. Automatic switching on of Generator/ UPS/invertors facility in case of power failure.
6.	Pasteurization and Post Pasteurization Culture	Post pasteurization culture may remain positive if pasteurization is not carried out appropriately Potential for contamination with water during pasteurization procedure	GMP Holder pasteurization at 62.5°C for 30 minutes after temperature in test container reaches 62.5°C followed by rapid cooling to 4°C	Check temperature with thermometer dipped to 2/3 rd level in test container to ensure 62.5°C and 4°C post cooling. Sealing of containers or ensuring air tight lids for all containers. Post pasteurization culture sterile.

7.	Storage of raw, post pasteurization quarantine milk and post pasteurization culture negative safe milk	Potential for mixing of safe milk containers with raw or quarantine milk containers.	GMP Separate freezers/ shelves in freezers.	Use separate freezers for 3 groups of containers or different pre –defined shelves of same freezer. Restrict access to freezers to designated personnel only.
8.	Storage temperature Post Pasteurization	Potential for contamination and spoilage of milk	CCP Temperature of freezer –20°C Not above –18°C	Ensure freezer temperature is appropriate with thermometer/external digital read out of temperature. Automatic switching on of Generator/ UPS/invertors facility in case of power failure. Use separate freezers/shelves for quarantine milk and culture report negative milk. Label with expiry date if utilization of DHM is planned beyond 3 months from date of collection.
Sr. No.	**Process**	**Hazard**	**CCP/GMP**	**Quality Assurance**
9.	Storage of Disbursed Milk on Site	Potential for contamination and spoilage of milk.	Store in refrigerator if utilization is planned within 24 hours or in deep freezer if utilization planned > 24 hours	
10.	Thawing and Utilization of Milk	Potential for contamination and spoilage of milk	GMP Thaw by keeping in fridge over-night Stand in container containing warm water before utilization	DHM containers are not to be put in microwave. Utilization of DHM within 4 hours when thawed to room temperature.
11.	Consent for use for recipients	Medico legal		Written consent documented on patient's indoor paper or Lactation Management Centre form.
12.	Labeling and Record keeping	Medico legal		Appropriate labeling of every DHM container. Record keeping of donor data, culture records etc.



Section

Appendix 1: Description of Individual Rooms in a CLMC 54

Appendix 2: Scope of Work of CLMC & LMU Staff 65

Appendix 3: Training Requirement 68

Appendix 4: Ensuring Quality in Lactation Management Centre Operations 69

Appendix 5: Equipment Specifications 73

Appendix 6: Record Keeping Formats 100

3 APPENDICES

APPENDIX 11

Description of Individual Rooms in a CLMC



Reception Area	
Area and built of room	⊙ This would be the first room at the entrance with a suggested area of approx. 6.9m X 4.2m. ⊙ This area should be nearer to lift if situated in upper floors and should have a porch if located in ground floor.
Designated activities	⊙ All administrative formalities such as registering, screening and enrolment of the donor mother and tracking the process. ⊙ Record keeping including logistics data. ⊙ Dispensing of pasteurized DHM. For dispensing, a separate counter or window would be provided. This would limit unnecessary entry and crowd into the lactation management centre. ⊙ Provide waiting space for mothers. All mothers would be suggested to remove their shoes and should be provided with hospital slippers at the reception area.

Equipment/logistics	⊙ Reception counter ⊙ Intercom ⊙ Cupboard for records ⊙ Seating and waiting area for mothers with chairs/sofa ⊙ Computer and printer ⊙ Separate shoe racks for keeping shoes for mothers and hospital slippers for changing.
In-charge	⊙ CLMC Manager
Group Counselling Room	
Area and built of room	⊙ Suggested area: 4.8m X 5.5m
Designated activities	⊙ Group counselling session which should be open to mothers who have come for milk donation or are seeking treatment for any breast conditions hampering breastfeeding. The purpose of counselling is to promote breastfeeding and encourage milk donation for the CLMC as a parallel effort. The mothers with babies in NICU/ SNCU should be encouraged to join group counselling sessions. However, Lactation Support Staff should check that their need for being with their babies for feeding/expression of milk is fulfilled first.

Group Counselling Room	
	⊙ Thematic areas to be discussed are: • Initial breast feeding, exclusive breast feeding, procedures to be followed for milk donation (including Dos and Don'ts) along with display of videos of IEC materials on IYCF, hand washing and process of milk expression and cleaning of tubing.
Equipment/Logistics	⊙ Chairs to accommodate 8-10 mothers or more. This will depend on the size of the counselling room. ⊙ IEC material for display ⊙ Video display requirements (Television, video tapes etc.) ⊙ Breast models (mannequins)
In-charge	⊙ Lactation Support Staff
Shower and Changing Room	
Area and built of room	⊙ The suggested area: 2.4m X 2.0m
Designated activity	⊙ It is important for mothers to be clean and relaxed before donating milk. Showering serves two purposes - to control milk contamination and to relax the mother which may lead to better volume of donated milk. ⊙ In case mother has already taken a shower or hesitant to take one, she may directly be given a gown to change. However, the mother should be made to/ shown how to wipe the nipples using wet cotton swabs. Cleaning nipples with alcohol swab or soap is not required. The gowns should be autoclaved and kept in a dry place. ⊙ A dedicated shower room has been designed in layout plan. The cleanliness of the room should be maintained and it should not have an attached toilet. As the mothers usually travel long distances and are sweaty in humid conditions of the country, it is preferable to shower with a plain liquid soap (not anti-bacterial soap). For breast washing, no soap is prescribed other than daily shower as it may lead to cracked nipples.

Equipment/logistics	⊙ Shower with availability of hot and cold water ⊙ Exhaust Fan ⊙ Clean towels and gowns ⊙ Liquid body soap dispenser
Milk Expression and Collection Room	
Area and built of room	⊙ Suggested area approx. 68.5 sq. m. ⊙ This room should comprise of 5-6 well-defined milk expression areas separated by partitions/curtains where mothers can express milk in privacy. ⊙ The use of glass door and windows is not recommended in this room. ⊙ Entry of male members in this room should not be allowed to ensure privacy. If there is urgent need for such entry, all mothers engaged in milk expression should be alerted of this before-hand. ⊙ The room should be a quiet place with a comforting ambience, clean environment. Arrangement for pleasant soothing music may be made to help mother relax. ⊙ Infection control measures should be observed with highest standards. ⊙ Rigorous hand washing with soap and water and drying with clean or disposable towel should be stringently followed before entering the room. ⊙ Sterilized tubing, bottle and breast shield set should be packed and provided to each mother when entering the milk expression chambers. ⊙ This can serve as a place for informal conversation between the donors. ⊙ Mothers should not have access to any room beyond milk expression room such as cleaning/processing and dispensing rooms.

Milk Expression and Collection Room	
Designated activity	⊙ Expression of milk
In-charge	⊙ Lactation Support Staff

Equipment in Milk Expression room

1. **Hand scrub** just outside this area made of steel: foot operated.
2. **Scrub station:** 90-96 cm height with water taps. Both hot water and cold water, soap liquid and scrubber.

1



2



3. **Sterile bottles** with caps and facility for labelling.
4. **Steel table**
5. **wall mounted cupboard** for storing a) sterile bottles for collection; b) sterile tunings of breast pump which come in contact with milk; c) provision for hand written labels for identification .

3

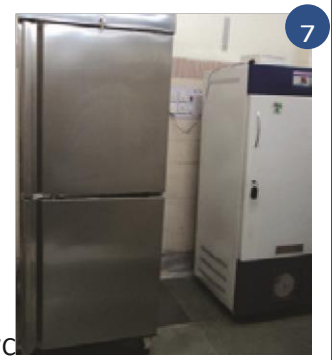


4

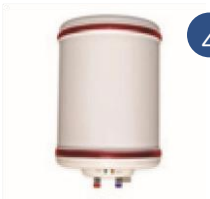


5



6. **one refrigerator (190l) with compressor** for mothers to keep their milk in the refrigerator under the supervision of nursing staff or by nursing staff herself. 7. **one vertical freezer** -20°C with compressor for keeping raw milk where the container is full and is not likely to be used within next 24 hours to be used by nursing staff only.	Storage of raw milk at 2° to 4°C 6 	Storage of milk at – 7  20°C
8. **Breast pumps** both mechanical as well as electrical hospital grade with tubing and each individual electric points usually the number is minimum 6.	8  	
9. **Music system** 10. **Sofa** for relaxation for mothers	9 	10 
11. 2.5 ton **Split AC** for 104.50 sq. Meter i.e. Milk expression room essentially and 24,000 British thermal unit per hour (BTU per hour) along with cleaning room.	11 	

Autoclaving/Cleaning Room	
Area & built of room	Suggested area 3.6 m x 3 m
Designated activity	To be used for cleaning, autoclaving and sealing of used bottles, tubing and washable part of breast pumps
In-charge	Lactation Support Staff
Equipment in the Autoclaving/Cleaning Room	
1. **Scrub station:** 2 bay scrub station and shall have sloping basin to eliminate back splash along with Soap bottle shelf. 90-96 cm height with water taps for hot water and cold water, soap liquid and scrubber for washing and rinsing the used reusable bottles along with tubing's of the breast pump. 2. **Steel table with sink** to keep the bottles and tubing's after rinsing with soap water.	1 
	2 

3. **Kitchen basket of steel or plastic** to drain out the water. 4. **Geyser:** 3 Lts. Electric Water Heater, Rust proof thermoplastic Body with Triple Safety System and Neon Indicators attached to the scrub station any one tap.	  
5. Washer and Thermal Disinfect or. 6. Hot air circulating oven.	 
7. Table top autoclave machine	 
8. **Steel table** for packing and wall mounted cupboard for storing. 9. **Heat sealer machine with cutter (200mm/400mm):** A machine used to seal products such as cleaned tubing's for breast milk pump, packing sterile bottle containers using thermoplastic materials like plastic bags, cellophane using heat. Sealing length 300mm appx. And sealing width 8-10mm	   
10. **Exhaust fan:** Must include a high quality mechanical back draft shutter that prevents outside air entering room when fan is switched off.	 

Milk Processing Room	
Area and built of room	⊙ The suggested area is 5.0m x 6.0m with glass doors to reduce risk of infection.
Designated activities	From milk expression and collection room DHM goes to this room for pooling and pasteurization. The activities carried out in this room are as follows: ⊙ Thawing before pooling ⊙ Pooling and making batch of pooled DHM ⊙ Aliquoting in pasteurising containers. ⊙ Pasteurization ⊙ Sealing of post pasteurised bottles ⊙ Labelling and documentation of Pasteurization
In-charge	CLMC Technician

Equipment in Milk processing room	
1. **Scrub station**	
2. **Refrigerator**	
3. **Horizontal Deep freezer**	
4. **Stainless steel table:** 4 feet length an	l two feet wide as working table
5. **Conical flask** at least one - liter capacity: 1000 ml Conical Flask Glass with Heavy Duty Rim, Borosilicate Glass with Approx Neck O.D. 56 mm. This can be autoclaved.	
6. **Stainless steel strainer**	
7. **Stainless Steel wire mesh basket**	
8. **Laminar flow cabinet**	

Milk Processing Room	
9. **A stainless steel table** (4 feet length and two feet wide) used for transferring into small bottles for pasteurization. While alliquoting milk, one should take aspetic precautions like use of cap, mask, sterile gloves, sterile sheet, sterile flask and sterile bottle.	  

10. **Cabinet for storing bottles**

11. **Milk bottles:** Reusable Milk Storage B ottles : Polypropylene. 100% free of Bisphenol – A Sterile reusable polypropylene bottles packed in sterile plastic bags.

12. **Bottle sealer with foil**



13. **Printer and water proof label**

- ⊙ Should produce high resolution Labels.
- ⊙ Should print more than 60 Labels per minute.
- ⊙ Resolution of 300x600 dpi.
- ⊙ Should be supplied with 100 compatible labels with the following specifications:
- Labels should be water proof.
- Can be peeled off easily.
- Size around 100 mm x 25 mm
- Can also be written with hand written labels with permanent markers.



Pasteurization prerequisite

14. **Hot water Geyser** : 10 liters

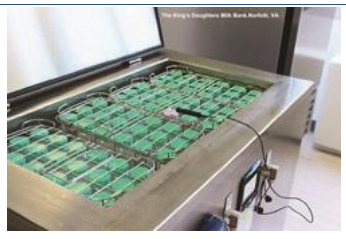
15. **Ro water system**

16. **Pipes** for outlet as per requirement of achine

17. **Air Exhaust fan:** should be on the ba ck side of pasteurizer : 18 cm from the floor.

18. **Split AC :** 1 ton

19. **Pasteurizer**



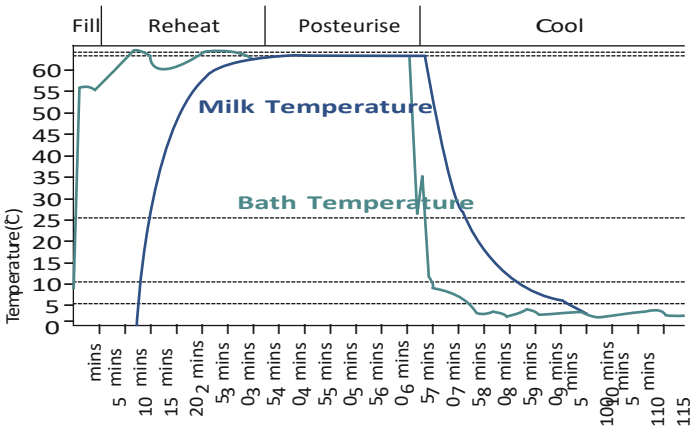


Milk Processing Room

20. **Data logger:** Holding for 30 minutes at 62.5°C and rapid cooling to 4°C within 20 minutes.



The data logger takes a reading of the milk temperature for every minute the milk is in the pasteurizer. The data logger also records the time and the date of the cycle. Once the pasteurization cycle is complete the information can be downloaded via the USB to the PC. This gives a permanent record of the satisfactory treatment of every batch.



Time and temperature graph at 62.5°C (144.5°F) for 30 minutes

Temperature Graph

Storing of post pasteurized bottles

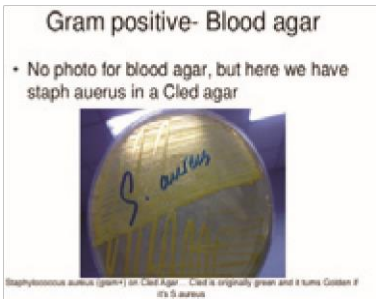
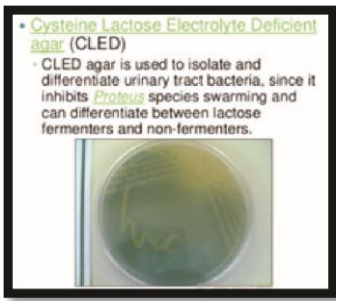


Microbiology Laboratory	
Area and built of room	⊙ The suggested area is 5.1m x 4.0m with glass doors. ⊙ The room should have a level II bio-safety cabinet and a level table with a Bunsen burner. ⊙ It should have adequate surface in room that is clean, well-lit, well-ventilated, and reasonably free of dust and drafts. ⊙ The microbial density of air in working area, measured in fallout pour plates taken during plating, should not exceed 15 colonies/plate during 15 min exposure.
Designated activity	⊙ Pre and Post-pasteurization milk testing is carried out here. ⊙ Post-pasteurisation milk sample is taken from test bottle identified per batch. Colony count is performed. ⊙ In case the milk sample tests positive as per norms, the batch of bottles from which this sample is collected should be discarded and proper documentation should be maintained along with back tracking of mothers. ⊙ All general safety measures of a microbiological laboratory should be followed.
In-charge	Microbiologist
Equipment in Microbiological Laboratory	

1. **Laminar flow cabinet** (Bio- safety cabinet) It is used in microbial inoculation and isolation studies as well as sterile storage of materials.	

Microbiology Laboratory	
2. **Refrigerator: 190 liters** This refrigerator is used for the storage of the stock solutions, chemicals, kits and nutrient media that should be maintained at certain temperatures.	
3. **Microscope with oil immersion lens**	
4. **Hot air oven** with temperature and time regulation.	
5. **Bunsen burner with Gas**	
6. **PH meter**	
7. **Lab Incubator**	
8. **Table top autoclave**	

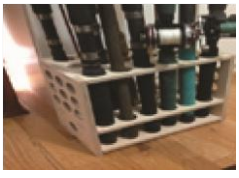
9. **water bath**	
10. **Shaker Incubator**	

Microbiology Laboratory	
11. **Media:** Agar, CLED agar media and MacConkey media CLED (cysteine-, lactose-, and electrolytedeficient) agar is a differential culture medium for use in isolating and enumerating bacteria. This is a valuable non-inhibitory growth medium used in the isolation and differentiation of urinary organisms and also of milk.	 
12. **Analytical balance**	
13. **Exhaust fan**	
14. **window 1 ton AC**	

Storage Area	
Area and built of room	⊙ The suggested area for this room is 4.4m x 6.0m.
Designated activities	⊙ Storage of post pasteurized and tested milk with separate space to store pre term and term milk ⊙ Regular temperature recording as per requirement ⊙ Dispensation of DHM by a counter/window
Equipment/Logistics	⊙ Refrigerator ⊙ Deep freezer with 24x7 power back up
In-charge	⊙ CLMC Technician/Lactation Support Staff
Equipment in Storage area	

1. **Vertical single door and Double door deep freezer** Milk storage room must have electrical point for running Two vertical –20°C freeze with voltage stabilizer and back up electrical supply. (Preferably double door) and One Vertical refrigerator for +2 to +4°C with voltage stabilizer Milk is stored in **deep freezer** at minus 20 degree. ⊙ First batch going inside the deep freezer should be the first batch coming out. ⊙ Milk kept in sealed bottles for dispensing: Dispense in a way that the earliest fortnight collected milk is dispensed first.	
2. A small 2 feet by 2 feet **steel table**	
3. A wall mounted **cupboard** for storing records along the entire wall	
4. Scrub station	
5. Air-condition Spit AC : 2 ton	
Sluice Room	
Area and built of room	⊙ The designated area should be 2.0m x 2.1m.
Designated activity	⊙ This room should contain a water reservoir with both inlet and outlet. ⊙ The water reservoir should be used to clean dirty mops, towel and other laundry before they're put in the washing machine.

Sluice Room	
	⊙ The ventilation system in the soiled utility/holding room should be engineered to have negative air pressure with air 100% exhausted to the outside. ⊙ Activities to be carried out in this room are: • Cleaning and washing. • Storing cleaning equipment and mobilizing to respective room.
Sluice room or Janitor room details with suggested equipment	
SLUICE RooM: 2 rooms or two parts of one big room	
1. **washing part:** This part of room will contain a water reservoir with both inlet and Outlet. Minimum dimension will be 4ft.wide x 3ft.front to back x 2ft. deep.	

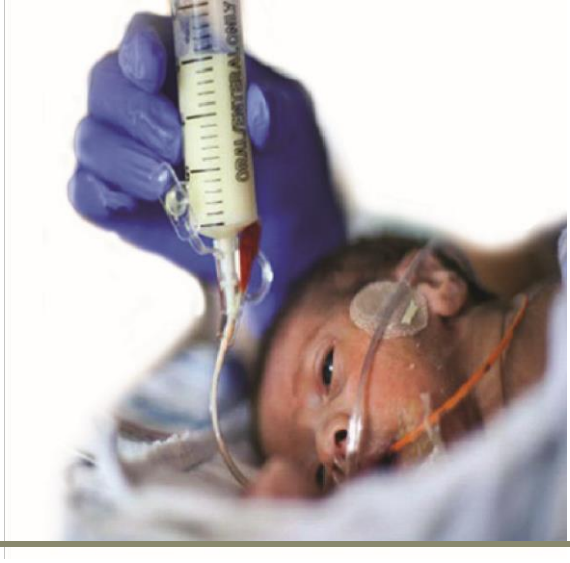
2. **Storage part:** It is the part of room for storage of clean mops, materials for cleaning, gloves and boots which are worn during cleaning. Other Housekeeping objects such as three bucket trolley should also be kept here.	
Details of cleaning equipment	
1. 2 bucket trolley with Mop Wringer with liquid detergent , soap and phenyl	
2. Broom and stick with bucket and dust pan	
3. Dust mop	
4. Magic mop set with 360° Rotating Pole & Steel Bucket preferably	
5. Janitor trolley with multiple function or **Multifunction Janitor** Cart :1) Bag Holder,2) Large Shelves, 3) Double Mop Bucket and Wringer.	
Sluice Room	
6. SS Room Dust Bins - 3L, made of stainless steel, covered, foot operated. At least 8 number and must be distributed in various places	
7. Water mop attached to a steel rod with mop replacement Effective and scientific way is to keep the mop in the reverse way along with handle Large Mop Upside Down Isolated on White	  

8. Window wiper	
9. **Microfiber cloth** for cleaning the floor (to be used with the mop handle) **Microfiber cloth** for *cleaning and mopping.* Microfibers are usually 0.9 or less deniers in diameter. For comparison a human hair is about 20 deniers, silk is about 4 deniers. Most microfiber cleaning cloths are made from split microfibers, which have even smaller strands; so small that they develop an atomic charge which attracts dirt and oils. This also means that their is more surface area in microfiber products which contributes to theirevaporative efficiency, i.e. they dry faster than any other fabric.	  
10. One Exhaust fan	
11. One ceiling fan within the sluice room.	
12. Folding laundry trolley for used linen and gown.	 
13. Proper dress with Rubber gloves and gum boots.	
14.Toilet cleaning would require separate rubber gloves and shoes along with toilet brushes and liquid cleaners as per hospital policy.	
15. Misc. Like squeeze, sponge, sponge mop, Bucket, scrub, Brush, garbage can color coded.	

APPENDIX

2

Scope of Work of CLMC & LMU Staff



FULL TIME POSITIONS

1. CLMC Manager: 1 Post

Job Description

- Promote, protect, and support breastfeeding.
- Support and promote the Comprehensive Lactation Management.
- In-charge of all staff of CLMC.
- Undertake rigorous supervision of all processes of CLMC and ensure quality assurance protocols are followed for safety of DHM.
- Microbiological surveillance.
- Supervise maintenance of all records (records for donors and recipients including consent forms, serological and microbiological test reports, milk dispensing and storage records).
- Provide inputs and decisions around dispensing of milk according to the protocols.
- Ensure the staff working in the CLMC are suitably trained and competent.
- Ensure there is adequate staff availability for the CLMC operations so that services are not compromised.
- Ensure communication with the team members on any contaminated milk/deviations.
- Aassessment of results, consult Paediatrician/Neonatologist in – charge of CLMC for taking decision on what to be done in case of any deviation from the protocols in any of the procedures.
- To maintain contact with the designated resource centre and key persons in the field for updating on safety measures and capacity building.
- *Qualification:* Graduate in Hospital Management.
- *Salary:* As per State norm
- (Indicative Salary: INR 30,000 per Month).

2. Lactation Support Staff (only female staff): 5 Posts

Job Description

- Promote, protect, and support breastfeeding.
- Support and Promote the Comprehensive Lactation Management.

- Routine rounds in postnatal ward, paediatric ward, SNCU including KMC ward for providing lactation support to mothers.
- Making mother aware regarding the CLMC facilities and motivating them to donate milk.
- Assist in recruiting and screening potential donors.
- Counselling mothers regarding breastfeeding and educating donors on milk expression techniques.
- Providing sterile gowns, sterile bottles, and tubing for breast pump to donors, facilitating and helping donors in milk expression.
- Would carry out cleaning and autoclaving of the equipment and ensure proper storage of milk collected at collection room and dispensing of milk.
- Bottle labelling and record keeping.
- In SNCU/KMC supervise nursing staff for thawing of milk, ensuring no refrigeration after thawing, following milk collection and dispensing safety protocols, maintaining cold chain.
- Documentation and record keeping.
- *Qualification:* Staff Nurse/Auxiliary Nurse Midwife.
- (Essential Pre-requisite of selection: Candidates who have completed three months of hands - on training in Lactation Management in an established CLMC and at end of training cleared a skilled based examination conducted at the designated training centres. This three months training is to be organized by State/District programme management unit).
- *Salary:* As per State norm. (Indicative Salary: INR 15,000 per Month).

3. CLMC Technician: One Post

Job Description

- Pooling of DHM
- Pasteurisation
- Storage of DHM
- Cleaning and maintaining all equipment that are used in the pasteurization process of milk and microbiological lab.
- Preparing and making labels and maintain records of pasteurization.
- *Qualification:* LT Diploma (DMLT) preferably with experience in microbiology.
- *Salary:* As per State norm (Indicative Salary: 18,000).

PART TIME POSITIONS

1. Microbiologist: 1 Post (Part Time)

Job Description

- Testing of pre/post-pasteurized milk samples and ensuring serology and record keeping of laboratory data.
- Periodic collection of water, air and surface swabs for bacterial culture.
- Relevant record keeping for the laboratory.
- *Qualification:* Masters in Microbiology (Pre-requisites: 10 days Training in Milk Cultures from designated training centre This 10 days training is to be organized by State/District programme management unit).
- *Salary:* As per State norm.

2. Hygiene Helper: 3 Post (Part Time)

Job Description

- Overall cleaning of the CLMC according to the protocols.
- Transporting DHM from well-baby clinic (if any) to CLMC premises.
- Transportation of dispensed DHM to NICU/SNCU/KMC.
- *Salary:* As per State norm.

LMU

- **Name of The post:** Lactation Support Staff (Only female staff).
- **Number of Staff:** Two
- **Job Description:** Overall supervision of functioning of LMU. Routine rounds in SNCU including KMC ward for providing lactation support to mothers, motivating them to express milk and counselling. Facilitating and helping mothers in milk expression and providing sterile gowns, sterile bottles, and tubing for breast pump. Would carry out cleaning and autoclaving of the equipment and ensure proper storage and dispensing of milk, Bottle Labelling and record keeping.
- *Qualification:* ANM (Essential Pre-requisite of selection: Candidates who have completed three months of hands- on training in Lactation Management in an established CLMC and at end of training cleared a skilled based examination conducted at the designated training centres) *Salary:* As per state norm (indicative salary:15,000).

APPENDIX

3

Training Requirement



Facility based Lactation Management Training for CLMC Manager and Lactation Support Staff

Place of Training

CLMC, associated with a Special Newborn Care Unit and a Kangaroo Mother Care Unit located within a mother and child care hospital.

Trainees

CLMC Manager and Enthusiastic female nursing staff posted in SNCU or maternity wards associated with a Mother and child care hospital.

Trainers

Pediatricians having experience in lactation counseling and Facility based Lactation Management, Lactation counselors with previous experience.

Duration of training

5 days (40 hours) of structured and hands-on training session.

Batch size

6 - 12 participants in each batch

Overview of training structure

A separate guideline for conducting training for various categories of the staff needs to be prepared. A tentative schedule of minimum five days training needs to be chalked out. The knowledge and skills on areas like Anatomy and Physiology of breasts, importance of exclusive and supplementary breastfeeding, proficiency in understanding all the processes indicated in the guideline i.e. counselling, collection, storage, pasteurization, thawing, testing, dispensation and record keeping etc.

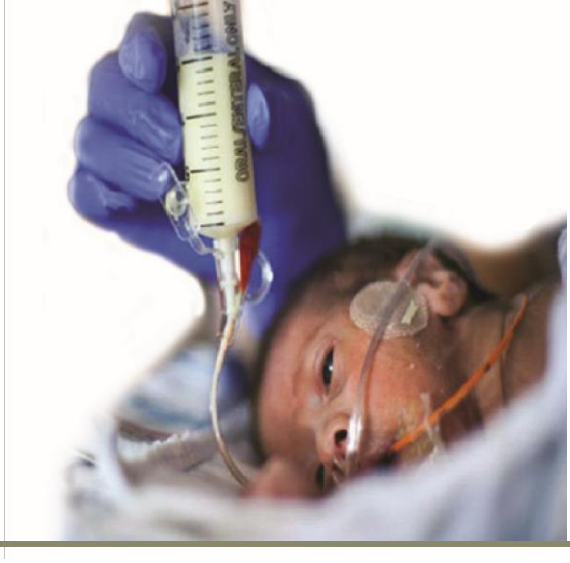
Other categories of the staff will also need to be oriented and trained in overall working of CLMC and also specific work assigned to them.

Training site should be one of the existing CLMC adhering and practicing the norms indicated in the guideline.

APPENDIX

4

Ensuring Quality in Lactation Management Centre Operations



I. National Quality Assurance Standards for Comprehensive Lactation Management Centre and Lactation Management Unit

A. Service Provision		CLMC	LMU
Standard A1	Services for promotion and adherence to early and exclusive breastfeeding are provided as per prevalent guidelines.	√	√
Standards A2	Services for collection, processing, storage and dispensing of Donor Human Milk are available.	√	
Standard A3	Services for expression, collection, storage and dispensing of mother's own milk are available.		√
B. Patient Rights			
Standard B1	There are no Physical , Informational or Financial barriers in availing the services.	√	√
Standard B2	Services are provided in dignified manner ensuring privacy & confidentiality as well as respecting societal and cultural preferences.	√	√
C. Inputs			
Standard C1	Lactation Management centre has adequate infrastructure and optimal layout for providing the mandated services.	√	√
Standard C2	Physical and fire safety measures have been implemented.	√	√
Standard C3	Adequate qualified and trained staff for rendering the mandated services are available.	√	√
Standard C4	Equipment and consumables for collection, processing and storage of Human milk are available as per defined norm and case load.	√	√
D. Support Services			
Standard D1	Maintenance and Upkeep processes are effectively implemented.	√	√
Standard D2	Procedures established for estimating the demand of donor human milk and maintaining the buffer stock to avoid stock out.	√	
Standard D3	Safe and comfortable environment is provided to donors and well as staff of lactation management centre.	√	√

Standard D4	Compliance to applicable statutory and legal requirements are ensured.	√	√

E. Clinical Services			
Standard E1	Procedures established as per guidelines for recruitment of Donors.	√ √	
Standard E2	Procedures established as per guidelines for screening of Donors.		
Standard E3	Implementation of optimal and scientific milk collection processes are ensured as per guidelines.	√	√
Standard E4	Labeling and pre-pasteurization storage of collected milk is done as per established protocols.	√	
Standard E5	Pooling and Aliquoting of milk is done as per established protocols.	√	
Standard E6	Pasteurization of Donor Human Milk is done as per protocol.	√ √	
Standard E7	Post Pasteurization testing of milk is done as per established protocol.		
Standard E8	Storage of pasteurized donor human milk is done as per established protocols.	√	
Standard E9	Established procedures for Intramural issue of Donor Human Milk.	√	
Standard E10	Optimal feeding practices are ensured in attached NICU/SNCU.	√	√
f. Infection Control			
Standard f1	Hand Hygiene and personal protection ensured during handling of Human Milk.	√	√
Standard f2	Sterility of processing and storage equipment are ensured.	√	√
Standard f3	Microbiological testing data are analyzed for improving the infection control practices.	√	
G. Quality Management			
Standard G1	Quality Policy and objectives have been defined and communicated to staff and users.	√	√
Standard G2	Hazard Analysis and Critical Control Point (HACCP) practices have been implemented as per guidelines.	√	√
Standard G3	Lactation management centre has documented and implemented Standard Operating Procedures.	√	√
Standard G4	Periodic review and Quality Improvement Processes are implemented.	√	√
H. outcome			
Standard H1	Key performance indicators (KPI) are measured.	√	√
Standard H2	Lactation management Centre strive to improve KPI and meet established benchmarks.	√	√

II. To ensure quality assurance at all steps, the day to day functioning of the CLMC and LMU should be based on HACCP principles. To develop an effective HACCP plan, the key CLMC staff including neonatologists, nurses, CLMC manager/technician, microbiologist, etc., should undergo mandatory training on HACCP. Consequently, SOPs should be laid down to prevent identified hazards from happening. These SOPs should clearly demonstrate identification of hazards, monitoring, trend analysis and establishment of corrective actions. In addition, the lactation management centres should continuously try to improve the

sanitary conditions of the premises and maintain proper hygiene.

Lactation Management Centre at health facilities should comply with the following:

Premises - maintenance and cleaning	⊙ The Lactation Management Centre should be located in a hygienic place and overall cleanliness should be maintained. All new units should be set-up away from environmentally polluted areas. ⊙ The interior area of the centre should have adequate space for all activities such as milk expressing, processing, storing etc. ⊙ The premise should be adequately lit, appropriately ventilated to maintain air quality so as to avoid aerial contamination of milk. ⊙ Floors, ceilings and walls should be smooth and easy to clean with no flaking paint or plaster. Floors should be cleaned with diluted phenyl/soap and water once every day and otherwise when required. Walls should be cleaned with standard disinfectant at least once a week. Dry mopping should not be permitted. ⊙ The floor and skirted walls should be washed as per requirement with an effective disinfectant to keep the premise free from insects. No spraying should be done during milk processing. It is preferable to use fly swats/flaps to kill flies. Windows and other openings should be fitted with net or screen to keep the premise insect free. ⊙ All equipment should be placed well away from walls to allow proper cleaning and inspection of the area. ⊙ The area should be free from any other equipment or item that is not part of the operation such as office files, stationary, old equipment etc. ⊙ All surfaces of pooling and pasteurising area should be cleaned with surface disinfectant before and after every use. ⊙ Door handles, switches etc. should be cleaned once a day with surface disinfectant. Lockers and drawers should be cleaned twice a week. ⊙ Dustbins should be washed daily with soap and water; polythene should be changed daily or if full earlier. ⊙ Hospital guidelines on biomedical waste management should be followed.
Water testing, supply and drainage	⊙ Water used in the operation should be potable and continuous supply should be ensured. In case of intermittent water supply, adequate water storage arrangement should be made. Chemical and bacteriological examination of the water should be done at regular intervals as recognized by the laboratories. ⊙ There should be an efficient drainage system and adequate provision for disposal of refuse. Drainage opening should be water-trap type so that no insects, flies or foul odour can enter the clean area from the drain.

Equipment maintenance and cleaning	⊙ Equipment and machinery should be of such design which permits easy cleaning. ⊙ The Lactation Management Centre should have adequate arrangement for cleaning of containers, tables, working parts of equipment etc. No vessel, container or equipment, the use of which is likely to cause metallic contamination injurious to health, should be employed to handle, pack or store human milk. ⊙ All equipment should be kept clean, washed, dried and stacked at the close of day to avoid growth of bacteria, mould, fungi or infestation. ⊙ The Lactation Management Centre should maintain a detailed manual of procedures. The procedure should be periodically reviewed and updated. All equipment manuals and user instructions of supplies should be available to the staff working in the centre, at all times. ⊙ Sterilization of all equipment and milk containers should be done according to manufacturer guidelines. ⊙ It is recommended that breast pumps parts should be sterilized by boiling. Breast pump used should be disassembled and washed thoroughly including small parts with detergent, rinsed well with warm water and then sterilized. ⊙ Autoclaves or hot air ovens, if used, should be monitored with physical and chemical indicators daily and with preferable biological indicators weekly. ⊙ Freezer temperatures should be recorded daily by a recording thermometer. The freezers should be equipped with temperature-sensitive alarms. ⊙ Storage and processing equipment should have scheduled maintenance checks and calibration as recommended by individual manufacturers. ⊙ Bio-safety cabinets or laminar air flow, if used, should undergo regular maintenance as per manufacturer's instructions for air flow, pressure gradient and HEPA filter efficiency.

Human resource	⊙ Eating, chewing, smoking, spitting and nose blowing should be prohibited within the premises. ⊙ All people working in operation should avoid wearing loose jewellery, glass items, false nails and other items that may fall into the milk. ⊙ Proper steps for hand hygiene should be practiced. Facility for hand wash with liquid soap and water should be available. Posters with pictures showing steps to hand washing should be displayed near all hand-washing areas for ready reference. Washing hands must not be done in sinks used for milk preparation or washing equipment. Hand-washing facilities should be kept in clean condition and good repair. ⊙ Staff in operational area should keep their finger nails trimmed, clean and wash their hands with soap and water and disinfect before commencing work. Scratching and touching of body parts, hair should be avoided during the operation. ⊙ Personal protective equipment including gloves, gown, cap and mask should be worn by the staff when handling milk, especially open containers, to prevent contamination of milk and milk contact surfaces such that: ⊙ Hair and beard is covered. ⊙ Sterile gloves are worn and changed between handling raw and pasteurised milk. ⊙ Clean cover gown, apron worn over clothing ⊙ Face mask is worn during milk handling. ⊙ Regular orientation on staff hygiene and equipment use should be provided for new staff or to entire staff when new equipment or supplies are purchased.

The list of accreditation bodies given by quality council of India for accredited quality certification is available here: http://www.qcin.org/nabcb/accreditation/reg_bod_qms.php.

APPENDIX

5

Equipment Specifications



Essential Equipments

1. Breast Pumps

MEDICAL DEVICE SPECIfICATIoN (Including information on the following where relevant/appropriate, but not limited to)		
Breast Pump		
Version no. :		1
Date:		Sept 2014.
Done by : (name/institution)		HCT/NHSRC
Name and Coding		
GMDN name		NA
GMDN code(s)		NA
General		
1. USE		
1.1	Clinical purpose	A breast pump is a device that extracts milk from the breasts of a lactating individual. Breast pump is an electrical devices powered by electricity or batteries.
1.2	Used by clinical department/ ward	NICU and PICU
Technical specifications for Hospital Grade Electric Breast Milk Pumps		
2. TECHNICAL CHARACTERISTICS		
2.1	Technical characteristics (specific to this type of device)	1. Pumping frequency 30 to 80 CPM and user adjustable. 2. Cushion inserted inside the breast cup so that it does not hurt the mother. 3. Suction Pressure 100 to 250 mm hg; user adjustable. 4. Able to express milk from both breasts simultaneously. 5. Collection bottles can be used for storage of milk. 6. Double alternating pumps/double cycling pumps. 7. Should be motorized breast pump units. 8. Should be hospital grade.
2.2	User's interface	Manual

MEDICAL DEVICE SPECIfICATIoN (Including information on the following where relevant/appropriate, but not limited to)		
2.3	Software and/or standard of communication (wherever required)	NA
3. PHYSICAL CHARACTERISTICS		
3.1	Dimensions (metric)	Portable
3.2	Weight (lbs, kg)	Compact unit (weight less than 4 kg)
3.3	Configuration	LCD/LED display suction timing
3.4	Noise (in dB)	<60db
3.5	Heat dissipation	NA
3.6	Mobility, portability	Yes
4 ENERGY SoURCE (electricity, UPS, solar, gas, water, Co_2 ....)		
4.1	Power Requirements	220-240 V AC + 10%, 50-60Hz power supply; 5A plug; TYPE D
4.2	Battery operated	NA YES (OPTIONAL).
4.3	Tolerance (to variations, shutdowns)	± 10% of input AC.
4.4	Protection	Electrical protection by reset table over current breakers or replaceable fuses.
5. ACCESSoRIES, SPARE PARTS, CoNSUMABLES		
5.1	Accessories (mandatory, standard, optional); Spare parts (main ones); Consumables/reagents (open, closed system)	1. Reusable collection bottles along-with breast cups - 10 sets. 2. All kinds of tubes - 12 sets (if applicable). 3. Breast pump Valve and Membrane (Pack of 4 Valves and 2 membranes) 25 No. 4. Other accessories required for optimum functioning of the equipment.
Bidding/Procurement Terms/Donation Requirements		
6. ENVIRoNMENTAL AND DEPARTMENTAL CoNSIDERATIoNS		
6.1	Atmosphere/Ambiance (air conditioning, humidity, dust ...)	1. Operating condition: Capable of operating continuously in ambient temperature of 10 to 40°C and relative humidity of 15 to 90% in ideal circumstances. 2. Storage condition: Capable of being stored continuously in ambient temperature of 0 to 50°C and relative humidity of 15 to 90%.
6.2	User's care, Cleaning, Disinfection and Sterility issues	1. Disinfection: Parts of the Device that are designed to come into contact with the patient or the operator should either be capable of easy disinfection or be protected by a single use/disposable cover.
7. STANDARDS AND SAfETY		
7.1	Certificates (pre-market, sanitary,); Performance and safety standards (specific to the device type); Local and/or international	1. Should be CE (EU)/FDA (US) approved product. 2. Manufacturer/supplier should have ISO 13485 certificate for quality standard. 3. Electrical safety conforms to standards for electrical safety IEC-60601-1; IEC 60601-1-11; IEC 60601-3-2; IEC 60601-3-3; IEC 60601-4-2; IEC 60601-4-4; IEC 60601-4-5; IEC 60601-4-8; IEC 60601-4-11.

8 TRAINING AND INSTALLATIoN		
8.1	Pre-installation requirements: nature, values, quality, tolerance	Supplier to perform installation, safety and operation checks before handover.
8.2	Requirements for sign-off	Certificate of calibration and inspection from the factory.
8.3	Training of staff (medical, paramedical, technicians)	Training of users in operation and basic maintenance shall be provided.

MEDICAL DEVICE SPECIfICATIoN (Including information on the following where relevant/appropriate, but not limited to)		
9. wARRANTY AND MAINTENANCE		
9.1	Warranty	3 years
9.2	Maintenance tasks	Maintenance manual detailing complete maintaining schedule.
9.3	Service contract clauses, including prices	1. Warranty of three years with free servicing (min. 3) during warranty. 2. AMC rates should not be greater than 3% of original cost.
10. DoCUMENTATIoN		
10.1	Operating manuals, service manuals, other manuals	1. User and maintenance manuals to be supplied in English. 2. Certificate of calibration and inspection to be provided. 3. List to be provided of equipment and procedures required for local calibration and routine maintenance. 4. List to be provided of important spares and accessories, with their part numbers and cost. 5. Contact details of manufacturer, supplier and local service agent to be provided.
10.2	Recommendations for maintenance	User/Technical/Maintenance manuals to be supplied in English.
11. NoTES		
11.1	Service Support Contact details (Hierarchy Wise; including a toll free/landline number)	Contact details of manufacturer, supplier and local service agent to be provided.
11.2	Recommendations or warnings	Any warning signs would be adequately displayed.

2. MILK CONTAINERS

MEDICAL DEVICE SPECIfICATIoN (Including Information on the following where relevant/appropriate, but not limited to)	
Milk Container	
Version no. :	1
Date:	JULY 2016.
Done by : (name/institution)	HCT/NHSRC
Name and Coding	
GMDN name	NA
GMDN code(s)	NA
GENERAL	
1. USE	
1.1 Clinical purpose	Milk container is required for collection and storing the milk.
1.2 Used by clinical department/ ward	NICU and PICU

Technical		
2. TECHNICAL CHARACTERISTICS		
2.1	Technical characteristics (specific to this type of device)	1. Milk containers of 3 sizes—50 ml, 100 ml, 200 ml; 50 of each size. 2. Milk containers are of two types: a. Polypropylene BPA free b. Glass Containers

MEDICAL DEVICE SPECIfICATIoN (Including Information on the following where relevant/appropriate, but not limited to)		
2.2	User's interface	Manual
2.3	Software and/or standard of communication (wherever required)	NA
3. PHYSICAL CHARACTERISTICS		
3.1	Dimensions (metric)	Portable
3.2	Weight (lbs, kg)	Compact unit
3.3	Configuration	NA
3.4	Noise (in dB)	NA
3.5	Heat dissipation	NA
3.6	Mobility, portability	Yes
4. ENERGY SoURCE (electricity, UPS, solar, gas, water, Co_2 ....)		
4.1	Power Requirements	NA
4.2	Battery operated	NA
4.3	Tolerance (to variations, shutdowns)	NA
4.4	Protection	
4.5	Power consumption	
5. ACCESSoRIES, SPARE PARTS, CoNSUMABLES		
5.1	Accessories (mandatory, standard, optional); Spare parts (main ones); Consumables/reagents (open, closed system)	NA
Bidding/Procurement Terms/Donation Requirements		
6. ENVIRoNMENTAL AND DEPARTMENTAL CoNSIDERATIoNS		
6.1	Atmosphere/Ambiance (air conditioning, humidity, dust ...)	NA

6.2	User's care, Cleaning, Disinfection and Sterility issues	Disinfection: MILK CONTAINER should be easy to clean and autoclave.
7. STANDARDS AND SAfETY		
7.1	Certificates (pre-market, sanitary, ..); Performance and safety standards (specific to the device type); Local and/ or international	1. The material of construction should be of food grade.
8. TRAINING AND INSTALLATIoN		
8.1	Pre-installation requirements: nature, values, quality, tolerance	NA
8.2	Requirements for sign-off	NA
8.3	Training of staff (medical, paramedical, technicians)	Training of users in operation and basic maintenance shall be provided.
MEDICAL DEVICE SPECIfICATIoN (Including Information on the following where relevant/appropriate, but not limited to)		
9. wARRANTY AND MAINTENANCE		
9.1	Warranty	1 year
9.2	Maintenance tasks	NA
9.3	Service contract clauses, including prices	NA
10. DoCUMENTATIoN		
10.1	Operating manuals, service manuals, other manuals	1. User manuals to be supplied in English/Hindi. 2. Certificate of calibration and inspection to be provided.
10.2	Recommendations for maintenance	1. All the rigid containers may be re-used but have to be washed preferably in a bottle washer or and sterilized appropriately. 2. Glass containers should be checked for chipping after every cleaning cycle.
11. NoTES		
11.1	Service Support Contact details (Hierarchy Wise; including a toll free/landline number)	NA
11.2	Recommendations or warnings	NA

3. PASTEURIZER

MEDICAL DEVICE SPECIfICATIoN (Including Information on the following where relevant/appropriate, but not limited to)		
Version no.:		1.0
Date:		6/4/2016

Done by : (name/institution)		HCT/NHSRC
NAME AND CODING		
GMDN name		Milk Pasteuriser
GMDN code(s)		NA
General		
1. USE		
1.1	Purpose	The purpose of the pasteuriser is to destroy pathogenic bacteria from milk and makes it safe for storage and consumption.
1.2	Used by	The machine is to be used in human milk banks.
Technical		
2. TECHNICAL CHARACTERISTICS		
2.1	Technical characteristics (specific to this type of device)	1. Inner and outer jacket made of stainless steel 304 grade 2. Easy to operate & handle. 3. Standard motor and gear box. 4. Outlet valve S.S.304 with TC clamp. 5. High speed stirrer for mixing. 6. Capacity for heating a minimum of 16 samples of milk with each sample jar not less than 330 cc volume. 7. Tank insulated glass wood. 8. Temperature gauge for showing temperature.

MEDICAL DEVICE SPECIfICATIoN (Including Information on the following where relevant/appropriate, but not limited to)		
		9. Rotation Controller regulator having varying speed from 10 to 100 rotations per minute. 10. Having jack-up facility for emptying and discharge without lifting the unit.
2.2	User's interface	Semi-automatic

2.3	Product Safety Features	1. Pasteurizer should be equipped with system that can heat the milk up to 63°C with sensitivity of ± 0.5°C with minimum fluctuation of temperature. 2. Equipment should have a holding arrangement for containers of milk immersed in water till the maximum level of milk in heating and/or cooling medium sufficient to give uniform heating and/or cooling to the milk. In no case, the bottles or containers to completely get immersed in water. The holder should have shaking arrangement sufficient to maintain the uniform temperature of milk and not to splash the milk inside the container. 3. The heating cycle should be designed in such a way that the milk receives desired temperature of 62.5°C and held for 30 minutes. 4. After completion of heating and holding, the temperature of milk is uniformly brought down to 25°C within 10minutes and further reduced to 4°C. 5. The heating medium should not have temp higher than 64°C ± 1 in order to avoid over heating of milk and minimize nutrient loss. 6. The pasteurizer should be equipped with data logging and storage, data analysis and generation of final report in various formats for effective analysis and corrective actions. 7. The water holding tank of pasteurizer should be self-drain type. 8. In case of fully automatic machine, there should be an audible alarm after completion of heating cycle and different alarm at end of cooling cycle. Later alarm should continue frequently till it is attended by an operator. 9. In case of semi-automatic equipment, it should have the following alarm systems: a After achieving set temperature. b Three minutes before completion of holding time for warning. c At the completion of holding time. d Achieving cooling set temperature (4°C) from 62.5°C in maximum 30 minutes. e Data logging system to record and retrieve all the data for analysis, evaluation and corrective action in appropriate formats to detect deviation. f Automatic water level maintenance in heating and cooling shaker bath. 10. In case of power failure a battery backup may be provided for continuous digital display of temperature of the pasteurizer.
2.4	Software and/or standard of communication (wherever required)	NA
3. PHYSICAL CHARACTERISTICS		
3.1	Dimensions (metric)	
3.2	Weight (lbs, kg)	
3.3	Configuration	

MEDICAL DEVICE SPECIfICATIoN
(Including Information on the following where relevant/appropriate, but not limited to)

3.4	Noise (in dB)	Audible beeper of minimum 65 dB
3.5	Heat dissipation	Inbuilt temperature control module
3.6	Mobility, portability	
4. ENERGY SoURCE (electricity, UPS, solar, gas, water, Co_2 ....)		
4.1	Power Requirements	Power Supply: 220 Volts
4.2	Battery operated	No
4.3	Tolerance (to variations, shutdowns)	Tolerance for 10% voltage fluctuations
4.4	Protection	Earthing for installation site, fuse for the machine
4.5	Power consumption	A maximum of 2.5 KW/Hr
5. ACCESSoRIES, SPARE PARTS, CoNSUMABLES		
5.1	Accessories (mandatory, standard, optional); Spare parts (main ones); Consumables/reagents (open, closed system)	List of all accessories, spare parts and consumables with rates and commitment of availability till the end life of the machine to be shared by the supplier.
Bidding/Procurement Terms/Donation Requirements		
6. ENVIRoNMENTAL AND DEPARTMENTAL CoNSIDERATIoNS		
6.1	Atmosphere/Ambiance (air conditioning, humidity, dust ...)	1. Operating condition: Capable of operating continuously in ambient temperature of 10 to 50°C and relative humidity of 15 to 90% in ideal circumstances. 2. Storage condition: Capable of being stored continuously in ambient temperature of 0 to 50°C and relative humidity of 15 to 90%.
6.2	User's care, Cleaning, Disinfection and Sterility issues	To be detailed by the manufacturer.
7. STANDARDS AND SAfETY		
7.1	Certificates (pre-market, sanitary, ..); Performance and safety standards (specific to the device type); Local and/ or international	1. Should be FDA/CE/BIS approved product. 2. Manufacturer and Supplier should have ISO 13485 certification for quality standards. 3. Electrical safety conforms to the standards for electrical safety IEC 60601-General requirements.
8. TRAINING AND INSTALLATIoN		
8.1	Pre-installation requirements: nature, values, quality, tolerance	1. Availability of 15-amp socket. 2. Safety and operation check before handover.
8.2	Requirements for sign-off	Certificate of calibration and inspection from the manufacturer.
8.3	Training of staff (medical, paramedical, technicians)	1. Training of users on operation and basic maintenance at least for two weeks. 2. Advanced maintenance tasks required shall be documented.
9. wARRANTY AND MAINTENANCE		

9.1	Warranty	3 years
9.2	Maintenance tasks	To be included in State Equipment Maintenance Program.
9.3	Service contract clauses, including prices	The spare price list of all spares and accessories (including minor) required for maintenance and repairs in future after guarantee/warranty period should be attached.
MEDICAL DEVICE SPECIfICATIoN (Including Information on the following where relevant/appropriate, but not limited to)		
10. DoCUMENTATIoN		
10.1	Operating manuals, service manuals, other manuals	Should provide 2 sets (hard copy and soft copy) of: 1. User, technical and maintenance manuals to be supplied in English/ Hindi language along with machine diagrams. 2. List of equipment and procedures required for local calibration and routine maintenance. 3. Service and operation manuals (original and copy) to be provided. 4. Advanced maintenance tasks documentation. 5. Certificate of calibration and inspection. 6. Satisfactory certificate for any existing installation from government hospital.
10.2	Recommendations for maintenance	List of important spares and accessories, with their part numbers and cost.
11. NoTES		
11.1	Service Support Contact details (Hierarchy Wise; including a toll free/landline number)	1. Contact details of manufacturer, supplier and local service agent to be provided. 2. Any Contract (AMC/CMC/ad-hoc) to be declared by the manufacturer.
11.2	Recommendations or warnings	Any warning signs would be adequately displayed.

4. LAMINAR AIR FLOW

MEDICAL DEVICE SPECIfICATIoN (Including Information on the following where relevant/appropriate, but not limited to)		
Version no.:		1.0
Date:		JULY 2016
Done by : (name/institution)		HCT/NHSRC
Name and Coding		
GMDN name		Laminar Air Flow
GMDN code(s)		NA
General		
1. USE		

1.1	Purpose	Laminar air flows are used to maintain a working area devoid of contaminants. Laminar Flow Cabinets create particle-free working environment by projecting air through a filtration system and exhausting it across a work surface in a laminar or uni-directional air stream. They provide an excellent clean air environment for a number of laboratory requirements.
1.2	Used by	Microbiology Technician
Technical		
2. TECHNICAL CHARACTERISTICS		
2.1	Technical characteristics (specific to this type of device)	⊙ Working area: 4 x 2 x 2 feet. ⊙ Hepa Filter efficiency 99.99% for .3u particle or better. ⊙ Cleanliness: Class 100 ⊙ Particle retention: 0.3 micron. ⊙ Illumination > 700 LUX. ⊙ Noise level < 66 dB

MEDICAL DEVICE SPECIfICATIoN (Including Information on the following where relevant/appropriate, but not limited to)		
		⊙ Power supply: 220/240 V Single phase, 50 Hz AC. ⊙ Vertical Airflow. ⊙ Stainless Steel (Type 304) Construction. ⊙ Two glass outlet in working Area; one on each side wall. Pre mounted UV Lamp (30w) with separate switch.
2.2	User's interface	Semi-automatic
2.3	Product Safety Features	NA
2.4	Software and/or standard of communication (wherever required)	NA
3. PHYSICAL CHARACTERISTICS		
3.1	Dimensions (metric)	NA
3.2	Weight (lbs, kg)	NA
3.3	Configuration	NA
3.4	Noise (in dB)	NA
3.5	Heat dissipation	NA
3.6	Mobility, portability	FIXED
4. ENERGY SoURCE (electricity, UPS, solar, gas, water, Co_2 ....)		
4.1	Power Requirements	Power Supply: 220/240 V Single Phase,50-60Hz AC.
4.2	Battery operated	No
4.3	Tolerance (to variations, shutdowns)	Tolerance for 10% voltage fluctuations.
4.4	Protection	Earthing for installation site, fuse for the machine.
4.5	Power consumption	NA

5. ACCESSoRIES, SPARE PARTS, CoNSUMABLES		
5.1	Accessories (mandatory, standard, optional); Spare parts (main ones); Consumables/reagents (open, closed system)	1. A spare UV Lamp (30w) - 2 Nos. 2. Hepa Filter for Chamber- 1 nos. 3. Gas Burner (Bunsen burner) - 2 nos.
Bidding/Procurement Terms/Donation Requirements		
6. ENVIRoNMENTAL AND DEPARTMENTAL CoNSIDERATIoNS		
6.1	Atmosphere/Ambiance (air conditioning, humidity, dust ...)	Operating condition: Capable of operating continuously in ambient temperature of 10 to 50°C and relative humidity of 15 to 90% in ideal circumstances.
6.2	User's care, Cleaning, Disinfection and Sterility issues	To be detailed by the manufacturer.
7. STANDARDS AND SAfETY		
7.1	Certificates (pre-market, sanitary, ...); Performance and safety standards (specific to the device type); Local and/or international.	1. Should be FDA/CE/BIS approved product. 2. Manufacturer and supplier should have ISO 13485 certification for quality standards. Electrical safety conforms to the standards for electrical safety IEC 60601-General requirements.
8. TRAINING AND INSTALLATIoN		
8.1	Pre-installation requirements: nature, values, quality, tolerance	1. Availability of 15-amp socket; (TYPE D). Safety and operation check before handover.
MEDICAL DEVICE SPECIfICATIoN (Including Information on the following where relevant/appropriate, but not limited to)		
8.2	Requirements for sign-off	Certificate of calibration and inspection from the manufacturer.
8.3	Training of staff (medical, paramedical, technicians)	1. Training of users on operation and basic maintenance at least for two weeks. Advanced maintenance tasks required shall be documented.
9. wARRANTY AND MAINTENANCE		
9.1	Warranty	3 years
9.2	Maintenance tasks	To be included in State Equipment Maintenance Program.
9.3	Service contract clauses, including prices	The spare price list of all spares and accessories (including minor) required for maintenance and repairs in future after guarantee/warranty period should be attached.
10. DoCUMENTATIoN		

10.1	Operating manuals, service manuals, other manuals	Should provide 2 sets (hardcopy and soft-copy) of: 1. User, technical and maintenance manuals to be supplied in English/ Hindi language along with machine diagrams. 2. List of equipment and procedures required for local calibration and routine maintenance. 3. Service and operation manuals (original and copy) to be provided. 4. Advanced maintenance tasks documentation. 5. Certificate of calibration and inspection. Satisfactory certificate for any existing installation from government hospital.
10.2	Recommendations for maintenance	List of important spares and accessories, with their part numbers and cost.
11. NoTES		
11.1	Service Support Contact details (Hierarchy Wise; including a toll free/landline number)	1. Contact details of manufacturer, supplier and local service agent to be provided. Any Contract (AMC/CMC/ad-hoc) to be declared by the manufacturer.
11.2	Recommendations or warnings	2. NA

5. REFRIGERATOR

MEDICAL DEVICE SPECIfICATIoN (Including Information on the following where relevant/appropriate, but not limited to)		
Version no. :		1.0
Date:		July 6, 2016
Done by : (name/institution)		HCT/NHSRC
Name and Coding		
GMDN name		Refrigerator
GMDN code(s)		NA
General		
1. USE		
1.1	Purpose	A device which is artificially kept cool and used to store food and drink.
1.2	Used by	All Departments.

MEDICAL DEVICE SPECIfICATIoN (Including Information on the following where relevant/appropriate, but not limited to)
Technical
2. TECHNICAL CHARACTERISTICS

2.1	Technical characteristics (specific to this type of device)	1. Should be frost free Refrigerator. 2. Should have a capacity of 300L. 3. Should have EEC 4-star rating or above. Should have inbuilt protection for voltage fluctuation or to be supplied with external stabilizer of adequate KVA capacity.
2.2	User's interface	Automatic/Semi-Automatic
2.3	Product Safety Features	Continuous recording for full traceability
2.4	Software and/or standard of communication (wherever required)	NA
3. PHYSICAL CHARACTERISTICS		
3.1	Dimensions (metric)	Dimension of internal self and weight carrying capacity will be defined locally Shelving should be compatible with the size of bottle.
3.2	Weight (lbs, kg)	NA
3.3	Configuration	Refrigerator only without freezer component
3.4	Noise (in dB)	NA
3.5	Heat dissipation	Inbuilt temperature control module.
3.6	Mobility, portability	
4. ENERGY SoURCE (electricity, UPS, solar, gas, water, Co_2 ....)		
4.1	Power Requirements	Power Supply: 220-240Vac, 50-60HZ Power Supply.
4.2	Battery operated	No
4.3	Tolerance (to variations, shutdowns)	Tolerance for 10% voltage fluctuations.
4.4	Protection	Earthing for installation site, fuse for the machine.
4.5	Power consumption	NA
5. ACCESSoRIES, SPARE PARTS, CoNSUMABLES		
5.1	Accessories (mandatory, standard, optional); Spare parts (main ones); Consumables/reagents (open, closed system)	List of all accessories, spare parts and consumables with rates and commitment of availability till the end life of the machine to be shared by the supplier.
Bidding/Procurement Terms/Donation Requirements		
6. ENVIRoNMENTAL AND DEPARTMENTAL CoNSIDERATIoNS		
6.1	Atmosphere/Ambiance (air conditioning, humidity, dust ...)	1. Operating condition: Capable of operating continuously in ambient temperature of 0 to 50°C and relative humidity of 15 to 90% in ideal circumstances. Storage condition: Capable of being stored continuously in ambient temperature of 0 to 50°C and relative humidity of 15 to 90%.

6.2	User's care, Cleaning, Disinfection and Sterility issues	To be detailed by the manufacturer
MEDICAL DEVICE SPECIfICATIoN (Including Information on the following where relevant/appropriate, but not limited to)		
7. STANDARDS AND SAfETY		
7.1	Certificates (pre-market, sanitary, ..); Performance and safety standards (specific to the device type);Local and/or international	1. All the electrical and measuring devices of CE standard. 2. All electrical cables & connections will be fire and chemical resistant.
8. TRAINING AND INSTALLATIoN		
8.1	Pre-installation requirements: nature, values, quality, tolerance	1. Availability of 15-amp socket; (TYPE D). 2. Safety and operation check before handover.
8.2	Requirements for sign-off	Certificate of calibration and inspection from the manufacturer.
8.3	Training of staff (medical, paramedical, technicians)	NA
9. wARRANTY AND MAINTENANCE		
9.1	Warranty	3 years but 5 years on compressor
9.2	Maintenance tasks	To be included in State Equipment Maintenance Program
9.3	Service contract clauses, including prices	The spare price list of all spares and accessories (including minor) required for maintenance and repairs in future after guarantee/warranty period should be attached.
10. DoCUMENTATIoN		
10.1	Operating manuals, service manuals, other manuals	Should provide 2 sets (hardcopy and soft-copy) of: 1. User, technical and maintenance manuals to be supplied in English/ Hindi language along with machine diagrams. 2. List of equipment and procedures required for local calibration and routine maintenance. 3. Service and operation manuals (original and copy) to be provided. 4. Advanced maintenance tasks documentation. 5. Satisfactory certificate for any existing installation from government hospital.
10.2	Recommendations for maintenance	List of important spares and accessories, with their part numbers and cost.
11. NoTES		
11.1	Service Support Contact details (Hierarchy Wise; including a toll free/landline number)	1. Contact details of manufacturer, supplier and local service agent to be provided. 2. Any Contract (AMC/CMC/ad-hoc) to be declared by the manufacturer.
11.2	Recommendations or warnings	3. Any warning signs would be adequately displayed.

6. DEEP FREEZER

MEDICAL DEVICE SPECIfICATIoN (Including Information on the following where relevant/appropriate, but not limited to)		
Version no. :		1.0
Date:		July 6, 2016
Done by : (name/institution)		HCT/NHSRC
Name and Coding		
GMDN name		Deep Freezer

MEDICAL DEVICE SPECIfICATIoN (Including Information on the following where relevant/appropriate, but not limited to)		
GMDN code(s)		NA
General		
1	USE	
1.1	Purpose	A vertical deep freezer to store the milk
1.2	Used by	The machine is to be used in human milk banks.
Technical		
2 TECHNICAL CHARACTERISTICS		
2.1	Technical characteristics (specific to this type of device)	⊙ 250L hard top double door (preferred) with hinges, lockable preferred. ⊙ Manage temperature between –20°C to –22°C ⊙ Capacity to cool 15 litres water in assorted sizes (50 to 200 ml plastic/glass bottles) at 10°C to –20° C in 24 hours ⊙ PUF insulated steel sheet sandwich construction ⊙ Provision to fix 5 baskets to store bottles. ⊙ Freezer should be lockable. ⊙ Audio Visual high and Low temperature alarms. ⊙ Stainless Steel Interior. ⊙ Castors free easy mobility. ⊙ Compatible Voltage Stabilizer (2 kVA) of standard Brands/ISI Mark. ⊙ Temp. Thermostat regulator. ⊙ Temp. Indicator Lamp. ⊙ Digital temperature control and LED door display and systems monitoring and reporting technology. ⊙ Epoxy covered SS metallic e external case. ⊙ Strong, moulded, chemically resistant abs interior. ⊙ The height between two sliding racks should be approximately 15 cm with proper provision to hold milk bottles of 50-200 ml
2.2	User's interface	Automatic/Semi-Automatic

2.3	Product Safety Features	1. Automatic control of temperature. 2. Automatic flow diversion. Continuous recording for full traceability.
2.4	Software and/or standard of communication (wherever required)	NA
3. PHYSICAL CHARACTERISTICS		
3.1	Dimensions (metric)	NA
3.2	Weight (lbs, kg)	NA
3.3	Configuration	NA
3.4	Noise (in dB)	NA
3.5	Heat dissipation	Inbuilt temperature control module
3.6	Mobility, portability	
4. ENERGY SoURCE (electricity, UPS, solar, gas, water, Co_2 ....)		
4.1	Power Requirements	Power Supply: 220-240Vac, 50-60HZ Power Supply.
4.2	Battery operated	No

MEDICAL DEVICE SPECIfICATIoN (Including Information on the following where relevant/appropriate, but not limited to)		
4.3	Tolerance (to variations, shutdowns)	Tolerance for 10% voltage fluctuations.
4.4	Protection	Earthing for installation site, fuse for the machine.
4.5	Power consumption	NA
5. ACCESSoRIES, SPARE PARTS, CoNSUMABLES		
5.1	Accessories (mandatory, standard, optional); Spare parts (main ones); Consumables/ reagents (open, closed system)	NA
Bidding/Procurement Terms/Donation Requirements		
6. ENVIRoNMENTAL AND DEPARTMENTAL CoNSIDERATIoNS		
6.1	Atmosphere/Ambiance (air conditioning, humidity, dust ...)	Operating condition: Capable of operating continuously in ambient temperature of 0 to 50°C and relative humidity of 15 to 90% in ideal circumstances.
6.2	User's care, Cleaning, Disinfection and Sterility issues	To be detailed by the manufacturer. To be installed 1 ft. away from the wall.
7. STANDARDS AND SAfETY		

7.1	Certificates (pre-market, sanitary, ..); Performance and safety standards (specific to the device type); Local and/ or international	1. All the electrical and measuring devices of CE standard. 2. All electrical cables and connections will be fire and chemical resistant.
8. TRAINING AND INSTALLATIoN		
8.1	Pre-installation requirements: nature, values, quality, tolerance	1. Availability of 15-amp socket; (TYPE D). Safety and operation check before handover.
8.2	Requirements for sign-off	Certificate of calibration and inspection from the manufacturer
8.3	Training of staff (medical, paramedical, technicians)	NA
9. wARRANTY AND MAINTENANCE		
9.1	Warranty	3 years or 5 years on compressor
9.2	Maintenance tasks	To be included in State Equipment Maintenance Program.
9.3	Service contract clauses, including prices	The spare price list of all spares and accessories (including minor) required for maintenance and repairs in future after guarantee/warranty period should be attached.
10. DoCUMENTATIoN		
10.1	Operating manuals, service manuals, other manuals	Should provide 2 sets (hardcopy and soft-copy) of:- 1. User, technical and maintenance manuals to be supplied in English/ Hindi language along with machine diagrams. 2. List of equipment and procedures required for local calibration and routine maintenance. 3. Service and operation manuals (original and copy) to be provided. 4. Advanced maintenance tasks documentation. 5. Satisfactory certificate for any existing installation from government hospital.
10.2	Recommendations for maintenance	List of important spares and accessories, with their part numbers and cost
MEDICAL DEVICE SPECIfICATIoN (Including Information on the following where relevant/appropriate, but not limited to)		
11. NoTES		
11.1	Service Support Contact details (Hierarchy Wise; including a toll free/landline number)	1. Contact details of manufacturer, supplier and local service agent to be provided. 2. Any Contract (AMC/CMC/ad-hoc) to be declared by the manufacturer.
11.2	Recommendations or warnings	Any warning signs would be adequately displayed.

7. HOT AIR OVEN

MEDICAL DEVICE SPECIfICATIoN (Including Information on the following where relevant/appropriate, but not limited to)	
Version no. :	1.0

Date:		July 6, 2016
Done by : (name/institution)		HCT/NHSRC
Name and Coding		
GMDN name		HOT AIR OVEN
GMDN code(s)		NA
General		
1. USE		
1.1	Purpose	Hot air ovens are electrical devices which use dry heat to sterilize. They can be operated using a thermostat to control the temperature. Their double walled insulation keeps the heat in and conserves energy, the inner layer being a poor conductor and outer layer being metallic. There is also an air filled space in between to aid insulation. An air circulating fan helps in uniform distribution of the heat. These are fitted with the adjustable wire mesh plated trays or aluminium trays and may have an on/off rocker switch, as well as indicators and controls for temperature and holding time.
1.2	Used by	The machine is to be used in human milk banks/laboratories.
Technical		
2. TECHNICAL CHARACTERISTICS		
2.1	Technical characteristics (specific to this type of device) Temp Required 121°C	1. Should be operated on 230V, 50Hz single phase AC supply and having temperature ranging between 50–200ºC. 2. Should be made of double walled chamber -Inner made of stainless steel SS 304 grade and powder coated outer surface. 3. Should provide with three heating elements on three sides of the equipment for uniform temperature on all shelves. 4. Should be provided with air circulating fan. 5. Should provide with a variable microprocessor based digital temperature controller with digital display and thermometer should be provided separate. 6. Should have a minimum chamber size of (LxBxH) 450x450x450 with 2 stainless steel trays with holes. 7. Should provide with air ventilations.
2.2	User's interface	Automatic/Manual
2.3	Product Safety Features	⊙ Hot air oven making use of dry heat for sterilizing of articles. ⊙ Features thermostat based controls for temperature. ⊙ Digitally controlled interface for maintaining of the temperatures.

MEDICAL DEVICE SPECIfICATIoN
(Including Information on the following where relevant/appropriate, but not limited to)

		⊙ Features double-walled construction. ⊙ System designed to hold in heat as well as bring reduction in energy output. ⊙ Double walled construction with inside from stainless steel as well as outside made available in mild steel finish. ⊙ Superior quality enamel paint as well as glass wool insulation support provided between two walls that provides for maximum thermal efficiency. ⊙ Silent hot air blower support that provides for uniform air movement as well as improved temperature distribution. ⊙ Featuring polished 304 grade stainless steel interior that provides for corrosion resistant usage as well as long lasting operation support. ⊙ Thermostat based safety device support. ⊙ Digital temperature controller cum indicator support.
2.4	Software and/or standard of communication (wherever required)	NA
3. PHYSICAL CHARACTERISTICS		
3.1	Dimensions (metric)	NA
3.2	Weight (lbs, kg)	NA
3.3	Configuration	NA
3.4	Noise (in dB)	NA
3.5	Heat dissipation	Inbuilt temperature control module.
3.6	Mobility, portability	
4. ENERGY SoURCE (electricity, UPS, solar, gas, water, Co_2 ....)		
4.1	Power Requirements	Power Supply: 220-230Vac, 50HZ Power Supply.
4.2	Battery operated	No
4.3	Tolerance (to variations, shutdowns)	Tolerance for 10% voltage fluctuations.
4.4	Protection	Earthing for installation site, fuse for the machine.
4.5	Power consumption	NA
5. ACCESSoRIES, SPARE PARTS, CoNSUMABLES		
5.1	Accessories (mandatory, standard, optional); Spare parts (main ones); Consumables/reagents (open, closed system)	NA
Bidding/Procurement Terms/Donation Requirements		
6. ENVIRoNMENTAL AND DEPARTMENTAL CoNSIDERATIoNS		

6.1	Atmosphere/Ambiance (air conditioning, humidity, dust ...)	NA
6.2	User's care, Cleaning, Disinfection and Sterility issues	To be detailed by the manufacturer
MEDICAL DEVICE SPECIfICATIoN (Including Information on the following where relevant/appropriate, but not limited to)		
7. STANDARDS AND SAfETY		
7.1	Certificates (pre-market, sanitary); Performance and safety standards (specific to the device type); Local and/ or international	1. All the --electrical and measuring devices of CE standard. 2. All electrical cables and connections will be fire and chemical resistant.
8. TRAINING AND INSTALLATIoN		
8.1	Pre-installation requirements: nature, values, quality, tolerance	1. Availability of 15-amp socket; (TYPE D). 2. Safety and operation check before handover.
8.2	Requirements for sign-off	Certificate of calibration and inspection from the manufacturer.
8.3	Training of staff (medical, paramedical, technicians)	NA
9. wARRANTY AND MAINTENANCE		
9.1	Warranty	3 years
9.2	Maintenance tasks	To be included in State Equipment Maintenance Program.
9.3	Service contract clauses, including prices	The spare price list of all spares and accessories (including minor) required for maintenance and repairs in future after guarantee/warranty period should be attached.
10. DoCUMENTATIoN		
10.1	Operating manuals, service manuals, other manuals	Should provide 2 sets (hardcopy and soft-copy) of:- 1. User, technical and maintenance manuals to be supplied in English/ Hindi language along with machine diagrams. 2. List of equipment and procedures required for local calibration and routine maintenance. 3. Service and operation manuals (original and copy) to be provided. 4. Advanced maintenance tasks documentation. 5. Satisfactory certificate for any existing installation from government hospital.
10.2	Recommendations for maintenance	List of important spares and accessories, with their part numbers and cost;
11. NoTES		

11.1	Service Support Contact details (Hierarchy Wise; including a toll free/landline number)	1. Contact details of manufacturer, supplier and local service agent to be provided. 2. Any Contract (AMC/CMC/ad-hoc) to be declared by the manufacturer.
11.2	Recommendations or warnings	Any warning signs would be adequately displayed.

8. AUTOCLAVE

fLASH STERILIzER wITH TRoLLEY	
Version no.:	1
Date:	5/12/2014
Done by: (name/institution)	HCT/NHSRC

fLASH STERILIzER wITH TRoLLEY		
Name and Coding		
GMDN name		Flash Sterilizer with trolley
GMDN code		NA
General		
1. USE		
1.1	Clinical purpose	Used for sterilization of unwrapped equipment at 132°C for three to ten minutes using steam.
1.2	Used by clinical department/ ward	Operation Theatre
Technical		
2. TECHNICAL CHARACTERISTICS		
2.1	Technical characteristics (specific to this type of device)	1. 18–23 litres table-top model. 2. No utility connection other than drainage and electricity. 3. In-built dryer. 4. Constructed of 304 or 316 stainless steel 5. Automatic cycle control with printer
2.2	User's interface	Manual
2.3	Software and/or standard of communication (wherever required)	Stages should be displayable.
3. PHYSICAL CHARACTERISTICS		
3.1	Dimensions (metric)	As per capacity
3.2	Weight (lbs, kg)	Max:900 gm
3.3	Capacity	18 to 20 litre
3.4	Noise (in dBA)	Noise-free

3.5	Heat dissipation	Heat Dissipation: Should maintain nominal Temp and the heat should be disbursed through an cooling mechanism
3.6	Mobility, portability	Table with castors and brakes
4. ENERGY SoURCE (electricity, UPS, solar, gas, water, Co_2...)		
4.1	Power Requirements	Recharging unit: Input voltage- 220V-240V AC, 50Hz
4.2	Battery operated	Yes
4.3	Tolerance (to variations, shutdowns)	NA
4.4	Protection	Earthing for installation site, fuse for the machine.
4.5	Power consumption	NA
5. ACCESSoRIES, SPARE PARTS, CoNSUMABLES		
5.1	Accessories (mandatory, standard, optional); Spare parts (main ones); Consumables/ reagents (open, closed system)	1. Trays-2 nos
Bidding/Procurement Terms/Donation Requirements		
6. ENVIRoNMENTAL AND DEPARTMENTAL CoNSIDERATIoNS		
6.1	Atmosphere/Ambiance (air conditioning, humidity, dust...)	1. Operating condition: Capable of operating continuously in ambient temperature of 10 to 40°C and relative humidity of 15 to 90% in ideal circumstances. 2. Storage condition: Capable of being stored continuously in ambient temperature of 0 to 50°C and relative humidity of 15 to 90%.

fLASH STERILIzER wITH TRoLLEY		
6.2	User's care, Cleaning, Disinfection & Sterility issues	1. Disinfection: Parts of the Device that are designed to come into contact with the patient or the operator should either be capable of easy disinfection or be protected by a single use/disposable cover. 2. Sterilization not required.
7. STANDARDS AND SAfETY		
7.1	Certificates (pre-market, sanitary,..); Performance and safety standards (specific to the device type); Local and/ or international	1. Should be FDA/CE/BIS approved product. 2. Manufacturer and Supplier should have ISO 13485 certification for quality standards. 3. Electrical safety conforms to the standards for electrical safety IEC 60601-General requirements (or equivalent BIS Standard) 4. Shall meet internationally recognised for Electromagnetic Compatibility (EMC) for electromedical equipment: 61326-1. 5. Certified to be compliant with IEC 61010-1 ,IEC 61010-2-40 for safety.
7.2	Local and/or international	Manufacturer/supplier should have ISO 13485 certificate for quality standard.
8. TRAINING AND INSTALLATIoN		

8.1	Pre-installation requirements: nature, values, quality, tolerance	1. Availability of 15 amp socket. 2. Safety and operation check before handover.
8.2	Requirements for sign-off	Certificate of calibration and inspection from the manufacturer.
8.3	Training of staff (medical, paramedical, technicians)	1. Training of users on operation and basic maintenance. 2. Advanced maintenance tasks required shall be documented.
9. wARRANTY AND MAINTENANCE		
9.1	Warranty	3 years
9.2	Mantenance tasks	1. Maintenance manual detailing. 2. Complete maintenance schedule.
9.3	Service contract clauses, including prices	The spare price list of all spares and accessories (including minor) required for maintenance and repairs in future after guarantee/warranty period should be attached.
10. DoCUMENTATIoN		
10.1	Operating manuals, service manuals, other manuals	Should provide 2 sets (hardcopy and soft-copy) of: 1. User, technical and maintenance manuals to be supplied in english/ hindi language along with machine diagrams. 2. List of equipment and procedures required for local calibration and routine maintenance. 3. Service and operation manuals (original and copy) to be provided; 4. Advanced maintenance tasks documentation. 5. Certificate of calibration and inspection.
10.2	Other accompanying documents	List of important spares and accessories, with their part numbers and cost;
11. NoTES		
11.1	Service Support Contact details (Hierarchy Wise; including a toll free/landline number)	Contact details of manufacturer, supplier and local service agent to be provided. Any Contract (AMC/CMC/add-hoc) to be declared by the manufacturer.
11.2	Recommendations or warnings	Any warning signs would be adequately displayed.

9. ICE BOX WITH COLD GEL PACK

MEDICAL DEVICE SPECIfICATIoN (Including Information on the following where relevant/appropriate, but not limited to)	
Version no. :	1.0
Date:	July 6, 2016
Done by : (name/institution)	HCT/NHSRC
Name and Coding	
GMDN name	Ice box with cold gel pack.
GMDN code (s)	NA
General	

1. USE		
1.1	Purpose	Ice box is portable air conditioning system without the need of electrical power. It is used with cold gel packs to maintain the cold chain of milk during the transport.
1.2	Used by	The ice box is to be used in CLMCs.
Technical		
2. TECHNICAL CHARACTERISTICS		
2.1	Technical characteristics (specific to this type of device)	1. Insulated box for refrigerated samples: Insulated box made of PVC or HDPE with minimum 3 mm inner & outer wall thickness with insulation of polyurathine foam having foam density of 38-42 Kg/ cubic metre. The product stored at 4°C should not rise by more than 1°C in 24 hours at ambient temp of 40°C. The box should pass the drop test of 1.5 metre. 2. Insulated box for frozen samples: Insulated box made of PVC or HDPE with minimum 3 mm inner & outer wall thickness with insulation of polyurathine foam having Foam Density of 38-42 Kg/ Cubic Meter. The product stored at -18°C temp should not rise by more than 1°C in 24 hours at ambient temp of 40°C. The box should pass the drop test of 1.5 metre.
2.2	User's interface	Manual
2.3	Product Safety Features	
2.4	Software and/or standard of communication (wherever required)	NA
3. PHYSICAL CHARACTERISTICS		
3.1	Dimensions (metric)	10" x 13" x 18"
3.2	Weight (lbs, kg)	10 lbs
3.3	Configuration	NA
3.4	Noise (in dBA)	NA
3.5	Heat dissipation	NA
3.5	Mobility, portability	
4. ENERGY SoURCE (electricity, UPS, solar, gas, water, Co_2 ....)		
4.1	Power Requirements	NA
4.2	Battery operated	No
4.3	Tolerance (to variations, shutdowns)	NA

MEDICAL DEVICE SPECIfICATIoN (Including Information on the following where relevant/appropriate, but not limited to)		
4.4	Protection	NA
4.5	Power consumption	NA

5. ACCESSoRIES, SPARE PARTS, CoNSUMABLES		
5.1	Accessories (mandatory, standard, optional); Spare parts (main ones); Consumables/reagents (open, closed system)	NA
Bidding/Procurement Terms/Donation Requirements		
7. ENVIRoNMENTAL AND DEPARTMENTAL CoNSIDERATIoNS		
7.1	Atmosphere/Ambiance (air conditioning, humidity, dust ...)	NA
7.2	User's care, Cleaning, Disinfection and Sterility issues	To be detailed by the manufacturer.
7.3	Standards and Safety	
7.4	Certificates (pre-market, sanitary, ..); Performance and safety standards (specific to the device type); Local and/ or international	Insulation thickness should be minimum 50 mm.
8. TRAINING AND INSTALLATIoN		
8.1	Pre-installation requirements: nature, values, quality, tolerance	NA
8.2	Requirements for sign-off	Certificate of inspection from the manufacturer.
8.3	Training of staff (medical, paramedical, technicians)	NA
9. wARRANTY AND MAINTENANCE		
9.1	Warranty	NA
9.2	Maintenance tasks	To be included in State Equipment Maintenance Program
9.3	Service contract clauses, including prices	NA
10. DoCUMENTATIoN		
10.1	Operating manuals, service manuals, other manuals	User manuals to be supplied in English/Hindi.
10.2	Recommendations for maintenance	NA
11. NoTES		
11.1	Service Support Contact details (Hierarchy Wise; including a toll free/landline number)	NA

11.2	Recommendations or warnings	NA

10. OTHER EQUIPMENT SPECIFICATIONS

A. SHAKER WATER BATH

fUNCTIoN

Bottles/containers filled with liquid/fluid will be submerged in the water bath chamber of the instrument. The temperature of water bath can be controlled at a particular temperature as well as the shaker speed can also be controlled at a particular speed to maintain a uniform temperature at every parts of the bottle fluid.

SPECIfICATIoNS

- It will contain a micro-processor controlled temperature regulator, an electronic timer device and a shaker speed controller.
- The temperature of water bath can be maintained at 62.5 degree Centigrade during the process by adjusting the micro-processor controlled temperature regulator.
- It should have a digital temperature indicator showing the bath temperature.
- There should be a system with which the shaker speed can be controlled.
- The bath chamber must accommodate at least 12–15 polypropylene-make bottles of height 10 cm and 5.5 cm diameter.
- Bottles will be submerged during the process; the water level can be adjusted manually.
- The bottles can be placed on removable stainless steel tray houses and fitted with lotus clamps.
- The inner chamber and outer body should be made of stainless steel.
- It should have a welded stainless steel construction CE marking.
- The instrument will work in the power supply of 230 V 50Hz single phase.
- Free delivery & installation and on site demonstration & training are required to be provided.
- **warranty:** One-year warranty from the date of installation.

BINoCULAR MICRoSCoPE	
Version no. :	1
Date:	5/12/2014
Done By: (Name/institution)	HCT/NHSRC
GMDN name	Binocular Microscope
GMDN Code	NA
General	
1. USE	

1.1	Clinical Purpose	Binocular microscope is simply a microscope that lets the viewer use both eyes. The microscope has 2 eye lenses. The development of the double eye piece microscope was adapted to reduce the eyestrain and muscular strain that typically results from traditional microscopes.
1.2	Used by clinical department/ ward	Clinical labs.

BINoCULAR MICRoSCoPE		
Technical		
2. TECHNICAL CHARACTERISTICS		
2.1	Technical characteristics (specific to this type of device)	1. Body-Single mould sturdy stand, inclined Binocular body 30 °, 360º rotatable head. 2. Eyepieces-Highest quality 10 X/20mm wide angle anti fungus field eyepiece. One with pointer. Diopter adjustment must be present on both eye pieces. 3. Objectives-Parfocal, antifungus coated 4x, 10x, 40x and 100x (oil immersion) with semi planner achromatic correction. Objective should be well centered even if their position on turret is changed. 4. Optical system-Infinity corrected. 5. Stage - Double plate rackless horizontal mechanical stage preferably 100 x 140 mm with fine vernier graduations designed with convenient coaxial adjustment for slide manipulation preferably through 30 x 70 mm double slide holder. 6. Sub stage-Abe condenser focusable, continuously variable iris diaphragm 7. Illuminator-Built-in LED light source with white light with intensity control and LED life of more than 10, 000 Hrs. 8. Finish-A durable textured acid resistant finish. 9. Battery backup : minimum 1 Hour. 10. Nose piece: Backward tilted revolving nose piece suitable to accommodate four objectives with click stop and rubber grip. 11. Focusing: Coaxial coarse and fine focusing knob, capable of smooth, fine focusing movement sensitivity; minimum: 300 micron; focusing stop for slide safety.
2.2	User's interface	Manual
2.3	Software and/or standard of communication (wherever required)	NA
3. PHYSICAL CHARACTERISTICS		
3.1	Dimensions (metric)	NA
3.2	Weight (lbs, kg)	NA
3.3	Capacity	NA
3.4	Noise (in dBA)	NA
3.5	Heat dissipation	NA
3.6	Mobility, portability	Portable

4 ENERGY SoURCE (electricity, UPS, solar, gas, water, Co_2 ....)		
4.1	Power Requirements	Input voltage- single/3-phase
4.2	Battery operated	No
4.3	Tolerance (to variations, shutdowns	NA
4.4	Protection	Should have over-charging cut-off with visual symbol.
4.5	Power consumption	Less than 2 W.
5. ACCESSoRIES, SPARE PARTS, CoNSUMABLES		
5.1	Accessories(mandatory, standard, optional); Spare parts (main ones); Consumables / reagents (open, closed system)	Should provide with wooden storage box, dust cover, immersion oil.

BINoCULAR MICRoSCoPE		
Bidding/Procurement Terms/Donation Requirements		
6. ENVIRoNMENTAL AND DEPARTMENTAL CoNSIDERAToNS		
6.1	Atmosphere / Ambiance (air conditioning, humidity, dust ...)	1. Operating condition: Capable of operating continuously in ambient temperature of 10 to 40 deg C and relative humidity of 15 to 90% in ideal circumstances. 2. Storage condition: Capable of being stored continuously in ambient temperature of 0 to 50 deg C and relative humidity of 15 to 90%.
6.2	User's care, Cleaning, Disinfection & Sterility issues	1. Disinfection: Parts of the Device that are designed to come into contact with the patient or the operator should either be capable of easy disinfection or be protected by a single use/disposable cover. 2. Sterilization not required.
7. STANDARDS AND SAfETY		
7.1	Certificates (premarket, sanitary, ..); Performance and safety standards (specific to the device type); Local and/ or international	1. Should be FDA/CE/BIS approved product. 2. Manufacturer and Supplier should have ISO 13485 certification for quality standards. 3. Electrical safety conforms to the standards for electrical safety IEC 60601-General requirements (or equivalent BIS Standard) 4. Certified to be compliant with IEC 61010-1, IEC 61010-2-40 for safety
7.2	Local and/or international	Manufacturer / supplier should have ISO 13485 certificate for quality standard.
8. TRAINING AND INSTALLATIoN		
8.1	Pre-installation requirements: nature, values, quality, tolerance	1. Availability of 5 amp socket; 2. Safety and operation check before handover;
8.2	Requirements for sign of	Certificate of calibration and inspection from the manufacturer

8.3	Training of staff (medical, paramedical, technicians)	1. Training of users on operation and basic maintenance; 2. Advanced maintenance tasks required shall be documented
9. wARRANTY AND MAINTENANCE		
9.1	Warranty	3 years
9.2	Maintenance tasks	1. Maintenance manual detailing; 2. Complete maintenance schedule;
9.3	Service contract clauses, including prices	The spare price list of all spares and accessories (including minor) required for maintenance and repairs in future after guarantee / warranty period should be attached;
10. DoCUMENTATIoN		
10.1	Operating manuals, service manuals, other manuals	Should provide 2 sets (hardcopy and soft-copy) of:- 1. User, technical and maintenance manuals to be supplied in English/ Hindi language along with machine diagrams; 2. List of equipment and procedures required for local calibration and routine maintenance; 3. Service and operation manuals (original and copy) to be provided; 4. Advanced maintenance tasks documentation; 5. Certificate of calibration and inspection
10.2	Other accompanying documents	List of important spares and accessories, with their part numbers and cost;
BINoCULAR MICRoSCoPE		
11. NoTES		
11.1	Service Support Contact details (Hierarchy Wise; including a toll free/ landline number)	Contact details of manufacturer, supplier and local service agent to be provided; Any Contract (AMC/CMC/ad-hoc) to be declared by the manufacturer;
11.2	Recommendations or warnings	Any warning signs would be adequately displayed

B. BOTTLE SEALER

fUNCTIoN

Specifically designed to avoid leakage of tank water into the breast milk bottle during the heating and cooling cycles of the breast milk pasteurization process. Sealing the breast milk bottles insures that mother's breast milk retains its sterilization properties, and that no leakage occurs in the bottle while the milk pasteurization process takes place in the heating/cooling cycles, and after the breast milk is stored for later usage.

SPECIfICATIoN

This equipment is intended to seal metal foiled wafer inside the capped containers. Heating takes place in the metal foil and conducts heat to its plastic coating and subsequently causes the container material to melt and fuse. Pressure is normally applied to the joint by means of the torque exerted by the screwed cap and it is obviously essential that the foil coating is compatible with the particular material.

The package should consist of the induction heating generator and hand applicator.

C. WASHER & THERMAL DISINFECTOR

SPECIfICATIoNS

1. Single door Washer Disinfector with Thermal Disinfection & Cleaning, in a single closed system. Front loader with LCD Display. Thermal disinfection should be carried out at more than 90˚ C.
2. Washer shall be able to wash instruments, trays, bottles, dishes etc.
3. The washer Disinfector should be microprocessor/PLC based with pre-set programs as well as option of at least 3 customize programs for cleaning and disinfection. Indicators for operation and programming of current cycle status and alarms (audio/video), program running date & time, error messages etc. RS 232 port for printer connection to monitor and validate washing phases
4. Should have at least 1 automatic Dispenser pumps for liquid cleaning agents/acidic agents.
5. Should have powerful circulation pump for efficient cleaning of the instruments.
6. Washer Disinfector should be made from high grade stainless steel AISI304. The wash chamber should have rounded corners & self-cleaning tank for easy cleaning & drainage.
7. Electrical door lock, Program failure check, audio/video alarms, should have sensors for temperature monitoring and control.
8. Cold & Hot water connections. Electrical connection: 240V 1N 50Hz 3.5kW.
9. The system should be ergonomic and user friendly.
10. The system should be ISO; European CE or US FDA certified & also comply with EN ISO 15883.-1 & EN ISO 15883.-2. Company should have a Local Service Centre in India.
11. All the consumables like detergents, neutralizer, door gasket, printer paper etc. should be quoted separately which will be freeze for next 10 years.
12. The system should be supplied with consumables like detergent, neutralizer and salt for water at least 500 cycles
13. The system should be supplied with at least 1 wash basket, 2 wash arms, Racks for washing of at least milk bottles.
14. The built-in water softener optional provides optimal cleaning effectiveness.
15. Basket volume at least 40 litre.

D. PH METRE

SPECIfICATIoN

	pH Mode	mV Mode
Range	0.00 to 14.00 pH	0 to ±1999 mV
Resolution	0.01 pH	± 1 mV
Accuracy	0.01 pH ± 1 digit	1 mV ± 1 digit

Input Impedance	10^{12} Ohms
Temperature Control	0 to 100°c Manual
Display	3.5 digit LED display with auto polarity & decimal
Calibration	Two buffers calibration (manually) 7pH & 4pH Or 9.2pH
Power Requirement	230V A.C ± 10%, 50Hz single phase
Environment	230V AC ± 10% 50Hz
Dimensions	205 x 65 x 130mm (Aluminum powder coated cabinet)
Weight	1.5kgs (Approx.) including accessories
Standard Accessories	PH Electrode, Stand, Rod, Clamp, Buffers, Dust Cover & Manual

E. LABEL PRINTER (Water Proof)

FUNCTION: Required for printing the labels and marking the bottles with pasteurization batch number, and expiry date.

SPECIfICATIoN

- Should produce high resolution Labels.
- Should print more than 60 Labels per minute.
- Resolution of 300x600 dpi.
- Should be supplied with 100 compatible labels with the following specifications:
- Labels should be water proof.
- Can be peeled off easily.
- Size around 100 mmx 25 mm
- Can also be written with hand written labels with permanent markers.

11. LIST OF OTHER EQUIPMENT

- Steel sink
- Air Conditioner
- RO system
- Room thermometers
- Computer/laptop with internet facility and printer
- Hand dryer
- Provision of Music/Television
- Facility for drinking water to mother

APPENDIX

6



Record Keeping Formats

1. Donor record

S. no.
Date and time
Donor registration number (unique ID as prepared by the CLMC/MCTS/AADHAR)
Donor's Full name
Age of the donor's baby
Result of serological testing
Name of the attending lactating support staff
Signature of the donor
Signature of the Lactation Support Staff

2. Milk refrigeration records

S. no.
S. no. of the container
Volume
Date and time of refrigeration
Date and time of collection
Site of collection
Fit for use: yes/no

3. Milk pooling records

S. no.
Date and time of pooling
Batch no.
S. no. of containers
Date and time of thawing
S. no. of containers in the batch
Total volume
Total containers

4. Milk pasteurization records

Date and time
Batch no.
Volume
Heat treatment and time
Post-pasteurisation report
Fit for use: yes/no

5. Dispensing record

S. no.
Site of use
Batch no.
S no. of container
Volume
Date of time and dispatch
Date of expression
Date of pasteurization
Delivered by
Received by

6. Temperature log book for refrigerator and freezer (separate registers should be maintained for each)

S. no
Date
Time
Temperature
Corrective steps take in case of deviation
Signature of in-charge

7a. Label on the container of pasteurized DHM

Unique ID of mother
Volume of Milk
Name and address of the lactation management centre
Batch no
Expression date
Freezing date
Thawing date
Thawing time

Result of pre-pasteurization testing
Date of post-pasteurization testing
Result of post-pasteurization testing
Expiry date
Date of issue
Place of issue

7b. Label on the container of mother's own milk

Unique ID of mother
Volume of Milk
Name and address of the lactation management centre
Batch no
Expression date
Freezing date
Thawing date
Thawing time
Expiry date
Date of issue
Place of issue

8. Label on the container of pasteurized DHM (heterologous donation)

Name of the product
Total volume
Unique ID for the mother
Batch no:
Date of donation
Age of child- to know whether pre term/term milk
Date of freezing
Date of pasteurization
Date and time of thawing?
Expiry date
Results of serological testing
Required temperature
Info on any visible signs of deterioration

national Guidelines on Lactation Management Centres in Public health Facilities

Place & date of issue

9. Label on the container of homologous donation

Name of the product
Total volume
Unique ID for the mother
Batch no:
Date of donation
Age of child- to know whether pre term/term milk
Expiry date
Required temperature
Info on any visible signs of deterioration
Place & date of issue

10. Deep freezer register

Date
S. no. of the container
Volume
Status: Raw/pasteurized/awaiting serological report
Date and time of pasteurization
Post-pasteurisation report
Freezing date
Expiry date
Date and time of thawing

11. Culture report register

Date

Date	Sl No./Batch No.	Reason for discard	Signature of technician

Batch no. of samples sent for culture

Laboratory
Date of report received
Details of report
Fit for use: yes/no
Signature of in-charge

12. Daily feeding record of the recipient

Date
Registration no. of recipient
Mother’s name
Volume of milk fed to recipient
Time of feeding
Name of staff feeding milk
Batch no. of milk

13. Discard Register



ANNEXURE 1

1 Checklist for Pre-requisites for Establishing Lactation Management Centres



ANNEXURES

Annexure 1: Pre-requisites for Establishing Lactation Management Centres 106

Annexure 2: Indicative Budget Estimate for Sstablishing CLMC and LMU 108

Annexure 3: Registration and Consent Form for the Donor 113

Annexure 4: Consent Form for the Recipient 115

Annexure 5: Monitoring and Evaluation Form 116

Annexure 6: IMS Act 119

Annexure 7: List of Contraindicated drugs for milk donation 121

Annexure 8: References 123

I. Pre-requisites for Establishing Comprehensive Lactation Management Centre (CLMC)				
S. No.	**Parameter**	**Status Tick (√) Yes or No**		**Remarks**
		Yes	No	
1	Early breastfeeding is a practice **for all deliveries,** irrespective of normal or assisted deliveries.			
2	Practice breastfeeding for babies born by Caesarean Section deliveries.			
3	Demonstrate efforts to **provide IYCF counseling** at each contact with mother-newborn dyad such as ANC clinic, delivery, post neonatal follow up, routine immunization, IPD and OPD.			
4	Practice **feeding with breast milk** and not artificial feeds for: Sick babies Preterm babies Low birth weight babies Cleft palate HIV mother			
5	Practice the policy of bedding in of babies and not separate babies from mothers at any point of time.			
6	Compliant with provisions of IMS Act 2003 and must not indulge in promotion of artificial infant formula feed.			
7	Delivery rate is at least 10,000 babies annually.			
8	Have 20 bedded NICU along with SNCU			
9	Case load of sick newborns	_____ _____ (Average number of Sick newborns admitted per annum)		
10	Have provision for admitting mothers of out-born babies close to NICU/SNCU			
11	Have adequate space i.e. 350 Sq. Mt. for establishing CLMC, preferably in close proximity of the neonatal units (NICU/SNCU)			

I. Pre-requisites for Establishing Comprehensive Lactation Management Centre (CLMC)				
S. No.	**Parameter**	**Status Tick (√) Yes or No**		**Remarks**
12	Full time neonatologist/pediatrician and part time microbiologist available			
13	Have laboratory facility for testing for Hep B, C (Optional), Syphilis/VDRL and HIV 1 and 2			
14	A dedicated refrigerator for storing human milk is available at SNCU			
15	Need assessment for establishing CLMC has been carried out by SPMU nominated officials			

ANNEXURE

2

Indicative Budget Estimate Details for Establishing CLMC and LMU



II. Pre-requisites for Establishing Lactation Management Unit (LMU)				
S. No.	**Parameter**	**Status Tick (√) Yes or No**		**Remarks**
		Yes	No	
1	Early breastfeeding is a practice **for all deliveries,** irrespective of normal or assisted deliveries			
2	Practice breastfeeding for babies born by Caesarean Section deliveries			
3	Demonstrate efforts to **provide IYCF counseling** at each contact with mother-newborn dyad such as ANC clinic, delivery, post neonatal follow up, routine immunization, IPD and OPD			
4	Practice **feeding human breast milk** and not artificial feeds for: Sick babies Preterm babies Low birth weight babies Cleft palate HIV mother			
	Practice the policy of bedding in of babies and not separate babies from mothers at any point of time			
5	Compliant with provisions of IMS Act 2003 and must not indulge in promotion of artificial infant formula feed.			
6	Case load of sick newborns	_____ (Average number of Sick newborns admitted per annum)		
7	At least 12 bedded SNCUs			
8	Have adequate space i.e. 160Sq Mt. for establishing CLMC, preferably in close proximity of the neonatal units (NICU/SNCU)			
9	A dedicated refrigerator for storing human milk is available at SNCU			
10	Need assessment for establishing CLMC has been carried out by SPMU nominated officials			

1. Indicative list of Budget estimate details for CLMC					
Heads	**Essential**	**Desirable**	**Unit Cost (INR)**	**Units Needed**	**Total Cost (INR)**
fixed Cost					
Infrastructure: Built up area at least 350 Square Metres					
Construction, renovation or minor civil work	*		Variable		Variable
Equipment					
Pasteurizer	*				
Automated imported/indigenous pasteurizer (the cost will vary according to the size)			3,00,000 (indigenous)/ 21,00,000 (imported)	1	3,00,000 (indigenous) /21,00,000 (imported)
Shaker water bath	*		60,000	1	60,000
Vertical Laminar air flow	*		1,00,000	1	1,00,000
Horizontal Laminar air flow (Bio-safety Cabinet)	*		1,00,000	1	1,00,000
Deep Freezer	*		50, 000	4	200,000
Refrigerator	*		30,000	3 (Minimum)	90,000
Microscope with oil immersion lens	*		10,000	1	10,000
Shaker Incubator		*	20,000	1	20,000
Lab Incubator	*		10,000	1	10,000
PH Meter	*		2,500	1	2,500
Bunsen burner	*		500	1	500
Analytical Balance	*		20,000	1	20,000
Hospital grade Electric Breast Pump	*		1,80,000	6 (Minimum)	10,80,000
Extra Re-usable Lactation sets supplied to be used with Breast pumps	*		3000	30	30,000
Containers Polypropylene (BPA Free)	*		100	150	15,000
Bottle sealer with Foil for sealing bottles	*		5,000	1	5,000
Printer and water proof labels	*		5,000	1	5,000

1. Indicative list of Budget estimate details for CLMC					
Heads	**Essential**	**Desirable**	**Unit Cost (INR)**	**Units Needed**	**Total Cost (INR)**
Stainless steel strainer	*		500	4	2,000
Stainless steel wire mesh basket	*		1,500	5	7,500
Glass beaker/Flask (1 litre) for pooling	*		300	6	1,800
Cleaning and sterilizing equipment	*				
Steel scrub station	*		35,000	4	1,40,000
Stainless steel table (4 x 2 Sq. Ft.)	*		5,000	5	25,000
Dishwasher	*		30,000	1	30,000
Kitchen Basket (steel/plastic)	*		3,000	1	3,000
Hot air oven	*		35,000	2	70,000
Bench top autoclave (automated)	*		80,000	2	160,000
Heat sealer Machine with cutter	*		1,500	1	1,500
Bucket trolley	*		7,000	2	14,000
Folding laundry trolley	*		1,000	2	2,000
Multi- Function Janitor	*		15,000	1	15,000
Dustbins (Stainless steel)	*		1,500	8	12,000
Mop set with 360° rotating pole and steel bucket	*		2,500	1	2,500
Medical ice box - gel packs	*		10,000	2	20,000
furniture					
Cupboard	*		10,000	3	30,000
Chairs	*		1,500	10	15,000
Donor room sofa (5 seats)		*	25,000	1	25,000
Tables	*		7,000	2	14,000
Miscellaneous items - reception counter, fixed cupboards, baby cradle, lockers, staff garment cabinet, wheel chair etc.		*	30,000		30,000

office Utility Items					
Curtains	*		500	5	2,500
Gowns	*		300	10	3,000
Dustbins	*		500	1	500
Communication Equipment and Computer					
Computer	*		35,000	1	35,000
Printer	*		8,000	1	8,000
Intercom	*		5,000	1	5,000
other Electronic Machines					
Air conditioner	*		30,000	4	120,000
Exhaust Fan	*		1,500	4	6,000
Ceiling Fan	*		2,000	4	8,000
RO water system	*		20,000	1	20,000
Generator	*		100,000	1	100,000
Geyser for hot water	*		8,000	5	40,000
LED television with a DVD player		*	25,000	1	25,000
Music System		*	10,000	1	10,000
Drinking water machine	*		12,000	1	12,000

1. Indicative list of Budget estimate details for CLMC					
Heads	**Essential**	**Desirable**	**Unit Cost (INR)**	**Units Needed**	**Total Cost (INR)**
oNE TIME fIXED CoST					**30.62 lakhs approx. (with indigenous pasteurizer)**
One time fixed cost for desirable items: 1.1 lakhs approx. **Note:** Washer & Disinfector may be considered as desirable equipment instead of dishwasher.					
Recurring Expenses Per Annum					
Containers Polypropylene (BPA Free)	*		100	150	15,000
Extra Reusable Lactation sets supplied to be used with Breast pimps	*		3,000	12	36,000
Stationary (Record and registers etc.)	*				2,400
Other cleaning equipment (Broom and stick with bucket and dust pan, Dust mop, water mop, window wiper, microfiber cloth, squeeze sponge, sponge mop, colour coded garbage can, bucket, brush and stainless steel dustbins etc.)	*		15,000		15,000
Dress, rubber gloves, gum boots for hygiene helpers	*		3,000	4 sets	12,000
Toilet cleaning requirements (separate rubber gloves, shoes, toilet brush)	*		2,000		2,000
Soap and other cleaning agents	*		1,000	12	12,000
Laboratory reagents including culture Media Nutrient Agar and CLED agar) and Petri dish (e.g. 300 per month @ Rs. 10 per pc)	*		5,000	12	60,000
Staff items (Gloves, mask, cap, apron, lab coat, gown etc.)	*		25,000	-	25,000
Electricity and water	*		Variable		Variable
Analysis of samples	*		Variable		Variable
Maintenance cost of equipment (part of AMC)	*		5,000	12	60,000
Miscellaneous items (Curtains, cup, saucer, glasses, baskets, mugs etc.)			10,000	-	10,000
Contingency @5%					12,500
ANNUAL RECURRING CoST					**2. 62 lakhs approx.**

Human Resources Per Annum					
fULL TIME HR					
CLMC Manager	*		30,000	1	360,000
CLMC Technician	*		18,000	1	216,000
Lactation Support Staff	*		15,000	5	900,000
PART TIME HR					
Microbiologist	*		As per State Norm	1	
Hygiene helper	*		As per State Norm	3	

2. Indicative list of Budget estimate details for LMU					
Heads	**Essential**	**Desirable**	**Unit Cost (INR)**	**Units Needed**	**Total Cost (INR)**
Infrastructure Built up area: 160 Sq. Mts.					
Construction, renovation or minor civil work	*		Variable		Variable
Equipment					
Refrigerator	*		30,000	1	30,000
Deep freezer	*		50,000	1	50,000
Hospital grade Electric Breast Pump	*		1,00,000	3 (Minimum)	3,00,000
Extra Reusable Lactation sets supplied to be used with Breast pimps	*		3,000	15	45,000
Containers Polypropylene (BPA Free)	*		100	75	7,500
Bottle sealer with Foil for sealing bottles	*		5,000	1	5,000
Printer and water proof labels	*		5,000	1	5,000
Stainless steel strainer	*		500	2	1,000
Stainless steel wire mesh basket	*		1,500	2	3,000
Cleaning and sterilizing equipment	*				
Steel scrub station			35,000	2	70,000

Stainless steel table (4*2 Sq. Ft)			5,000	3	15,000
Dishwasher			30,000	1	30,000
Kitchen Basket (steel/plastic)			2,000	1	2,000
Hot air oven			30,000	1	30,000
Bench top autoclave (automated)			60,000	1	60,000
Heat sealer Machine with cutter			1,500	1	1,500
Bucket trolley			7,000	1	7,000
Folding laundry trolley			1,000	1	1,000
Multi- Function Janitor			15,000	1	15,000
Dustbins (Stainless steel)			1,500	5	7,500
Mop set with 360^0 rotating pole and steel bucket			2,500	2	5,000
Medical ice box - gel packs	*		10,000	2	20,000
furniture					
Cupboard	*		6,000	3	18,000
Chairs	*		1,500	6	9,000
Donor room sofa (5 seats)		*	25,000	1	25,000
Tables	*		7,000	2	14,000
Miscellaneous items - reception counter, fixed cupboards, baby cradle, lockers, staff garment cabinet, wheel chair etc.		*	10,000		10,000
Communication Equipment and Computers					
Computer	*		25,000	1	25,000
Printer	*		5,000	1	5,000
other Electronic Equipment					
Air conditioner	*		30,000	3	90,000
Ceiling Fan	*		1,500	3	4,500
2. Indicative list of Budget estimate details for LMU					

Heads	Essential	Desirable	Unit Cost (INR)	Units Needed	Total Cost (INR)
Exhaust Fan	*		1,500	3	4,500
Geyser	*		6,000	3	18,000
Music System	*		10,000	1	10,000
Drinking water machine	*	*	12,000	1	12,000
office Utility Item					
Curtains	*		500	5	2,500
Gowns	*		300	10	3,000
oNE TIME fIXED CoST					**9.60 Lakhs Approx.**
Recurring Expenses Per Annum					
Record registers	*		1,000		1,000
Containers Polypropylene (BPA Free)	*		50	150	7,500
Extra Reusable Lactation sets supplied to be used with Breast pumps	*		3,000	6	18,000
Stationary	*				2,500
Other cleaning equipment (Broom and stick with bucket and dust pan, Dust mop, water mop, window wiper, microfiber cloth, squeeze sponge, sponge mop, colour coded garbage can, bucket, brush)	*		7,000	-	7,000
Dress, rubber gloves, gum boots for hygiene helpers	*		2,000	3	6,000
Toilet cleaning requirements (separate rubber gloves, shoes, toilet brush)	*		3,000	-	3,000
Soap and other cleaning agents	*		1,000	12	12,000
Staff items (gloves, mask, cap, apron, lab coat etc.)	*		10,000	-	10,000
Electricity and water	*		Variable	-	Variable
Maintenance cost of equipment (part of AMC)	*		3,000	12	36,000
Curtains	*		1,000		1,000
Miscellaneous items (cup, saucer, glasses, baskets, mugs etc.)	*		2,000	-	2,000

Contingency @ 5%					5,300
Annual Recurring Cost					**1.11 Lakhs Approx.**
Human Resource					
Lactation Support Staff (Full time)			15,000	2	360,000
Hygiene Helper (Part time for 2 hrs for morning and afternoon shifts)			As per State norm	2	

national Guidelines on **Lactation Management Centres** in Public health Facilities

ANNEXURE

3

Registration and Consent Form for the Donor



(The form should be printed and filled in local language)

1. Registration Form

(Confidential)

1. Date: _____/_____/_____
2. Donor registration number: ..... (This should be linked to the hospital registration number)
3. Name of the donor: .....
4. Address:.....

   .....
5. Phone no.: .....
6. Age of the donor: .....
7. Age of her child: .....
8. Name of collection centre: .....
9. Name of referring doctor: .....
10. Check List for Taking Medical History of the Mother
    a. Any acute illness: Yes/No
    b. Past illness/chronic disorders: Yes/No
    c. Medications being taken (if any)
    d. Any organ transplant or blood transfusion in past 12 months: Yes/No
    e. High risk behaviour for HBV, HIV, HCV and venereal diseases: Yes/No
    f. Consumption of illegal drugs, tobacco products, alcohol or nicotine: Yes/No
11. Breast examination:
    a. Mastitis: Yes/No

Name of the donor	
Age	
Witnesses (please state two)	1) 2)
Signature	
Date and time	

b. Local skin lesions: Yes/No

c. Others: .....

12. Active herpes simplex or chicken pox infections: Yes/No

13. Received viral vaccine like rubella, measles, mumps vaccination in past one month: Yes/No

14. Received varicella vaccination in the past 3 months: Yes/No

15. Had Rubella or Chicken Pox infection in the household in the past one month: Yes/No

16. Child thriving well: Yes/No

17. Laboratory reports

a. HIV I and II: Positive/Negative

b. Hepatitis B: Positive/Negative

c. VDRL: Positive/Negative

Name and Sign of the Counsellor

Sign of the donor

2. Consent Form

I have been counselled about (a) breastfeeding, (b) advantages of breastfeeding for the baby and the mother (c) use of donor human milk by lactation management centres. I have also been informed that if I donate milk as per the guidelines, I will still have adequate milk to meet my baby's needs.

I have been informed of the following in the language known to and understood by me:

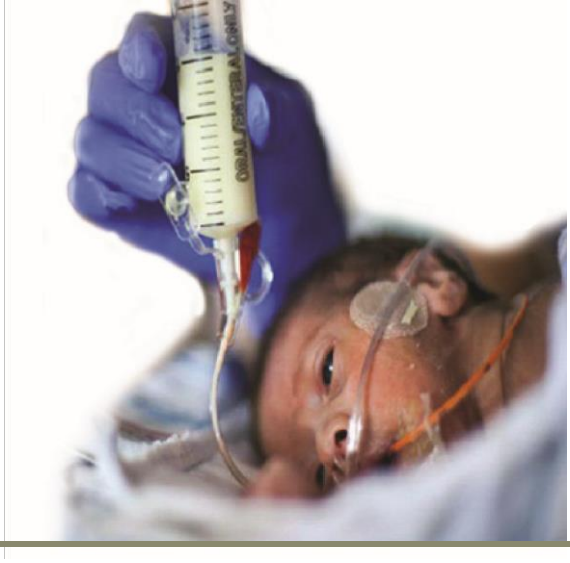
1. donated milk will be used for vulnerable babies irrespective of their religion and will not be used for commercial purposes.
2. for ensuring safety of the donated milk, I will have to provide medical history and undergo physical examination and screening for HIV 1 & 2, Hepatitis B and Syphilis
3. all information pertaining to my medical status and status of donation will be strictly confidential and will be shared on a 'need to know basis' only.
4. donation of milk is voluntary and I can withdraw my consent for further donation of milk at any time.
5. I will get no incentive whether in cash or kind, for donating milk
6. information on safe expression and storage of breast milk.

On the basis of the above information provided to me, I hereby give my consent for donating my breastmilk by signing this form without any coercion or undue influence and after satisfying my queries and doubts.

ANNEXURE

4

Consent Form for the Recipient



(This form should be printed and filled in local language)

I have been informed about (a) breastfeeding, (b) advantages of mother's milk for nutrition, growth and development of the baby as compared to other types of milk as well (c) donor human milk provided by the Comprehensive Lactation Management Centre (CLMC) for my baby for fulfilling the nutritional requirement.

I have been informed that adequate precautions are taken to make the milk disease free and quality is assured. However, still some diseases can be transmitted to the recipient. The CLMC follows strict guidelines to ensure that safest possible milk is provided. I have also been informed that the donors are healthy mothers who have been screened; the milk is pasteurised and checked for bacterial growth.

After understanding relevant details and clearing my doubts, I am willing to use this milk for my baby.

I have been explained all these in the language known to me and I am signing this form without any pressure or coercion.

1) Name of the facility:

Name of the recipient/hospital registration number	
Age and gender	
Name of relatives and relationship with them	
Witnesses (please state two)	1) 2)
Signature	
Date and time	

ANNEXURE

5

Monitoring and Evaluation Form



2) Name of the surveyor:

3) Date:

4) Score:

Guidelines	Met	Not Met	Comments
Organisation			
Written procedures and protocols that meet the minimum standards as in guidelines			
Administrative structure meets the guidelines			
Donor Selection			
Evidence that potential donors are screened verbally			
Evidence that potential donors have completed written health screening as per the guidelines			
Evidence that potential donors are instructed to report all infections			
There is a written record that documents that each donor has been screened for HIV 1 and 2, Hepatitis B, VDRL within 6 months before milk donation			
Serological testing is done by a certified laboratory and donors are excluded if any positive results on a diagnostic/confirmatory serological test are received			
In case where Hindi is not a primary language for the donor applicant and she indicates that a translator is required, the CLMC will make efforts to offer a translator to help with screening process			
Donor Education and Procedures			
Donors are given verbal/written instructions covering: 1. Technique for milk collection following Hygiene Protocols 2. Hand washing			

Guidelines	Met	Not Met	Comments
3. Bathing/washing the breast 4. Handling milk containers			
Evidence of donor consent			
Procedures			
A detailed procedure manual is available to the personnel for lactation management centre all the time			
Evidence of disaster plan covering emergencies affecting DHM quality. These plans should include how to protect milk in case of power outage, and notification plans for staff in case of inability to dispense milk			
Provision of automatic switch of equipment to generator/UPS/inverter facility in case of temporary power failure			
Building and Facilities			
The milk processing building and structure will of suitable size, construction and design to facilitate maintenance and sanitary operations for milk processing purposes			
Provide sufficient place for placement of equipment and storage of materials			
Are constructed in such a manner that the floors, walls and ceiling can be adequately cleaned			
No pest is allowed in any area of the lactation management centre. Effective measures are taken to exclude pests from the processing areas and to protect against contamination of milk by pests.			
Only designated staff have access to freezers used for lactation management centre			
Equipment			
Equipment manual is available to the lactation management centre personnel all the time			
Evidence of disaster plan covering emergencies affecting DHM quality. These plans should include how to protect milk in case of power outage, and notification plans for staff in case of inability to dispense milk			
Refrigerators are monitored by means of recording thermometers or are equipped with temperature sensitive alarms. The temperature should be maintained at 4°C with brief fluctuations secondary to opening doors			
Freezers are monitored by means of recording thermometers or are equipped with temperature sensitive alarms. The temperature should be maintained at –20°C with brief fluctuations secondary to opening doors (not above –18°C).			
There is evidence that storage and processing equipment calibrated every 6 months as per the manufacturer's directions.			
All equipment cleaned and maintained according to manufacturer's instructions.			
Milk Analysis and Handling			
Milk is gradually thawed in a manner that it prevents the milk from reaching room temperature.			

Guidelines	Met	Not Met	Comments
Pooling of the milk is conducted under clean conditions			
A sample is taken from each pool of milk for bacteriological screening using sterile technique			
Confirmation of negative serological test			
Aliquots of milk are pasteurised by heating to 62.5°C for 30 minutes and rapidly cooled to 4°C.			
Milk temperature and bath temperature are recorded and monitored.			
The containers are sealed by air tight lids			
Milk is promptly labelled and frozen for storage			
Pasteurised milk is stored in separate freezer or different pre-defined shelf of same freezer			
Milk Dispensing			
The lactation management centre has a written plan of how to dispense milk on priority basis to those in greatest need			
The milk is dispensed on a first-in, first-out basis			
Record Keeping			
A system of tracking DHM from donor to recipient should be maintained			
The labelling should be done as specified in the guidelines			

ANNEXURE

6

The Infant Milk Substitutes, Feeding Bottles and Infant Foods (Regulation of Production, Supply and Distribution) Act, 1992 and as Amended Act in 2003



This Act provides for the regulation of production, supply and distribution of infant milk substitutes, feeding bottles and infant foods with a view to the protection and promotion of breastfeeding and ensuring the proper use of infant foods and for matters connected to it. It extends to the whole of India. It also lays the responsibility of health workers and of the government to provide accurate information to people. Following are the basic provisions of the IMS Act.

THE IMS ACT PROVISIONS

IMS Act is violated if any baby Food Company, its distributor or supplier, or any person

1. Promotes any food by whatever name, for children up to two years.
2. Promotes use of infant foods before the age of six months.
3. Advertises by any means--television, newspapers, magazines, journals, through SMS, emails, radio, pamphlets etc.
4. Distributes the product or samples to any person
5. Contacts pregnant or lactating mothers using any person.
6. Gives any kind of inducements like free gifts, tied sales, to anyone.
7. Distributes information and educational material to mothers, families etc. (They can give educational material to health professionals like doctors, nurses etc. provided it has information prescribed in clause 7 of the IMS Amendment Act, 2003. The education material should have only factual information and should not promote the products of the company).
8. Gives tins, cartons, accompanied leaflets of these products having pictures of mothers or babies, cartoons or any other such images to increase salability.
9. Displays placards, posters in a hospital, nursing home, chemist shop etc. for promoting these products.
10. Provides direct or indirect inducements to health workers.
11. Demonstrates to mothers or their family members how to feed these products. However, a doctor can demonstrate this to the mother.
12. Gives benefits to doctors, nurses or associations like IAP, IMA, NNF etc., for example, funds for organizing seminars, meeting, conferences, contest, fee of educational course, sponsoring for projects, research work or tours.
13. Fixes commission of employees on the basis of volume of sales of these products.

HIGHLIGHTS OF THE ACT

- Prohibits all persons from any kind of promotion of infant milk substitutes, infant foods or feeding bottles.
- Prohibits the advertisement of infant milk substitutes and feeding bottles to ensure that no impression is given that feeding of these products is equivalent to, or better than, breastfeeding.
- Prohibits providing free samples and gifts to pregnant women, mothers of infants and members of the families.
- Prohibits donation of free or subsided supplies of products for health care institutions and prohibits incentives and gifts to health workers.
- Prohibits display of posters at health care facilities/hospitals/health centres.
- The Act also prescribes that all labels of IMS/Infant food, must say in English and local, languages that breastfeeding is the best. Also, the labels must not have pictures of infants or women or phrases designed to increase the sale of the product.
- Prohibits any contact of employers manufacturing and distributing company with pregnant women, even for providing educational material to them.

PENALITIES FOR CONTRAVENTION

Violations of the Act attract imprisonment for up to three years and/or fine up to Rs. 5000.

Penalty with regard to the Label on container or quality of infant milk substitute, feeding bottle and infant food is punishable with imprisonment up to 6 month extended to 3 years and fine at least Rs. 2000.

WHAT HEALTH SERVICE PROVIDERS CAN DO

- Seek correct and scientific information about breastfeeding, feeding bottles and infant foods.
- Understand the hazards of using infant milk substitutes.
- Create awareness on promotion and protection of breastfeeding.
- Report violations to the right authorities. Inform/publicize addresses and names of organizations where you can report violations.

A. Immunosuppressive drugs

Azathioprine	❑ Avoid breastfeeding cyclosporine
	❑ Avoid breastfeeding

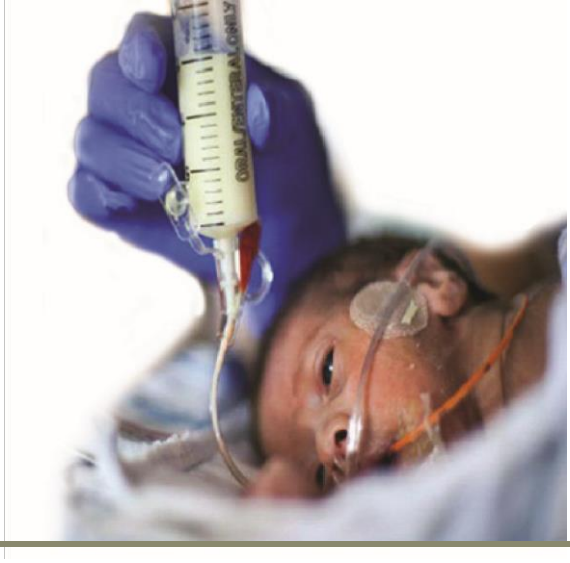
B. Cytotoxic drugs General information: Breastfeeding is contraindicated when a mother has to take a drug which belongs to this category:

Asparaginase	❑ Avoid breastfeeding
Bleomycin	❑ Avoid breastfeeding
Chlorambucil	❑ Avoid if possible
Chlormethine	❑ Avoid breastfeeding
Cisplatin	❑ Avoid breastfeeding

ANNEXURE

7

List of Contraindicated drugs for milk donation



Cyclophosphamide	❑ Avoid breastfeeding
Cytarabine	❑ Avoid breastfeeding
Dacarbazine	❑ Avoid breastfeeding
Dactinomycin	❑ Avoid breastfeeding
Daunorubicin	❑ Avoid breastfeeding
Doxorubicin	❑ Avoid breastfeeding
Etoposide	❑ Avoid breastfeeding
Fluorouracil	❑ Avoid breastfeeding
Levamisole	❑ Avoid breastfeeding
Mercaptopurine	❑ Avoid breastfeeding
Methotrexate	❑ Avoid breastfeeding
Procarbazine	❑ Avoid breastfeeding
Vinblastine	❑ Avoid breastfeeding
Vincristine	❑ Avoid breastfeeding

C. Hormones and Antihormones

Tamoxifen	❑ Avoid breastfeeding

D. Drugs used in palliative care: The Committee recommended that all drugs mentioned in the WHO publication *Cancer pain relief: with a guide to opioid availability*, second edition 1996 be considered essential. The drugs are included in the relevant sections of the model list, according to their therapeutic use, e.g. analgesics.

E. Anti-parkinsonism Drugs

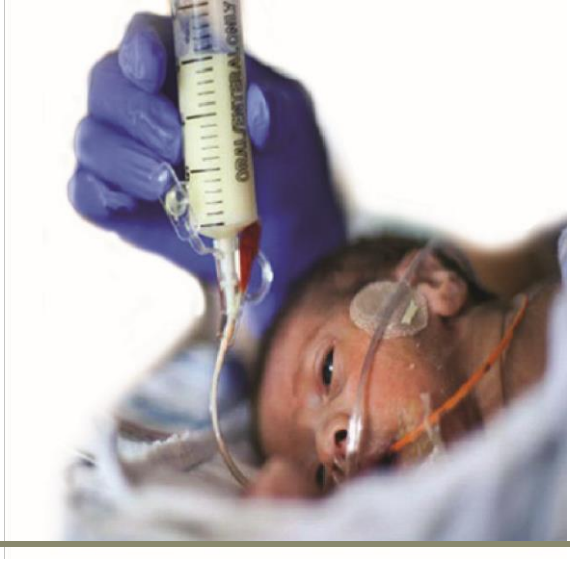
Levodopa + Carbidopa	❑ Avoid if possible. (**Levodopa** may inhibit lactation)

f. Amiodarone

G. Lithium

H. Radio Pharmaceuticals

I. Retinoids



ANNEXURE

8

References

J. Anti-cancer drugs

K. Androgens

L. Aspirin in large doses

M. Chloramphenicol

N. Estrogens

o. Ergotamine P.

Iodine

Q. Metformin

INTRoDUCTIoN

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Notes

Notes



Ministry of health & Family Welfare
Government of india
nirman Bhavan, new delhi

VALUE ADDED COURSE

Human Milk Banking Course and PECO 12

List of Students Enrolled (November 2019- December 2019)

Final Year MBBS Student			
Sl. No	**Name of the Student**	**Roll No**	**Signature**
1	AARTHI.A	U16MB251	Aarthi .A.
2	ABILASHA.K	U16MB252	Abilasha. K.
3	ABITHA RAJLIN J.S	U16MB253	Abitha Rajlin
4	ADAPALA PRIYANKA	U16MB254	Adapala priyanka
5	ADHITHAYA RAJ .N	U16MB255	Adhithya raj. N.
6	AJAY .N	U16MB256	Ajay N
7	AKSHYA .R	U16MB257	
8	ALLARI KARTHIK ABHIROOP	U16MB258	
9	AMAL ASHOK	U16MB259	Amal Ashok.
10	AMIRTHAVARSHNI .R	U16MB260	
11	ANANYA SHARMA	U16MB261	Ananyasharma
12	ANGALAKUDURU DEEPCHAND	U16MB262	Angalakuduru Deepchand.
13	ANJAN BANERJEE	U16MB263	
14	ANWESHA CHATTERJEE	U16MB264	
15	ARCHANA .A	U16MB265	Archana. A.
16	ARCHITHA.A	U16MB266	Architha. A.
17	ARIVUMATHI .R	U16MB267	Arivumathi .R
18	ARJUN.S	U16MB268	Arjun. S.
19	ASHVANTH KUMAR .A	U16MB269	Ashvanth Kumar. A
20	ASMITHA S.V	U16MB270	

Dr Karuppaiah Pandi

RESOURCE PERSON

ASSISTANT PROFESSOR
DEPARTMENT OF PAEDIATRICS
SRI LAKSHMI NARAYANA INSTITUTE OF
MEDICAL SCIENCES

Dr Sivaprakasam

CO-ORDINATOR

PAEDIATRICS HEAD
DEPT. OF PAEDIATRICS
SRI LAKSHMI NARAYANA INSTITUTE OF
MEDICAL SCIENCES
OSUDU, PUDUCHERRY

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Aastha. A
V16MB257

HUMAN MILK BANKING COURSE

QUESTIONS

Course Code: PECO 12

1. What is PDHM?

   Pasteurised Donor Human Milk

2. Who started the first milk bank in India and where?

   Dr. Armeda Fernandez in SION hospital, Mumbai

3. Who are the primary beneficiaries of PDHM?

   High risk newborns admitted in the NICU.

4. What is the minimum required area for a milk bank?

   300 square feet.

5. What is the method of heat treatment of donor milk to eliminate potential pathogens?

   Pretoria Holder pasteurization method.

6. Recommended temperature and duration in the above method?

   62.5 deg celsius for 30 mins

7. What is the temperature in a deep freezer to store milk in a milk bank?

   -30 deg celcius

8. Which method is used to sterilize articles needed in the milk bank?

   Hot air oven/ Autoclave

9. Say true or false: Pooled milk from various donors can be used in a milk bank.

   False

10. What is CLMC?

    Comprehensive Lactation Management Centre.

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that _____ABITHA RAJLIN J.S___U16MB253_____ has actively participated in the Value Added Course on *Human Milk Banking Course* held during December 2019- Jan 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. Karuppaiah Pandi
RESOURCE PERSON

Dr. Sivaprakasam
COORDINATOR

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that _____AJAY N___U16MB256_____ has actively participated in the Value Added Course on *Human Milk Banking Course* held during December 2019- Jan 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. Karuppaiah Pandi

RESOURCE PERSON

Dr. Sivaprakasam

COORDINATOR

Student Feedback Form

Course Name: Human Milk Banking Course
Subject Code: PECO12

Name of Student: Aarthi. A Roll No.: U16MB001

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear				✓	
2	Course contents met with your expectations				✓	
3	Lecturer sequence was well planned					✓
4	Lectures were clear and easy to understand				✓	✓
5	Teaching aids were effective				✓	
6	Instructors encourage interaction and were helpful					✓
7	The level of the course					✓
8	Overall rating of the course	1	2	3	4	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

nil.

Date: 18.11.2019.

Signature

Date: 03.01.2020

From

Dr. Sivaprakasam. V
Professor and Head,
Department of Pediatrics,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To

The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: Human Milk banking

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: Human Milk Banking from December 2019 to January 2020 for 20 final year MBBS students. We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards,

Dr. Sivaprakasam

PAEDIATRICS HEAD
DEPT. OF PAEDIATRICS
SRI LAKSHMI NARAYANA INSTITUTE OF
MEDICAL SCIENCES
OSUDU, PUDUCHERRY

Encl: Photographs



PECO 12 –Human Milk Banking Course, December 2019

Sri Lakshmi Narayana Institute of Medical Sciences

Date: 03.05.2019

From
Dr. M Kalasree
Head Of Department Incharge
Department of Anaesthesia
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research
Puducherry

To
The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Puducherry

Sub: Request for Permission to conduct value-added course: Pre- Operative Anesthetic Assessment

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: Pre- Operative Anesthetic Assessment for undergraduates from Jan- June 2020. We solicit your kind permission for the same.

Kind Regards

Dr.M KALASREE

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: Dr JAYALAKSHMI

The HOD: Dr. M KALASREE

The Expert: Dr Chandrasekar

The committee has discussed about the course and is approved.

Dean Subject Expert HOD

DEPARTMENT OF ANAESTHESIOLOGY
SRI LAKSHMI NARAYANA INSTITUTE
OF MEDICAL SCIENCES
OSUDU, KUDAPAKKAM, PUDUCHERRY-605 502

Dr. G. JAYALAKSHMI, BSC.,MBBS.,DTCD.,MD.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Ageram Kudapakkam, Post,
Villanur Commune Puducherry-605 502.

Head of Dept. Anaesthesiology
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry - 605 502

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affliated to Bharath University, Chennai - TN]

Circular

07.06.2019

Sub: Organizing Value-added Courses: Pre- Operative Anesthetic Assessment - reg

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research**, is organizing **"_Pre- Operative Anesthetic Assessment"** course in Jan- June 2020. The course content is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before 15/06/2019. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

Dr. G. JAYALAKSHMI, BSC.,MBBS.,DTCD.,M
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Ageram Kudapa
Villanur Commune Pud

Encl: Copy of Course content

COURSE PROPOSAL

Course Title: **PRE- OPERATIVE ANESTHETIC ASSESSMENT**

Course Objective

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1. To enable the students to learn history taking and physical examination of patients coming for operative procedures. It will also teach them to identify individuals who are at a higher risk for the procedure, so that they can evaluate the patient further with appropriate investigations and referral.

2. To understand the various risk factors that can be predictors for adverse outcome after anaesthesia and to optimize them in the best possible way

Course Outcome:

On successful completion of the course the students will be able to classify patients according to the ASA risk stratification for various surgical procedures

Course Audience: IV MBBS

Course Coordinator: Dr M KALASREE

Course Faculties with Qualification and Designation:

1. Dr. Kalasree-Associate Professor
2. Dr Chandrasekar- Assistant Professor

Course Curriculum/Topics with schedule (Min of 30 hours)

S.No	Date	Topics	Time	Hours	Faculty
1	04.01.2020	Pac	2-4PM	1	Dr Chandrasekar
2	11.01.2020	Introduction	2-4PM	1	Dr. Kalasree
3	18.01.2020	Objectives	2-4PM	1	Dr Chandrasekar
4	25.01.2020	Step[s of pre operative visit	2-4PM	1	Dr. Kalasree
5	01.02.2020	History taking	2-4PM	1	Dr Chandrasekar
6	08.02.2020	Examination	2-4PM	1	Dr. Kalasree
7	15.02.2020	LEMON scoring	2-4PM	1	Dr Chandrasekar
8	22.02.2020	Airway assessment	2-4PM	1	Dr. Kalasree
9	29.02.2020	Group discussion	2-4PM	1	Dr Chandrasekar
10	01.03.2020	Risk assessment	9-11AM	1	Dr. Kalasree
11	07.03.2020	Mallampati scoring	2-4PM	1	Dr Chandrasekar
12	08.03.2020	Fasting guidelines	9-11AM	1	Dr. Kalasree
13	14.03.2020	Medical management and optimization	2-4PM	1	Dr Chandrasekar
14	15.03.2020	Informed consent	9-11AM	1	Dr. Kalasree
15	21.03.2020	Final assessment	2-4PM	1	Dr Chandrasekar

References:

1.Clinical Anestehesiology, Morgan & Mikail's, 5th Edition, Page No 295-307

2. Clinical Anesthesia, Paul G. Barash, Seventh Edition, Page № 583- 609

3.Http://Www.Medscape.Com/Viewarticle/819 629_2

4. Miller's Anesthesia 8th Edition

VALUE ADDED COURSE

1. Name of the program & Code

: PRE- OPERATIVE ANESTHETIC ASSESSMENT, ANAES 12

2. Duration & Period

30 hrs: Jan 2020- March 2020

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled:

Enclosed as Annexure- II

5. Assessment procedures:

Multiple choice questions- *Enclosed as Annexure- III*

6. Certificate of Participation:

Enclosed as Annexure- IV

7. No. of times offered during the same year:

1 Time JAN 2020-MARCH 2020

8. Year of discontinuation: 2020

9. Summary report of each program year-wise

Value Added Course Jan 2020- March 2020					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	ANAES 12	PRE-OPERATIVE ANESTHETIC ASSESSMENT	DR. M KALASREE	IV MBBS	20

10. Course Feed Back

Enclosed as Annexure- V

RESOURCE PERSON

DEPARTMENT OF ANAESTHESIOLOGY SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES OSUDU, KUDAPAKKAM, PUDUCHERRY-605 502

DR.CHANDRASEKAR

COORDINATOR

Sri Lakshmi Narayana Institute of Medical Sciences Osudu, Kudapakkam, Puducherry - 605 502

DR. M KALASREE

Annexure I

PREOPERATIVE ASSESSMENT

INTRODUCTION

The pre-operative assessment is an opportunity to identify co-morbidities that may lead to patient complicationsduring the anaesthetic, surgical, or post-operative period. Patients scheduled for elective procedures will generally attend a pre-operative assessment one week before the date of their surgery.

Preoperative assessment forms an integral precursor to the surgical process. It provides the opportunity to assess acute illness, optimize chronic disease where appropriate, assess risk and structure perioperative management.

During the assessment process, consideration should be made of surgical complexity, the severity of specific co-morbidities and an individual's functional capacity.

The process of assessment requires the adoption of basic clinical skills, targeted investigations and also the use of functional assessment tools, including cardiopulmonary exercise testing.

Surgical procedures and administration of anesthesia are associated with a complex stress response that is proportional to the magnitude of injury, total operating time, amount of intraoperative blood loss and degree of postoperative pain. The adverse metabolic and hemodynamic effects of this stress response can present many problems in the perioperative period.

Decreasing the stress response to surgery and trauma is the key factor in improving outcome and lowering the length of hospital stay as well as the total costs of patients care.

It is well recognized that safe and efficient surgical and anesthesia practice requires an optimized patient.Several of the large-scale epidemiological studies have indicated that inadequate preoperative preparation of the patient may be a major contributory factor to the primary causes of perioperative mortality

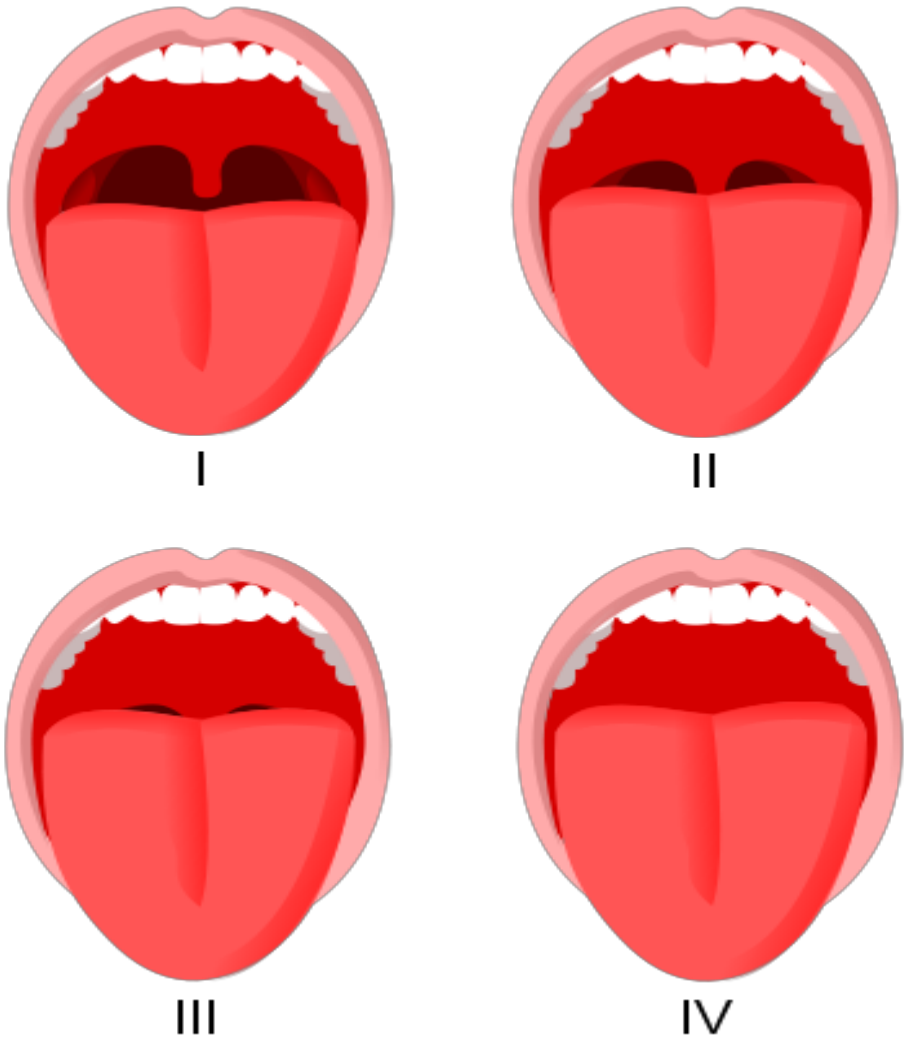
THE AIRWAY EXAMINATION

The airway examination will typically be covered during the anaesthetist's assessment of the patient but is always good practice to assess during the preoperative assessment. Look at the face for any obvious facial abnormalities. Particularly, do they have a receding mandible (retrognathia). This could cause difficulties during airway insertion.

Ask the patient to open their mouth and assess:

- Their degree of mouth opening (favourable if inter-incisor distance is above 3cm).
- Their teeth, mainly do they have teeth? If so, what is their dentition like? Are any teeth loose?
- Their oropharynx. Ask the patient to maximally protrude their tongue. A Mallampati classification which correlates with difficulty of intubation, can be assessed.

Lastly, assess the neck. Ask the patient to flex, extend and laterally flex the neck to see their range of movement. Then ask the patient to maximally extend their neck and measure the distance between the thyroid cartilage and chin (the thyromental distance); if this is less than 6.5cm (~3 finger breadths), it indicates that intubation may be difficult.



Fasting guidelines

Pre-operative assessment

A thorough preoperative evaluation is necessary in order to identify the patients who are at increased risk of aspiration. The preoperative evaluation should include patient history and clinical examination which in turn should include the patient's age, sex, American Society of Anesthesiologists (ASA) status, any difficult airway, gastro-oesophageal reflux disease, diabetes or any other factors which may increase the risk of pulmonary aspiration. It is imperative that the patients are educated on the need and importance of preoperative fasting.

Clear fluids

The fasting period especially for clear fluids have literally come down over the past 50 years. Randomised trials comparing the gastric volume and pH in two groups who were given clear fluids either till 2 to 4 hours or more than 4 hours prior to surgery showed lower gastric pH in the second group whereas equivocal findings regarding gastric volume.[1] This was further corroborated by a study done by Maltby *et al*., which showed that clear fluids can safely be taken till 2 hours prior to surgery.[4] Also another study by Song *et al.* where ultrasonic assessment of gastric volume in children were done, showed that clear fluids up to 10 to 15ml/kg when given 2 hours prior to induction resulted in a decrease in antral volume rather than increasing it.[5]

The guidelines published by the European and American organisations encourage drinking clear fluids till 2 hours prior to an elective surgery.[1],[6] The updated

guidelines by European Society of Paediatric Anaesthesiologists (ESPA) encourage drinking clear fluids till 1 hour prior to surgery. ESPA updated guidelines regarding clear fluids has also been endorsed by Society for Paediatric Anaesthesia of Australia and New Zealand. Clear fluids include fruit juice without pulp, water, and coffee or tea without milk; but do not include alcohol. Milk is not included under clear fluids because it coagulates in the acidic environment of stomach and delays gastric emptying. Though some studies define a small amount of milk added to tea or coffee as clear fluids, there is insufficient data to suggest the volume of milk that can be safely added.

Until recently, most guidelines would suggest a fasting period of 2 hours for clear fluids.[7] Nonetheless recent studies have shown that the risk of pulmonary aspiration is less in children and this has led to many centres now moving on to a 1 hour fasting time for clear fluids in children.[8] The APRICOT study– 'The Anesthesia Practice in Children Observational Trial', which is a pan European multicentric study reported that there has not been a single documented admission to intensive care or incidence of prolonged intubation following aspiration in children.[2],[9] A study by Andersson H *et al.* reported that liberalising the fasting period in children for clear fluids did not alter the incidence of pulmonary aspiration.[10] APAGBI, the French Language Society of Paediatric Anaesthesiologists and the ESPA also recommends clear fluid intake upto 1 hour prior to elective surgery unless specific contraindications exists. It is now an official guideline of ESPA that clear fluids can be allowed till 1 hour prior to surgery.[11] A recent study of 16000 children from the United States also showed the safety of 1 hour NPO for clear fluids.[12]

Hence, it can be summarised that while the traditional 2 hours fasting regime for

clear fluids may still be practiced for adults, it can be reduced upto 1 hour for children prior to an elective surgery unless specific contraindications exist. The decrease in fasting time results in reduced anxiety, irritability, hunger and thirst in the perioperative period which in turn contributes to the comfort and well-being of children.

Breast milk

Studies have suggested that breast milk empties faster than formula feeds but required more than 2 hours and upto 3 hours to ensure complete emptying. So the current guidelines recommend a fasting period of 4 hours for breast milk before an elective procedure requiring any form of anaesthesia.[2],[6]

Infant formula feeds

There is inadequate data to evaluate the safe period of fasting for formula feeds. This is due to the fact that gastric emptying for formula feed varies with the content of the formula. Also, rather large variations have been noticed in the composition of formula food between different regions/countries. For this reason, ASA has set a fasting period of 6 hours for infant formula before any elective procedures requiring anaesthesia.[1]

Solids and non-human milk

Robert *et al.* on their study on rhesus monkey suggested that clinically significant aspiration occurs when the gastric volume is more than 25ml (0.4ml/kg) and the pH is 2.5 or less.[13] Van de Putte *et al.* on their study on the gastric volume using

bed side ultrasound however suggested a higher critical volume of 1.5 ml/kg for clinically significant aspiration.[14] A randomised control trial by Miller *et al.* showed no significant difference between patients who fasted overnight and patients who had light breakfast 2 to 4 hours prior to surgery in terms of gastric volume and pH.[15] Further non randomised studies by Thomas *et al*. showed that incidence of hypoglycaemia was more in the group that fasted for 8 hours or more as compared to the group that had milk 4 hours prior to surgery.[16] Also non-randomised trials by Power *et al.* reported enhanced comfort in patients with fasting period of 2 hours for fluids and 6 hours for solids with no increase in the risk of pulmonary aspiration.[17]

It is recommended that non-human milk or a light meal can be taken till 6 hours prior to elective surgery requiring any form of anaesthesia whereas a heavy meal or meal with fried and fatty items require a longer fasting period of 8 hours or more as the gastric emptying may be delayed in such cases. Not only the type of food, but also the amount is important in determining the fasting period.[1]

Carbohydrate loading

Recognition of the physiology of stress response to surgery and anaesthesia led to the adoption of various measures to decrease it.[18] It has been recognised that prolonged preoperative fasting leads to increased stress response to surgery. Major surgeries result in a lot of metabolic responses which includes insulin resistance and hyperglycaemia. Preoperative carbohydrate loading enhances recovery by modifying insulin resistance, minimising protein losses and thus improving postoperative muscle function. It has also been reported that preoperative loading of carbohydrate does not increase the incidence of pulmonary aspiration; however,

its role in diabetics has not been well established.[19] Carbohydrate loading has also been found to be an important independent predictor for improved post-operative outcome and in the reduction of post-operative wound dehiscence.[20] Fluids with 50 grams of carbohydrate can be safely given till 2–3 hours prior to surgery.[21] However, all carbohydrates may not be equally safe, with evidence being based primarily on products with predominantly maltodextrins.[6]

Chewing gum

The 2011 European fasting guidelines do not put any restriction on chewing gum. A randomised controlled trial by Dubin *et al.* suggested that surgery need not be cancelled if the patient arrives chewing sugarless gum prior to induction. It has also been established that no significant relationship exists between chewing sugarless gum, gastric volume and pH.[22] A randomised controlled trial in children aged between 5 and 17 years reported that children who chewed gum with or without sugar prior to anaesthesia had higher gastric volume and pH.[23] A meta-analysis of four studies on the effects of chewing gum in the perioperative period reported a slight increase in gastric volume without a change in gastric pH. This increase in gastric volume was found to be insufficient for causing pulmonary aspiration. Therefore, it has been suggested that surgery need not be cancelled in healthy individuals who chew gum in the preoperative period.[24] There is also evidence suggesting that gum chewing can enhance gastric mobility and emptying. However, chewing gum should not be allowed after administration of sedatives and any residual chewing gum should be removed from the mouth prior to induction.[25] As the significance of increase in gastric volume by gum chewing is unclear, some studies have suggested restricting it in the immediate preoperative period.[3] In view of the conflicting reports regarding gum chewing in the

preoperative period, further studies may be required to determine the exact relationship between gum chewing and pulmonary aspiration.

Special situations

While assessing the fasting status of a trauma victim it must be remembered that the gastric volume is not related to the hours of fasting but to the nature of trauma and the time interval between last food intake and trauma.[26] Thus all trauma victims are considered to be full stomach.[6] Severe pain and administration of opioids can cause a delay in gastric emptying.[27],[28] Various systemic diseases can also cause delay in gastric emptying, the commonest example being diabetes mellitus.[29] It has been found that there is no significant change in gastric acid secretion in pregnancy.[6],[30] While early labour does not significantly affect gastric emptying, advanced labour can result in delay of the same.[31] Conditions causing gastro esophageal reflux as in hiatus hernia and bowel obstruction can increase the risk of pulmonary aspiration during anaesthesia. Patients with difficult airway are also at high risk for aspiration. So the anaesthetic management has to be modified in such situations.

Current Concepts

Role of education

Education to all medical staff regarding the importance of correct duration of fasting will help in the practical application of the existing guidelines. Newton *et*

al. documented that introduction of standard protocols and education of nurses and doctors can reduce unnecessary preoperative fasting duration by three times.[32]

Role of ultrasound in fasting

There is growing evidence for role of ultrasound in qualitative and quantitative assessment of gastric content which in turn will guide us more into starvation guidelines.[33]

Post-operative feeding

It has been reported that early oral feeding is safe and well tolerated even after elective colorectal surgery, which questions the traditional belief of fasting till bowel function returns.[34] The European society for clinical nutrition and metabolism (ESPEN) guidelines recommend that oral intake can be initiated within hours of surgery in most of the patients.[35] Delaying oral intake following surgery gives no added advantage. Few studies challenged the concept of early feeding as they documented increased incidence of nausea and vomiting after early but forced feeding.[36] But none of the recent studies support this issue. Early oral intake in the postoperative period does not affect wound healing and can result in decreased hospital stay following surgery.[35],[37],[38],[39] There has been various observational studies, meta-analysis and multicentric trials that support early oral intake after surgery.[38] Based on the various studies it can be concluded that early but on demand oral feeding can be started in the post-operative period even before the return of bowel function in otherwise healthy individuals. While fluids can be started almost immediately, the introduction of solids should be done more cautiously.

Summery

Types of Feeds	Hours of Fasting -Existing Guidelines	Explanation
Clear Fluid	1	Rare instances of aspiration (0.07-0.1%) and if aspiration occurs, it is not severe and long lasting.
Max vol=3 ml/kg		Mostly, fasting durations are prolonged.
water, clear (non-opaque) fruit juice or squash/ cordial, ready diluted drinks, and nonfizzy sports drinks. Non-thickened, non-carbonated		Clear fluid calms the child down especially in hot weather
Carbohydrate rich drink	2	Improves insulin sensitivity.
		Better metabolic profile.
		Early Discharge after surgery.
Breast Milk	4	High whey to casein ratio content of breast makes it follow water like emptying.
		Due to high lipid content than water needs more time
Milk	6	Cow's milk+Gastric acidic juices converts into solid and liquid (curd)
		Emptying follows biphasic with rapid initial liquid phase followed by zero order solid phase
Solids		Follows zero order kinetics.
Non Fatty Meal	6	
Fatty Meal	8	
Postoperative resumption of fluids	As early as possible, on demand	

PREOPERATIVE ASSESSMENT

INFORMED CONSENT

Legally, two or more persons are said to consent when they agree upon the same thing in the same sense. Consent must be obtained prior to conducting any medical procedure on a patient.

It may be expressed or implied by patient's demeanour. A patient who comes to a doctor for treatment implies that he is agreeable to general physical (not intimate) examination.Express consent (verbal/written) is specifically stated by the patient.

Express verbal consent may be obtained for relatively minor examinations or procedures, in the presence of a witness. Express written consent must be obtained for all major diagnostic, anaesthesia and surgical procedures as it is the most undisputable form of consent.

ESSENTIAL PRINCIPLES OF A VALID CONSENT AND THE INDIAN LAW

A doctor must take the consent of the patient before commencing a treatment/procedure

Except in emergencies, informed consent should be obtained sometime prior to the procedure so that the patient does not feel pressurised or rushed to sign. On the day of surgery, the patient may be under extreme mental stress or under influence of pre-medicant drugs which may hamper his decision-making ability. Consent remains valid for an indefinite period, provided there is no change in patient condition or proposed intervention. [4] It should be confirmed at the time of surgery.

Consent must be taken from the patient himself

The doctor before performing any procedure must obtain patient's consent. [5] No one can consent on behalf of a competent adult. In Dr.RamcharanThiagarajanFacs versus Medical Council of India case, [6] disciplinary action was awarded to the surgeon for not taking a proper informed consent for the entire procedure of kidney and pancreas transplant surgery from the patient. In some situations, beside patient consent, it is desirable to take additional consent of spouse. In sterilisation procedures, according to the Ministry of Health and Family Welfare, Government of India guidelines, consent of spouse is not required. [7] The Medical Council of India (clause 7.16) however states that in case an operation carries the risk of sterility, the consent of both husband and wife is needed. [8] It is advisable to take consent of spouse when the treatment or procedure may adversely affect or limit sex functions, or result in death of an unborn child. [9] In case of minor, consent of person with parental responsibility should be taken. [10] In an emergency, the person in charge of the child at that time can consent in absence of parents or guardians (loco parentis). [11] In a medical emergency, life-saving treatment can be given even in absence of consent.

Refusing treatment in life-threatening situations due to non-availability of consent may hold the doctor guilty, unless there is a documented refusal to treatment by the patient. In Dr. TT Thomas versus Smt.Elisa and Ors case, [12] the doctor was held guilty of negligence for not operating on a patient with life-threatening emergency condition, as there was no documented refusal to treatment.

The patient should have the capacity and competence to consent

A person is competent to contract [13] if (i) he has attained the age of majority, [14] (ii) is of sound mind [15] and (iii) is not disqualified from contracting by any law to which he is subject. The legal age for giving a valid consent in India is 18 years. [14] A child >12 years can give a valid consent for physical/medical examination (Indian Penal Code, section 89). [3] Prior to performing any procedure on a child <18 years, it is advisable to take consent of a person with parental responsibility so that its validity is not questioned. If patient is incompetent, then consent can be taken from a surrogate/proxy decision maker who is the next of kin (spouse/adult child/parent/sibling/lawful guardian). [11]

Consent should be free and voluntary

Consent is said to be free [16] when it is not caused by coercion, [17] undue influence, [18] fraud, [19] misrepresentation, [20] or mistake. [21],[22],[23]

Consent should be informed

Consent should be on the basis of adequate information concerning the nature of the treatment procedure. [5] Consent should be informed and based on intelligent understanding. The doctor must disclose information regarding patient condition, prognosis, treatment benefits, adverse effects, available alternatives, risk of refusing treatment and the approximate treatment cost. He should encourage questions and answer all queries. [2]

If the possibility of a risk, including the risk of death, due to performance of a procedure or its refusal is remote or only theoretical, it need not be

explained. [5] Exceptions to physician's duty to disclose include [24] : (i) Patient refusal to be informed; this should be documented. (ii) If the doctor feels that providing information to a patient who is anxious or disturbed would not be processed rationally by him and is likely to psychologically harm him, the information may be withheld from him (therapeutic privilege); he should then communicate with patient's close relative, family doctor or both.

The "adequate information" must be furnished by the doctor (or a member of his team) who treats the patient. [5]

Information imparted should enable the patient to make a balanced judgment as to whether he should submit himself to the particular treatment or not. [5]

Consent should be procedure specific

Consent given only for a diagnostic procedure, cannot be considered as consent for the therapeutic treatment. [5] Consent given for a specific treatment procedure will not be valid for conducting some other procedure. [5] In Samira Kohli versus Dr.PrabhaManchanda and Anr case, [5] the doctor was held negligent for performing an additional procedure on the patient without taking her prior consent. An additional procedure may be performed without consent only if it is necessary to save the life or preserve the health of the patient and it would be unreasonable to delay, until patient regains consciousness and takes a decision. [5]

A common consent for diagnostic and operative procedures may be taken where they are contemplated. [5]

Consent obtained during the course of surgery is not acceptable

In Dr.Janaki S Kumar and Anr versus Mrs.Sarafunnisa case, [25] in an allegation of performing sterilisation without consent, it was contended that consent was obtained during the course of surgery. The commission held that the patient under anaesthesia could neither understand the risk involved nor could she give a valid consent.

Consent for blood transfusion

When blood transfusion is anticipated, a specific written consent should be taken, [24] exception being an emergency situation where blood transfusion is needed to save life and consent cannot be attempted. [26] In M. Chinnaiyan versus Sri. Gokulam Hospital and Anr case, [27] court awarded compensation as patient was transfused blood in the absence of specific consent for blood transfusion.

Consent for examining or observing a patient for educational purpose

Prior to examining or observing patients for educational purpose, their consent must be taken. [28]

Blanket consent is not valid

Consent should be procedure specific. An all-encompassing consent to the effect 'I authorize so and so to carry out any test/procedure/surgery in the course of my treatment' is not valid. [29]

Fresh consent should be taken for a repeat procedure

A fresh written informed consent must be obtained prior to every surgical procedure that includes re-exploration procedure. In Dr.Shailesh Shah versus AphraimJayanandRathod case, [30] the surgeon was found deficient in service and was liable for compensation as he had performed a re-exploration surgery without a written consent from the patient.

Surgical consent is not sufficient to cover anaesthesia care

The surgeons are incapable to discuss the risks associated with anaesthesia. Informed consent for anaesthesia must be taken by the anaesthesia provider as only he can impart anaesthesia related necessary information and explain the risks involved. It may be documented by the anaesthesiologist on the surgical consent form by a handwritten note, or on a separate anaesthesia consent form. [31]

Patient has the right to refuse treatment

Competent patients have the legal and moral right to refuse treatment, even in life-threatening emergency situations. [31] In such cases informed refusal must be obtained and documented, over the patient's witnessed signature. [32] It may be advisable that two doctors document the reason for non-performance of life-saving surgery or treatment as express refusal by the patient or the authorised representative and inform the hospital administrator about the same.

To detain an adult patient against his will in a hospital is unlawful. [9] If a patient demands discharge from hospital against medical advice, this should be recorded,

and his signature obtained. [9]

Unilaterally executed consents are void

Consent signed only by the patient and not by the doctor is not valid. [33]

Witnessed consents are legally more dependable

The role of a witness is even more important in instances when the patient is illiterate, and one needs to take his/her thumb impression. [34]

Consent should be properly documented

Video-recording of the informed consent process may also be done but with a prior consent for the same. This should be documented. It is commonly done for organ transplant procedures. If consent form is not signed by the patient or is amended without his signed authorisation, it can be claimed that the procedure was not consented to. [10]

Patient is free to withdraw his consent anytime

When consent is withdrawn during the performance of a procedure, the procedure should be stopped. The doctor may address to patient's concerns and may continue the treatment only if the patient agrees. If stopping a procedure at that point puts patient's life in danger, the doctor may continue with the procedure till such a risk no longer exists. [10]

Consent for illegal procedures is invalid

There can be no valid consent for operations or procedures which are illegal. [24] Consent for an illegal act such as criminal abortion is invalid. [9]

Consent is no defence in cases of professional negligence. [9]

How to Obtain a Valid Consent and Consent Format

Always maintain good communication with your patient and provide adequate information to enable him make a rational decision. [35] It is preferable to take consent in patient's vernacular language. It may be better to make him write down his consent in the presence of a witness. [34] It is desirable to use short and simple sentences and non-medical terminology that is written/typed legibly. [36] Patient information sheets (PIS) depicting procedure related information, including pre-operative and post-operative pre-cautions in patient's understandable local language with pictorial representation may facilitate the informed consent process. These may help in providing consistently accurate information to the patients. [35] PIS should be handed over to the patients after explaining the contents. Even videos may be used as an aid in increasing patient understanding.

Patient's name……..…Age/Gender……

Medical record number……..……Address……

Proposed surgical procedure……

I hereby give my free and voluntary consent in a fully alert state of mind to the administration of general and/ or regional anaesthesia with or without sedation/local anaesthesia with or without sedation/sedation only, for the performance of ……procedure on me/my patient. I agree to be supplemented or administered any other mode of anaesthesia during the course of the procedure/surgery, if necessary.

I have been explained in a language that I understand the procedure involved in the administration of various types of anaesthesia, together with the expected benefits and the associated risks including the risks that are specific to me. I have had an opportunity, to discuss and clarify any concerns and ask questions regarding the anaesthesia procedure and alternative methods and the same have been satisfactorily answered.

I have been given patient information sheets/information material on CD regarding the proposed anaesthetic technique which I have fully understood.

I have been explained the risks associated with undergoing/not undergoing blood transfusion and am willing/ not willing to undergo transfusion if required during the perioperative period (if applicable).

I have been explained the additional/high risk of anaesthesia due to emergency nature/ inadequate fasting period/difficult airway/co-existing or co-morbid conditions such as …….... (if applicable).

I have been explained the risk of dental trauma and subsequent morbidity (if applicable).

I have been explained the need of post-operative ventilation and Intensive Care Unit following my/my patient's surgery (if applicable).

Patient's signature/Proxy decision maker's name and signature……

Relationship to patient in case of proxy decision maker……

Place……Date……Time……..

I have explained verbally to the patient in detail about the anaesthesia technique and procedure, related risks, advantages and disadvantages. I have given the patient opportunity to ask any questions and have satisfactorily answered them.

Anaesthesiologist name and Signature……

Place, Date and Time……

Witness Name and Signature……Address……

Place, Date and Time……

Summery

It is not only ethical to impart correct and necessary information to a patient prior to conducting any medical procedure, but it is also important legally.

This communication should be documented. Even professional indemnity insurance may not cover for lapses in obtaining a valid consent, considering it to be an intentional assault.

PREOPERATIVE ASSESSMENT

LEMON SCORING

The LEMON score is a mnemonic for predicting difficult intubation.

It stands for Look, Evaluate the 3-3-2 rule, Mallampati score, Obstruction, and Neck mobility (NEJM JW Emerg Med Mar 2005 and Emerg Med J 2005; 22:99).

Using a prospective registry of emergency department intubations in Japan, researchers assessed the sensitivity and specificity of the modified LEMON criteria for predicting difficult intubation (defined as requiring >1 attempt).

The modified LEMON criteria do not include assessment of the Mallampati score or measurement of thyroid-to-mouth distance (part of the 3-3-2 rule).

LEMON Airway assessment method

L	Look externally (Facial trauma, large incisors, beard or moustache, large tongue
E	Evaluate the 3-3-2 rule - Incisor distance: 3 FB - Hyoid-mental distance: 3 FB - Thyroid-to-mouth distance: 2 FB
M	Mallampati Score $\geq$ 3
O	Obstruction : Presence of any condition like epiglotitis, Peritonsillar abscess, trauma
N	Neck Mobility (Limited neck mobility)

Drug history

A history of medication use should be obtained in all patients. Especially, the geriatric population consumes more systemic medications than any other group. Numerous drug interactions and complications arise in this population and special attention should be paid to them

Generally, administration of most drugs should be continued up to and including the morning of operation, although some adjustment in dosage may be required (e.g. antihypertensives, insulin).

Some drugs should be discontinued preoperatively. The monoamine oxidase inhibitors should be withdrawn 2-3 weeks before surgery because of the risk of interactions with drugs used during anesthesia. The oral contraceptive pill should be discontinued at least 6 weeks before elective surgery because of the increased risk of venous thrombosis.

Recently, the American Society of Anesthesiologists (ASA) examined the use of herbal supplements and the potentially harmful drug interactions that may occur with continued use of these products preoperatively[11–13]. All patients are requested to discontinue their herbal supplements at least 2 weeks prior to surgery.

The use of medications that potentiate bleeding needs to be evaluated closely, with a risk-benefit analysis for each drug and with a recommended time frame for discontinuation based on drug clearance and half-life characteristics. Aspirin should be discontinued 7-10 days before surgery to avoid excessive bleeding and thienopyridines (such as clopidogrel) for 2 weeks before surgery. Selective cyclooxygenase-2 (COX-2) inhibitors do not potentiate bleeding and may be continued until surgery. Oral anticoagulants should be stopped 4-5 days prior to invasive procedures, allowing INR to reach a level of 1.5 prior to surgery.

Perioperative risk assessment

Perioperative risk is a function of the preoperative medical condition of the patient, the invasiveness of the surgical procedure and the type of anesthetic administered.

The ASA grading system was introduced originally as a simple description of the physical state of a patient (Table 2). Despite its apparent simplicity, it remains one of the few prospective descriptions of the patient general health which correlates

with the risk of anesthesia and surgery[15–16]. It is extremely useful and should applied to all patients who present for surgery. Increasing physical status is associated with increasing mortality. Emergency surgery increases risk dramatically, especially in patients in ASA class 4 and 5.

Table 2.

American Society of Anesthesiologists' Classification of Physical Status

Status	*Disease State*
ASA class 1	No organic, physiologic, biochemical, or psychiatric disturbance
ASA class 2	Mild to moderate systemic disturbance that may or may not be related to the reason for surgery *Examples*: Heart disease that only slightly limits physical activity, essential hypertension, diabetes mellitus, anemia, extremes of age, morbid obesity, chronic bronchitis
ASA class 3	Severe systemic disturbance that may or may not be related to the reason for surgery, *(does limit activity)* *Examples*: Heart disease that limits activity, poorly controlled essential hypertension, diabetes mellitus with vascular complications, chronic pulmonary disease that limits activity, angina pectoris, history of prior myocardial infarction
ASA class 4	Severe systemic disturbance that is life-threatening with or without surgery *Examples*: Congestive heart failure, persistent angina pectoris, advanced pulmonary, renal, or hepatic dysfunction
ASA class 5	Moribund patient who has little chance of survival but is submitted to surgery as a last resort (resuscitative effort) *Examples*: Uncontrolled hemorrhage as from a ruptured abdominal aneurysm, cerebral trauma, pulmonary embolus.
ASA class 6	A declared brain-dead patient whose organs are being removed for donor purposes
E	An "E" is added to the status number to designate an emergency operation

Surgical complications occur frequently. One large study[17] documented at least one complication in 17% of surgical patients. Surgery-related morbidity and mortality generally fall into one of three categories: cardiac, respiratory and infectious complications[17]. The overall risk for surgery-related complications depends on individual factors and the type of surgical procedure. For example, advanced age places a patient at increased risk for surgical morbidity and mortality. The reason for an age-related increase in surgical complications appears to correlate with an increased likelihood of underlying disease states in older persons[18]. Diseases associated with an increased risk for surgical complications include respiratory and cardiac disease, malnutrition and diabetes mellitus[7]. With respect to the type of surgery, major vascular, intraabdominal and intrathroracic surgical procedures, as

well as intracranial neurosurgical procedures are frequently associated with increased perioperative morbidity and mortality[19, 20]. In addition, urgent and emergency procedures constitute higher risk situations than elective, nonurgent surgery and present a limited opportunity for preoperative evaluation and treatment.

When one looks at strictly anesthetic problems that lead to morbidity and mortality, airway problems and failure to provide adequate ventilation leading to hypoxia become important. Fortunately the number of critical incidents involving anaesthetics alone appear to be decreasing in recent years[15].

Assessing cardiovascular risk

The American College of Cardiology (ACC) and the American Heart Association (AHA) published a task force report on Guidelines for Perioperative Cardiovascular Evaluation for Noncardiac Surgery[19]. The purpose is to provide a framework for considering cardiac risk of noncardiac surgery in a variety of patients and operative situations.

The factors which guide decision making include the patient's cardiovascular risk and functional capacity and the surgery specific risk (Table 3-Table 5).

Table 3.

Patient-Related Predictors for Risk of Perioperative Cardiac Complications

Major clinical predictors (markers of unstable coronary artery disease)
Myocardial infarction <6 weeks
Unstable or severe angina (class III-IV)
Decompensated congestive heart failure
Significant arrhythmias (e.g., causing hemodynamic instability)
Severe valvular disease (e.g., aortic or mitral stenosis with valve area <1.0 cm^2)
CABG or PTCA <6 weeks
Intermediate clinical predictors (markers of stable coronary artery disease)
Previous myocardial infarction >6 weeks and <3 months (>3 months if complicated) based on the history or the presence of pathologic Q waves
Mild angina (class I-II)
Silent ischemia (Holter monitoring)
Compensated congestive heart failure, ejection fraction <0.35
Post CABG or PTCA >6 weeks and <3 months, or >6 yr, or with anti-anginal therapy
Diabetes mellitus
Renal insufficiency
Minor clinical predictors (increased probability of coronary artery disease)
Familial history of coronary artery disease
Age >70 yr
ECG abnormalities (arrhythmia, LVH, left bundle branch block)
Low functional capacity
History of stroke
Uncontrolled systemic hypertension
Hypercholesterolemia
Smoking
Post infarction (>3 months), asymptomatic without treatment
Post CABG or PTCA >3 months and <6 yr, and no symptoms of angina nor anti-anginal therapy
CABG= coronary artery bypass grafting, PTCA= percutaneous transluminal coronary angioplasty, LVH=left ventricular hypertrophy

Table 5.

Surgery-Related Predictors for Risk of Perioperative Cardiac Complications

High risk procedures (cardiac complication rate >5%)
Emergency surgery
Aortic and major vascular surgery
Prolonged surgical procedures with large fluid shifts or blood loss
Unstable hemodynamic situations
Intermediate risk procedures (cardiac complication rate 1-5%)
Abdominal or thoracic surgery
Neurosurgery
ENT procedures
Minor vascular surgery, including carotid endarterectomy
Orthopedic surgery
Prostatectomy
Low risk procedures (cardiac complication rate <1%)
Breast surgery
Superficial surgery
Eye surgery
Endoscopic procedures
Plastic and reconstructive surgery
Ambulatory surgery

Patients' risk factors are usually subdivided into three categories: major, intermediate and minor (Table 3). A 6-week period is necessary for the myocardium to heal after an infarction and for the thrombosis to resolve. Patients with coronary revascularization done within the preceding 40 days should also be classified as high-risk patients. Because of sympathetic stimulation and hypercoagulability during and after surgery, *patients with major predictors have a five times greater perioperative risk.* Only vital or emergency surgical procedures should therefore be considered for these patients. All elective operations should be postponed and the patients properly investigated and treated.

Intermediate-risk factors are proof of well established but controlled coronary artery disease. Diabetes mellitus is included in this category because it is frequently associated with silent ischemia and represents an independent risk factor for perioperative mortality.

Minor risk factors are markers of an increased probability of coronary artery disease, but not of an increased perioperative risk (Table 3).

Exercise tolerance is a major determinant of perioperative risk. It is usually evaluated by the estimated energy requirement for various activities and graded in metabolic equivalents (MET) on a scale defined by the Duke Activity Status Index (Table 4). One MET represents the oxygen consumption of a resting adult (3.5 ml/kg/min).

Table 4.

Examples of Functional Capacity

1-4 METs	Standard light home activities Walk around the house Walk 1-2 blocks on level ground at 3-5 km/h
5-9 METs	Climb a flight of stairs, walk up a hill Walk on level ground at >6 km/h Run a short distance Moderate activities (golf, dancing, mountain walk)
≥10 METs	Strenuous sports (swimming, tennis, bicycle) Heavy professional work
METs=metabolic equivalents of oxygen consumption	

Surgical procedures can be stratified into three categories, according to their level of perioperative physiological stress (Table 5).

Previous MI

Till recently it was accepted generally that a MI within 6 months of proposed surgery is a contraindication to elective anesthesia and surgery. It appears now that the risk after a previous infarction is related less to the age of the infarction than to

the functional status of the ventricles and to the amount of myocardium at risk from further ischemia. A small infarction without residual angina in the context of a good functional status allows essential non-cardiac surgery as soon as 6 weeks after the ischemic episode. On the contrary, a patient with a large infarct, residual symptoms and ejection fraction <0.35 has a high probability of a further cardiac event, even 6 months after the infarction. Usual practice guidelines consider the period within 6 weeks of infarction as a time of high risk for a perioperative cardiac event, because it is the mean healing time of the infarct-related lesion. The period from 6 weeks to 3 months is of intermediate risk; this period is extended beyond 3 months in cases with complications such as arrhythmias, ventricular dysfunction or continued medical therapy. In uncomplicated cases, no benefit can be demonstrated for delaying surgery more than 3 months after an ischemic accident[19].

Recent data have shown that any event in the coronary circulation, (ischemia, infarction, or revascularization), induces a high-risk period of 6 weeks and an intermediate-risk period of 3 months. A 3-month minimum delay is therefore indicated before performing non-cardiac surgery after myocardial infarction or revascularization. However, this delay may be too long if an urgent surgical procedure is requested, as for instance with rapidly spreading tumors, impending aneurysm rupture, infections requiring drainage, or bone fractures. In these situations, recent studies, have demonstrated a marked benefit of operating under the protection of β_1-adrenergic antagonism, which reduces the cardiac complication rate in such patients. When possible, beta-blockers should be started days or weeks before elective surgery, with a target heart rate between 50 and 60 beats per minute[20].

What are defined as perioperative cardiac complications?

Myocardial infarction, pulmonary edema, ventricular fibrillation, primary cardiac arrest, or complete heart block are defined as major perioperative cardiac complications. Perioperative MI: usually presents atypically (without chest pain), occurs within the first 2 days of surgery and carries a high mortality. The rate of postoperative myocardial infarction is 0.7% after general surgery in a male population over 50 yr old, but increases to 3.1% after vascular surgery where the prevalence of asymptomatic coronary artery disease is particularly high[17, 21]. Should a MI occur, the mortality rate remains at 40% to 70% [21]. The ACC/AHA Guidelines for Perioperative Cardiovascular Evaluation for Noncardiac Surgery offer recommendations for a patient suffering a perioperative MI. These include consideration for prompt angioplasty, aspirin, beta-blockade and possible angiotensin converting enzyme inhibitor therapy[19].

Management recommendations

Given an acute surgical emergency, preoperative evaluation might have to be limited to simple and critical tests such as a rapid assessment of cardiovascular vital signs, volume status, hematocrit, electrolytes, renal function, urine analysis and ECG. Only the most essential tests and interventions are appropriate until the acute surgical emergency is resolved. A more thorough evaluation can be conducted after surgery.

The decision to proceed with elective surgery begins with an assessment of risk. The clinician should assess the patient's preoperative risk factors and the risks associated with the planned surgery. It is often helpful to give an estimate of the percentage risk of cardiac complications (see above, by risk class) so that the surgeon can make the most educated decision regarding whether or not to proceed with surgery.

The decision to undergo further testing depends upon the interaction of the patient's risk factors, surgery-specific risk and functional capacity.

If a major risk predictor is present, nonemergency surgery should be delayed for medical management, risk factor modification and possible coronary angiography. For patients at intermediate clinical risk, both the exercise tolerance and the extent of the surgery are taken into account with regard to the need for further testing.

Patients with poor functional status should undergo noninvasive cardiac testing unless low-risk surgery is planned. Patients with good or excellent functional status require noninvasive testing only if they are having high-risk surgery. Finally, patients with minor risk predictors or no risk predictors should have noninvasive testing if they have poor functional status and are about to undergo high-risk surgery. *Importantly, no preoperative cardiovascular testing should be performed if the results will not change perioperative management.*

The results of noninvasive testing can then be used to determine further perioperative management. Such management may include intensified medical therapy or cardiac catheterization, which may lead to coronary revascularization or potentially to cancellation or delay of the elective noncardiac operation. Alternatively, results of the noninvasive test may lead to a recommendation to proceed directly with surgery. In some patients, the risk of coronary angioplasty or corrective cardiac surgery may approach or even exceed the risk of the proposed noncardiac surgery. In some instances, this approach may be appropriate, however, if it also significantly improves the patient's long-term prognosis.

Go to:

Assessing pulmonary risk

A careful history taking and physical examination are the most important parts of preoperative pulmonary risk assessment. The role for preoperative pulmonary function testing remains uncertain. No data suggest that spirometry identifies a high-risk group that would not otherwise be predicted by the history and physical examination. Spirometry may be useful when there is uncertainty about the presence of lung impairment. It should be used selectively when the information it provides will change management or improve risk stratification.

Postoperative pulmonary complications (PPCs) such as pneumonia, atelectasis, bronchitis, bronchospasm, hypoxemia, respiratory failure with prolonged mechanical ventilation or exacerbation of underlying chronic lung disease, increase patient morbidity and mortality and prolong the length of hospital stay after surgery[23]. PPCs occur in approximately 20-30% of patients undergoing major, non thoracic surgery.

The risk factors for PPCs include the following[24]:

- *Procedure-related risk factors:* primarily based on how close the surgery is to the diaphragm (i.e. upper abdominal and thoracic surgery are the highest risk procedures).
- *Length of surgery* (> 3 hours) and general anesthesia (vs. epidural or spinal).
- Emergency surgery.
- Underlying chronic pulmonary disease or symptoms of respiratory infection.
- Smoking.
- Age >60 years.
- Obesity.

- Presence of obstructive sleep apnea.
- Poor exercise tolerance or poor general health status.

The most significant of these risk factors is the *site of surgery,* with abdominal and thoracic surgery having pulmonary complication rates ranging from 10 to 40 percent[25]. As a rule, the closer the surgery is to the diaphragm, the higher the risk of pulmonary complications. The most important modifiable risk factor is *smoking*. The relative risk of pulmonary complications among smokers as compared with nonsmokers ranges from 1.4 to 4.3. Unfortunately, the risk declines only after eight weeks of preoperative cessation[26]. This interval allow the mucociliary transport mechanism to recover, the secretions to decrease and the carbon monoxide levels in the blood to drop.

The presence of either *obstructive or restrictive pulmonary disease* places the patient at increased risk of developing perioperative respiratory complications. If significant pulmonary disease is suspected by history or physical examination, determination of functional capacity, response to bronchodilators and/or evaluation for the presence of carbon dioxide retention through arterial blood gas analysis may be justified.

For elective anesthesia and surgery in a patient with a history of *asthma*, the asthmatic condition should be under control and the patient should be free of wheezing, with a peak flow greater than 80% of predicted. If necessary, the patient should receive a short course of steroids (60 mg of prednisone daily or the equivalent) prior to surgery to achieve this goal[27–28]. If the patient takes drugs regularly, treatment must not be discontinued. Any patient who has previously been admitted to hospital for an asthmatic attack should be carefully assessed, because airway reactivity persists for several weeks after an asthmatic episode.

The increased frequency of PPCs in patients with chronic obstructive pulmonary disease (COPD) may be explained by co-morbidities (e.g. cardiovascular disease) rather than by airway obstruction. Patients with COPD may have chronically fatigued respiratory muscles. Impaired nutrition, electrolyte and endocrine disorders can contribute to respiratory muscle weakness and should be corrected before surgery. Patients with COPD should be examined for unrecognized corpulmonale; if present, it should be treated before surgery[29–30].

Generally, all patients with COPD / asthma who require home oxygen therapy or have required hospitalization for respiratory problems in the past 6 months are assumed to be at greater risk.

Patients with obstructive sleep apnea (OSA) are prone to postoperative hypoxemia quickly after emergence from general anesthesia. The sedative and respiratory depressant effects of general anesthesia place the patient with OSA at significantly increased risk of airway obstruction and respiratory compromise in the perioperative period. It is prudent to diagnose OSA preoperatively so special treatments applied appropriately[31].

Go to:

Diabetes mellitus

Perioperative morbidity and mortality are greater in diabetic than in non-diabetic patients. When a diabetic patient needs surgery, *it is important to remember that he or she is more likely to be harmed by neglect of the long term complications of diabetes than from the short term control of blood glucose levels.* The majority of long-standing diabetics develop compromise in one or more organs. The diabetic patient who needs elective surgery should be carefully assessed preoperatively for

symptoms and signs of peripheral vascular, cerebrovascular and coronary disease. Co-existing pathologies must be identified and carefully managed perioperatively.

Diabetics have a higher incidence of death after MI than non-diabetics. Myocardial ischemia or infarction may be clinically "silent" if the diabetic has autonomic neuropathy. Therefore, a high index of suspicion for myocardial ischemia or infarction should be maintained throughout the perioperative period if unexplained hypotension, dysrhythmias, hypoxemia or ECG changes develop. Eight to 31% of type 2 diabetics are reported to have asymptomatic coronary artery disease on stress testing. Administration of perioperative beta-blockers should be considered in diabetic patients with coronary artery disease to limit perioperative ischemia. Despite prior controversy regarding the use of beta blockade in diabetics (due to concerns of worsened glucose intolerance and masking symptoms of hypoglycemia), it is emphasized that diabetics benefit as much or more than the non-diabetic population from post-MI beta blockade[32–33].

Adequate control of blood glucose concentration (< 180 mg/dL) must be established preoperatively and maintained until oral feeding is resumed after operation. Oral hypoglycemic agents are withheld the day of surgery for an agent with a short half-life and up to 48 h preoperatively for a long acting agent such as chlorpropamide. A combination of glucose and insulin is the most satisfactory method of overcoming the deleterious metabolic consequences of starvation and surgical stress in the diabetic patient. Generally, there is no need for insulin infusion in diabetics who are diet-controlled regardless of type of surgery, or in diabetics who are on oral agents only and are undergoing minor surgeries.

Complications of perioperative hyperglycemia include dehydration, impaired wound healing, inhibition of white blood cell chemotaxis and function (associated with an increased risk of infection), worsened CNS and spinal cord injury under

ischemic or hypoxic conditions and hyperosmolarity leading to hyperviscosity and thrombogenesis. A glucose level > 180 mg/dL (10 mmol/ L) results in osmotic diuresis; glycosuria may lead to dehydration and increases the risk of urinary tract infection. As a general rule in a 70 kg patient, 1 unit/h of regular insulin lowers the glucose by approximately 2530 mg/dL (1.5 mmol/L).

Hypoglycemia [a glucose < 50 mg/dL (2.8 mmol/L) in adults and < 40 mg/dL (2.2 mmol/L) in children] may develop postoperatively due to residual effects of long-acting oral hypoglycemic agents or insulin preparations given preoperatively, in addition to perioperative fasting. Recognition of hypoglycemia in the perioperative period may be delayed because anesthetics, analgesics, sedatives and sympatholytics agents alter the usual presenting symptoms of hypoglycemia. In addition, diabetics with autonomic neuropathy have blunting of the adrenergic symptoms associated with hypoglycemia. These symptoms generally begin with confusion, irritability, fatigue, headache and somnolence and may progress to seizures, focal neurologic deficits, coma and death[32]

PREOPERATIVE ASSESSMENT

OBJECTIVES

The following primary goals of preoperative evaluation and preparation have been identified

1. Documentation of the condition(s) for which surgery is needed.
2. Assessment of the patient's overall health status.
3. Uncovering of hidden conditions that could cause problems both during and after surgery.
4. Perioperative risk determination.

5. Optimization of the patient's medical condition in order to reduce the patient's surgical and anesthetic perioperative morbidity or mortality.
6. Development of an appropriate perioperative care plan.
7. Education of the patient about surgery, anesthesia, intraoperative care and postoperative pain treatments in the hope of reducing anxiety and facilitating recovery.
8. Reduction of costs, shortening of hospital stay, reduction of cancellations and increase of patient satisfaction.

PREOPERATIVE ASSESMENT

STEPS OF PRE OPERATIVE VISIT

Pre-Operative History

The history is the most important component of the preoperative evaluation. The history should include a past and current medical history, a surgical history, a family history, a social history (use of tobacco, alcohol and illegal drugs), a history of allergies,current and recent drug therapy, unusual reactions or responses to drugs and any problems or complications associated with previous anesthetics. A family history of adverse reactions associated with anesthesia should also be obtained. In children, the history should also include birth history, focusing on risk factors such as prematurity at birth, perinatal complications and congenital chromosomal or anatomic malformations and history of recent infections, particularly upper and lower respiratory tract infections.

The history should include a complete review of systems to look for undiagnosed disease or inadequately controlled chronic disease. Diseases of the cardiovascular and respiratory systems are the most relevant in respect of fitness for anesthesia and surgery

The pre-operative history follows the same structure as typical history taking, with the addition of some anaesthetic and surgery specific topics.

History of the Presenting Complaint

A brief history of why the patient first attended and what procedure they have subsequently been scheduled for. One should also confirm the side on which the procedure will be performed (if applicable)

Past Medical History

A full past medical history (PMH) is required, with the following specifically asked about:

- Cardiovascular disease (including hypertension and exercise tolerance)
  - The risk of an acute cardiac event is increased during anaesthesia
- Respiratory disease, as adequate oxygenation and ventilation is essential in reducing the risk of acute ischaemic events in the peri-operative period
- Renal disease, as many features of renal disease (such as anaemia, coagulopathy, biochemical disturbances) can increase the incidence of surgical complications
- Endocrine disease, specifically diabetes mellitus and thyroid disease
  - Many medications often require specific changes to be made in the peri-operative period

Other specific questions it may be useful to ask themselves the following questions:

- Female of reproductive age – could they be pregnant
- African or Afro-Caribbean descent – could they have undiagnosed sickle cell disease

Past Surgical History

Has the patient had any previous operations? If so, what, when, and why?

Past Anaesthetic History

Has the patient had anaesthesia before? If so, were there any issues? Were they well intra- and post-operatively? Specifically, has the patient experienced to any previous post-operative nausea and vomiting?

Drug History

A full drug history is required, as some medications require stopping or altering prior to surgery. Ask about any known drug allergies.

Family History

An important condition to ask about is malignant hyperpyrexia* (also known as malignant hyperthermia), yet any other adverse reactions in surgery of immediate family members should also be documented.

**An autosomal dominant condition that characteristically leads initially to muscle rigidity (despite neuromuscular blockade) followed by a rise in temperature (requires senior input and support if present)*

Social History

Ensure to ask the patient about smoking history and alcohol intake and their exercise tolerance.

Pre-Operative Examination

The physical examination should build on the information gathered during the history. At a minimum, a focused preanesthesia physical examination includes an assessment of the airway,

lungs and heart, with documentation of vital signs[6]. Unexpected abnormal findings on the physical examination should be investigated before elective surgery.

In the pre-operative examination, two distinct examinations are performed; the general examination (to identify any underlying undiagnosed pathology present) and the airway examination (to predict the difficulty of intubation). If appropriate, the area relevant to the operation can also be examined.

Perform a full general examination, looking closely for any obvious cardiovascular, respiratory, or abdominal signs. An anaesthetic examination, including an airway assessment, will also be performed by the anaesthetist prior to any surgery (see Appendix).

American Society of Anaesthesiologists Grade

On all anaesthetic charts, a patient will be given an American Society of Anaesthesiologists (ASA) grade after their pre-operative assessment, which has been subjectively assessed and based on the criteria below. A patient's ASA grade directly correlates with their risk of post-operative complications and absolute mortality.

ASA Grade	Definition	Absolute Mortality (%)
I	Normal healthy patient	0.1
II	Mild systemic disease	0.2
III	Severe systemic disease	1.8
IV	Severe systemic illness that is a constant threat to life	7.8

ASA Grade	Definition	Absolute Mortality (%)
V	Moribund, who is not expected to survive without the operation	9.4
E	Suffix added if an emergency operation	–

Pre-Operative Investigations

It is generally accepted that the clinical history and physical examination represent the best method of screening for the presence of disease. Routine laboratory tests in patients who are apparently healthy on clinical examination and history are not beneficial or cost effective. A clinician should consider the risk-benefit ratio of any ordered lab test. When studying a healthy population, 5% of patients will have results which fall outside the normal range. Lab tests should be ordered based on information obtained from the history and physical exam, the age of the patient and the complexity of the surgical procedure[6–9] (Table 1).

Table 1.

Indications for specific preoperative tests

Complete blood count Major surgery Chronic cardiovascular, pulmonary, renal, or hepatic disease; or malignancy Known or suspected anemia, bleeding diathesis, or myelosuppression Less than one year of age
International Normalized Ratio (INR), Activated Partial Thromboplastin Time (aPTT) Anticoagulant therapy Bleeding diathesis Liver disease
Electrolytes & creatinine Hypertension Renal disease Diabetes Pituitary or adrenal disease Digoxin or diuretic therapy, or other drug therapies affecting electrolytes
Fasting glucose Diabetes (should be repeated on day of surgery)
Electrocardiograph Heart disease, hypertension, diabetes Other risk factors for cardiac disease (may include age) Subarachnoid or intracranial hemorrhage, cerebrovascular accident, head trauma
Chest radiograph Cardiac or pulmonary disease Malignancy

The nature of the exact investigations required depends on a number of factors, including co-morbidities, age, and the nature of the procedure.

Each specific hospital is likely to provide local guidelines, however it is useful to understand the tests than could be done pre-operatively and have an appreciation as to why each may be requested. NICE produce a colour traffic light table which can further guide your investigative decisions.

Blood Tests

- Full Blood Count (FBC)
  - Most patients will get a full blood count, predominantly used to assess for any anaemia or thrombocytopenia, as this may require correction pre-operatively to reduce the risk of cardiovascular events
- Urea & Electrolytes (U&Es)
  - To assess the baseline renal function, which help inform any potential IV fluid management intra- and post-operatively
- Liver Function Tests (LFTs)
  - Important in the assessing liver metabolism and synthesising function, useful for peri-operative management; if there is suspicion of liver impairment, LFTs may help direct medication choice and dosing

- Clotting Screen
  - Any indication of deranged coagulation, such as iatrogenic causes (e.g. warfarin), inherited coagulopathies (e.g haemophilia A/B), or liver impairment, will need identifying and correcting before surgery
- Group and Save (G&S) +/- cross-matching

Group and Save (G&S) and Cross-Match (X-match) are two tests often cause a great deal of confusion:

- A G&S determines the patient's blood group (ABO and RhD) and screens the blood for any atypical antibodies; the process takes around 40 minutes and no blood is issued
  - A G&S is recommended if blood loss is not anticipated, but blood may be required should there be greater blood loss than expected

- A cross-match involves physically mixing the patient's blood with the donor's blood, in order to see if any immune reaction takes places; if it does not, the donor blood is issued and can be transfused in to the patient, otherwise alternative blood is trialled
  - This process also takes ~40 minutes (in addition to the 40 minutes required to G&S the blood, which must be done first), and should be done if blood loss is anticipated

Imaging

Electrocardiogram (ECG)

An ECG is often performed in individuals with a history of cardiovascular disease or for those undergoing major surgery. It can indicate any underlying cardiac pathology and provide a baseline if there are post-operative signs of cardiac ischaemia.

N.B An echocardiogram (ECHO) may be considered if the person has (1) a heart murmur (2) cardiac symptom(s) (3) signs or symptoms of heart failure.

Chest X-rayA plain film chest radiograph (CXR) should be used only when necessary and should not be performed routinely (Fig. 1). Local guidelines should be available to aid decision-making and indications may include:

- Respiratory illness who have not had a CXR within 12 months
- New cardiorespiratory symptoms
- Recent travel from areas with endemic tuberculosis
- Significant smoking history

If a patient has a chronic lung condition, spirometry may be of use in assessing current baseline and predicting post-operative pulmonary complications in these patients.

Other Tests

Pregnancy Testing

Consider pregnancy testing in all women of reproductive age, always ensuring to get the patient's consent

Sickle Cell Test

Do not routinely offer testing for sickle cell disease or sickle cell trait before surgery. If the person has any member of their family with sickle cell disease, or is Africa or Afro-Caribbean descent however, strongly consider performing a sickle cell test.

Urinalysis

A urinalysis may be performed if any evidence or suspicion of ongoing glycosuria or urinary tract infection, yet should not be done routinely pre-operatively.

MRSA Swabs

All patients will have swabs taken from the nostril ± perineum ± other sites for MRSA colonisation. If this is isolated, antiseptic hair and body wash, along with topical ointment applied to the nostrils, will be given; in some hospitals, this is given for all elective patients pre-operatively, even if this means the operation is delayed.

VALUE ADDED COURSE

PRE-OP ANAESTHETIC ASSESSMENT

Annexure II

STUDENT ENROLLMENT LIST (JAN-MARCH 2020)

S.No.	University no	Name of the student	Year / CRRI	Signature
1.	U15MB351	SAKTHIYANATHAN .S	IV th	Sakthiyanathan.
2.	U15MB352	SANDIYA. T	IV th	Sandiya.
3.	U15MB353	SARANKUMAR. B	IV th	Saran kumar.
4.	U15MB354	SARANYA R.E	IV th	Saranya.
5.	U15MB355	SARANYA. E	IV th	Saranya.
6.	U15MB356	SARATH KUMAR. A	IV th	Sarath Kumar
7.	U15MB357	SATHESH. B	IV th	Sathesh kumar
8.	U15MB358	SATHIYA NARAYANA .S	IV th	Sathiya Narayana.
9.	U15MB359	SEDHUPATHY. S	IV th	Sedhupathy.
10.	U15MB360	SELVASRINIVASAN. B	IV th	Selvasrinivasan.
11.	U15MB361	SENTHILKUMARAN. A	IV th	Sharad Zad I
12.	U15MB362	SHAHARA ZAD .S	IV th	Sakthi
13.	U15MB363	SHAKTHI. K	IV th	Shakthi. K.
14.	U15MB364	SHALINI. A	IV th	Shalini
15.	U15MB365	SHANMUGA PRIYANGA. A	IV th	Shanmuga Priyanga.
16.	U15MB366	SHARUMATHI.E	IV th	Sharumathi
17.	U15MB367	SHIYAM. M	IV th	Shiyam
18.	U15MB368	SHRIRAAM .K	IV th	Shriraam.
19.	U15MB369	SIVA SAKTHI VELAN .A.V	IV th	Siva Sakthi velan.
20.	U15MB365	SHANMUGA PRIYANGA. A	IV th	Shanmuga Priyanga.

RESOURCE PERSON

DEPARTMENT OF ANAESTHESIOLOGY
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
OSUDU, KUDAPAKKAM, PUDUCHERRY-605 502

DR. CHANDRASEKAR

COORDINATOR

DR. M KALASREE

Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry - 605 502

Annexure III

MCQ: Pre-op Assessment

1. Most important parameter for the anaesthetics to asses

    a. Genitourinary system
    b. GI system
    c. Airway
    d. Skeletal system

2. M in LEMON assessment stands for
    a. Maniquine
    b. Modification
    c. Malampatti
    d. All the above

3. METS stands for
    a. Metabolic equilants
    b. Mass effect
    c. Metastatic equilants
    d. None of the above

4. Endoscopic procedures come under what type of cardiac risk
    a. Mild
    b. Moderate
    c. Severe
    d. Very severe

5. All the following test are done to assess the pregnant women except.
    a. Hb
    b. RFT
    c. ECG
    d. X-RAY chest

6. In ASA physical status a normal healthy patient is classified under.

    a. ASA-1
    b. ASA-2
    c. ASA-3
    d. ASA-4

7. Injection glycopyrulate is

    a. Opioid
    b. Muscle relaxants
    c. Antisialagogue
    d. Anti- hypertension

8. The clear liquid can be given before how many hours

    a. 5hrs
    b. 3hrs
    c. 2hrs
    d. 6hrs

9. Thyromental distance

    a. 5.2cm
    b. 3cm
    c. 6.5cm
    d. 1cm

10. Willson's test is done for

    a. Tongue protrusion
    b. Neck movements
    c. Upper lip bite
    d. Eye movements

Sathesh.B

Annexure III

7/10

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c. Upper lip bite
d. Eye movements

Shalini. A

Annexure III

6/10

MCQ: Pre-op Assessment

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   d. Skeletal system

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d. 1cm

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b. Neck movements
c. Upper lip bite
d. Eye movements

Annexure V

Student Feedback Form

Course Name: **PRE OPERATIVE ANAESTHETIC EVALUATION**
Subject Code: **ANAES 12**

Name of Student: _____ Roll No.: _____

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear					
2	Course contents met with your expectations					
3	Lecturer sequence was well planned					
4	Lectures were clear and easy to understand					
5	Teaching aids were effective					
6	Instructors encourage interaction and were helpful					
7	The level of the course					
8	Overall rating of the course	1	2	3	4	5

*** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory**

Suggestions if any:

Annexure V

Student Feedback Form

Course Name: **PRE OPERATIVE ANAESTHETIC EVALUATION**
Subject Code: **ANAES 12**

Name of Student: A. SHANMUGA PRIYANGA Roll No.: 115MB365

We are constantly looking to improve our classes and deliver the best training to you.

Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear				✓	
2	Course contents met with your expectations					✓
3	Lecturer sequence was well planned				✓	
4	Lectures were clear and easy to understand					✓
5	Teaching aids were effective				✓	
6	Instructors encourage interaction and were helpful					✓
7	The level of the course					✓
8	Overall rating of the course	1	2	3	4	5

*** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory**

Suggestions if any:

Excellent.

Annexure V

Student Feedback Form

Course Name: **PRE OPERATIVE ANAESTHETIC EVALUATION**
Subject Code: **ANAES 12**

Name of Student: Sharaza3ed. S Roll No.:
U1SMB362

We are constantly looking to improve our classes and deliver the best training to you.

Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear			✓		
2	Course contents met with your expectations				✓	
3	Lecturer sequence was well planned			✓		
4	Lectures were clear and easy to understand				✓	
5	Teaching aids were effective					✓
6	Instructors encourage interaction and were helpful			✓		
7	The level of the course				✓	
8	Overall rating of the course	1	2	3	4	5

*** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory**

Suggestions if any:

Good

Date: 02.04.2020

From
Dr. M Kalasree
Head Of Department Incharge
Department of Anaesthesia
Sri Lakshmi Narayana Institute of Medical Sciences
Puducherry

To
The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Puducherry

Sub: Completion of value-added course: Pre Operative Anaesthetic Evaluation

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: Pre Operative Anaesthetic Evaluation in Jan – March 2020 for 20 students. We solicit your kind action to send certificates for all the participants, whose name list is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards,

Dr. M Kalasree

Sri Lakshmi Narayana Institute of Medical Sciences
Oulgu, Kodapakkam, Puducherry - 605 502

Encl: Certificates

Photographs

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that ____SHAKTHI K____ has actively participated in the Value Added Course on Pre operative Anaesthetic Evaluation held during January - June 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. CHANDRASEKAR
RESOURCE PERSON

DEPARTMENT OF ANAESTHESIOLOGY
SRI LAKSHMI NARAYANA INSTITUTE
OF MEDICAL SCIENCES
OSUDU, KUDAPAKKAM, PUDUCHERRY-605 502

Dr. KALASREE M
COORDINATOR

Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry - 605 502

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that __SANDIYA T_____ has actively participated in the Value Added Course on Pre operative Anaesthetic Evaluation held during January - June 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

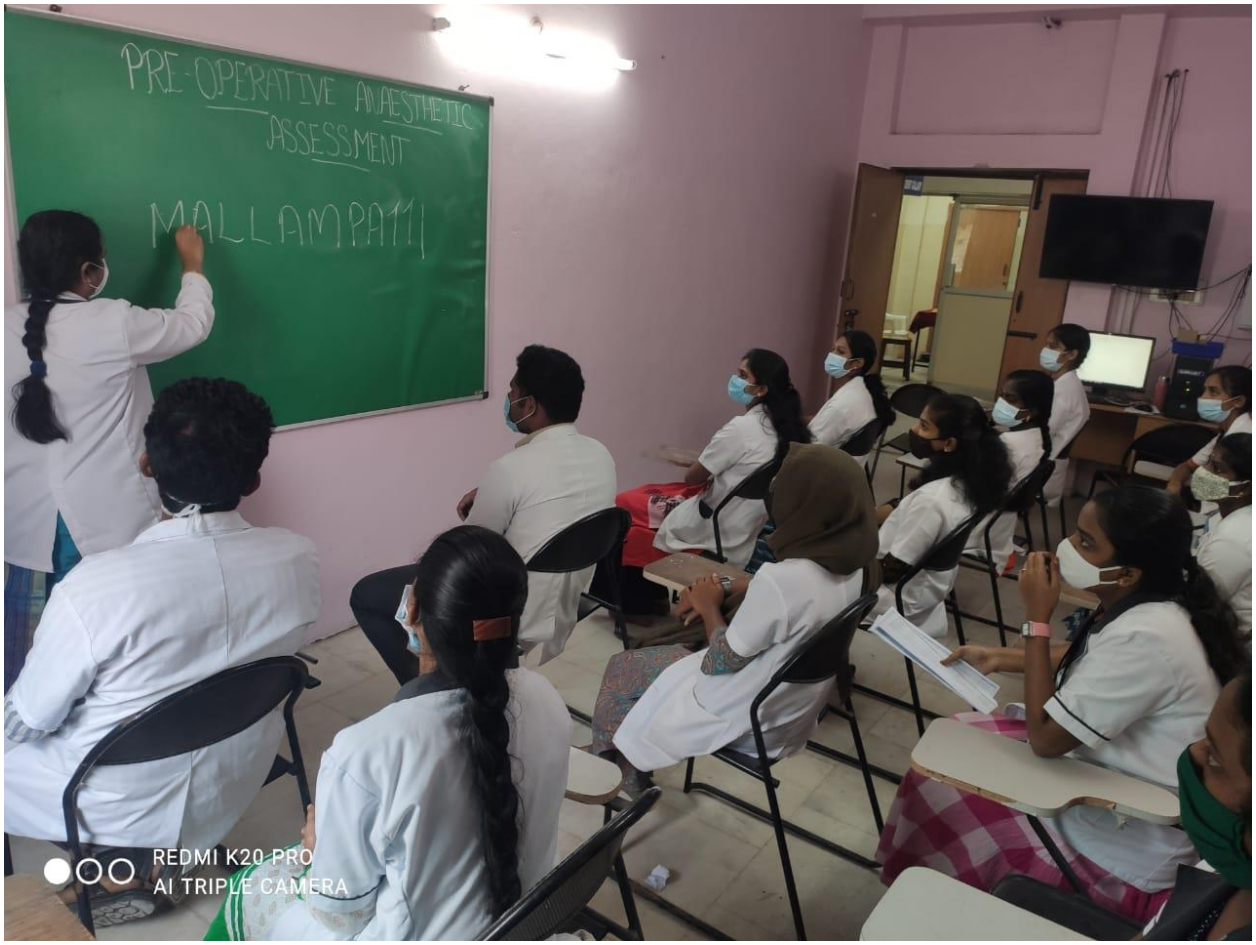
DEPARTMENT OF ANAESTHESIOLOGY
SRI LAKSHMI NARAYANA INSTITUTE
OF MEDICAL SCIENCES
OSUDU, KUDAPAKKAM, PUDUCHERRY-605 502.

Dr. CHANDRASEKAR
RESOURCE PERSON

Dr. KALASREE M
COORDINATOR

Sri Lakshmi Narayana Institute of Medical Sciences
Sri Lakshmi Kudapakkam Puducherry - 605 502.

SSS


PRE-OPERATIVE ANAESTHETIC
ASSESSMENT
MALLAMPATI
REDMI K20 PRO
AI TRIPLE CAMERA

Sri Lakshmi Narayana Institute of Medical Sciences

Date 02/01/2020

From
Dr.R.Venkataramanan,
Professor and Head,
otorhinolaryngology,
SLIMS
Bharath Institute of Higher Education and Research,
Puducherry.

To
The Dean,
SLIMS
Bharath Institute of Higher Education and Research,
Puducherry.

Sub: Permission to conduct value-added course: Diagnosis of OSA using polysomnography reg.

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: Simulation Based Training In Audiology on Jan 2020 to June 2020. We solicit your kind permission for the same.

Kind Regards

Dr.R.Venkataramanan

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:
The Dean:
The HOD:
The Expert:

The committee has discussed about the course and is approved.

Dean

(Sign&Seal)

DEAN
Prof.K.BALAGURUNATHAN,M.S
(General surgeon)
SRI LAKSHMI NARAYANA
INSTITUTE OF MEDICAL SCIENCES
OSUDU PONDICHERRY

SUBJECT EXPERT
(Sign &Seal)

Dr. R. VENKATARAMANAN, MS.
Reg. No: 72549
Professor ENT
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

HOD(SIGN AND SEAL)

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affliated to Bharath University, Chennai - TN]

Ref. No. SLIMS/Dean Off/VAC/024 **Date:03/01/20**

From
The Dean
Sri Lakshmi Narayana Institute of Medical
sciences, Pondicherry – 605502

To
The Registrar,
Bharath Institute of Higher Education and
Research, Chennai - 600073.

Respected Sir

Sub: Request for permission and approval of Syllabus for certificate course (Value Added course) for the academic year 2019-20 - Reg

Ref: Requesting letter received from Departments

*****

With reference to the above, herewith forwarding the proposed list of Value-added courses for necessary permission and approval of syllabus to conduct the same.

This is for your kind information and needful action.

Thankingyou

Yours faithfully

[DEAN]

DEAN
Prof.K.BALAGURUNATHAN,M.S
(General surgeon)
SRI LAKSHMI NARAYANA
INSTITUTE OF MEDICAL SCIENCES
OSUDU PONDICHERRY

Encl's:

1. Requesting letter received from department
2. Syllabus of thecourse
3. Details of faculty handlingcourse

Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry

VALUE ADDED COURSE : Diagnosis of OSA using polysomnography

COURSE CO-ORDINATOR DETAILS

Faculty Name: Dr.S.Ganesh

Email ID:e n t s l i m s @ g m a i l . c o m

Bharath
INSTITUTE OF HIGHER EDUCATION AND RESEARCH
(Declared as Deemed - to - be - University under section 3 of UGC Act 1956)

Ref. No. BHIER/ VAC/B-02 **Date:05.01.2020**

From

The Registrar,
Bharath Institute of Higher Education and
Research, Chennai - 600073.

To

The Dean
Sri Lakshmi Narayana Institute of Medical
sciences, Pondicherry – 605502

Sir / Madam,

Sub: Approval of Syllabus to conduct certificate course (Value Added course) for the academic year 2019-2020 – Reg.

Ref: Ref. No. SLIMS/Dean Off/VAC /024 Dated: 03.01.2020

*****

With reference to the above, it is to inform that the proposal submitted to conduct Value Added Course has been accepted and approved by BIHER, council meeting. List of the VAC are mentioned below for the academic year 2019– 2020. The abstract of the VAC course completion detail should be submitted to the Registrar office.

Thanking you

Yours faithfully

REGISTRAR

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affliated to Bharath University, Chennai - TN]

Circular

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07/01/2020

Sub: Organising Value-added Course: Diagnosis of OSA using polysomnography **reg.**

With reference to the above mentioned subject, it is to bring to your notice that SLIMS,**Bharath Institute of Higher Education and Research**, is organising **"Diagnosis of OSA using polysomnography"**. The course content and registration form is enclosed below.

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before 15/01/2020. Applications received after the mentioned date shall not be entertained under any circumstances.

DEAN

DEAN
Prof.K.BALAGURUNATHAN,M.S
(General surgeon)
SRI LAKSHMI NARAYANA
INSTITUTE OF MEDICAL SCIENCES
OSUDU PONDICHERRY

Encl: Copy of Course content

VALUE ADDED COURSE

1. Name of the programme &Code

Diagnosis of OSA using polysomnography – A value added course for the medical students.
& **ENT 12**

2. Duration &Period

30 hrs & Jan 2020-June 2020

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Pre test and post test which includes 10 mcqs - *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

1 time Jan 2020- June 2020

8. Year of discontinuation:2020

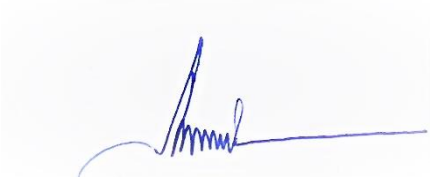
9. Summary report of each program year-wise

Value Added Course- Jan 2020- June 2020					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	ENT 12	Diagnosis of OSA using polysomnography	1.Dr.Venkataraman 2. Dr.R.Nithish Thimothy	3rd year MBBS students	11 students & 2020

10. Course FeedBack

Enclosed as Annexure- V





RESOURCE PERSON
1. **Dr.R.VENKATARAMANAN**
2. **Dr.R.NITHISH TIMOTHY**

COORDINATOR
Dr.S. GANESH

COURSE PROPOSAL

1. NAME OF THE PROGRAMME

Diagnosis of OSA using polysomnography– A value added course for the medical students.

2. AIM

Training the students to provide hands on experiance for diagnosing OSA using polysomnography.

3. OBJECTIVES

a) To teach the students how to connect polysomnogram leads and interpret the polysomnogram results.

4. METHODOLOGY

Students who are interested in participating in value added course are enrolled and the course is conducted for them during the non college hours for a period of 30 hours from Jan 2020 – June 2020 . This course is conducted every 6 months.

Course Audience: 3rd year MBBS students

Course Coordinator: Dr.S.Ganesh

Course Faculties with Qualification and Designation:

1.Dr. R. Venkataramanan

2.Dr. R.Nithish Thimothy

Schedule followed during the course

No	Topic	Title	Duration	Date and time
1	Diagnosis of OSA using polysomnography	Introduction and learning outcomes of polysomnography	6hrs	4pm-6pm(25/1/20),4pm-6pm(7/2/20),4pm-6pm(14/2/20)
		Indications , patient evaluation and instructions	6hrs	4pm-6pm(23/2/20),4pm-6pm(3/3/20),4pm-6pm(9/3/20)
		Components and types of polysomnography	6hrs	4pm-6pm(16/3/20),4pm-6pm(26/3/20),4pm-6pm(6/4/20)
		Demonstartion of connecting leads and interpretation of polysomnography	6hrs	4pm-6pm(18/4/20),4pm-6pm(28/4/20),4pm-6pm(6/5/20),
		Hands on training connecting polysomnography leads and interpretation of results and DOPS	6hrs	4pm-6pm(19/5/20),4pm-6pm(3/6/20),4pm-6pm(10/6/20)
		TOTAL	30HRS	

REFERENCE BOOKS: 1) SCOTT BROWN 8th edition

2) ANIRBAN BISWAS 5th edition

POLYSOMNOGRAPHY



POLYSOMNOGRAPHY

- Introduction
- Indications
- Patient evaluation and instructions
- Components
- Derived Information
- Types
- Limitation
- Summmary

PSG - INTRODUCTION

- Term “Polysomnography” was proposed by Holland ,Dement and Raynal (1974)

- The most commonly used test in the diagnosis of obstructive sleep apnea syndrome (OSAS)

- Consists of a simultaneous recording of multiple physiologic parameters related to sleep and wakefulness

Indications for PSG

- Sleep related breathing disorders
- CPAP titration in OSA
- Assessment of treatment results- OSA
- Sleep related behavioral disorders
- Atypical or unusual parasomnias
- Narcolepsy
- Neuromuscular disorder & sleep related symptoms
- Paroxysmal arousal or seizure phenomenon
- Periodic Leg Movements of Sleep
- Parasomnias not responding to conventional therapy

Ref : American Academy of Sleep Medicine

Initial Assessment

- Detailed medical & psychiatric history
- Medication, smoking, alcohol, activities on that day

Assessment of sleep:

- Sleep history for the last 24 hrs.
- Sleep scoring systems

Stanford Sleepiness scale

Epworth Sleepiness scale

Pittsburgh Sleep Quality Index (PSQI)

Recording Room

- The study patient and the monitoring apparatus and technologist are housed in adjacent rooms.
- Recording room should be as homely and comfortable.

- It should be sound-proofed and air-conditioned.
- Intercom system to interact with the patient.

- Rheostatically controlled lighting
- Toilet and restroom



Recording room with study subject



Recording video camera



Monitoring room for the technician

Patient instructions

- Reporting time: 1 hour prior to the usual time of sleep.
- A prior visit to familiarize with the lab is useful.
- Patient should have had a relaxed day, without daytime sleep.

- Headwash, adequate food.
- Abstain from caffeine in the afternoon and evening of the day on which PSG is planned

- Avoid alcohol on the day of PSG
- Avoid strenuous exercise on the day of the PSG.

Patient instructions

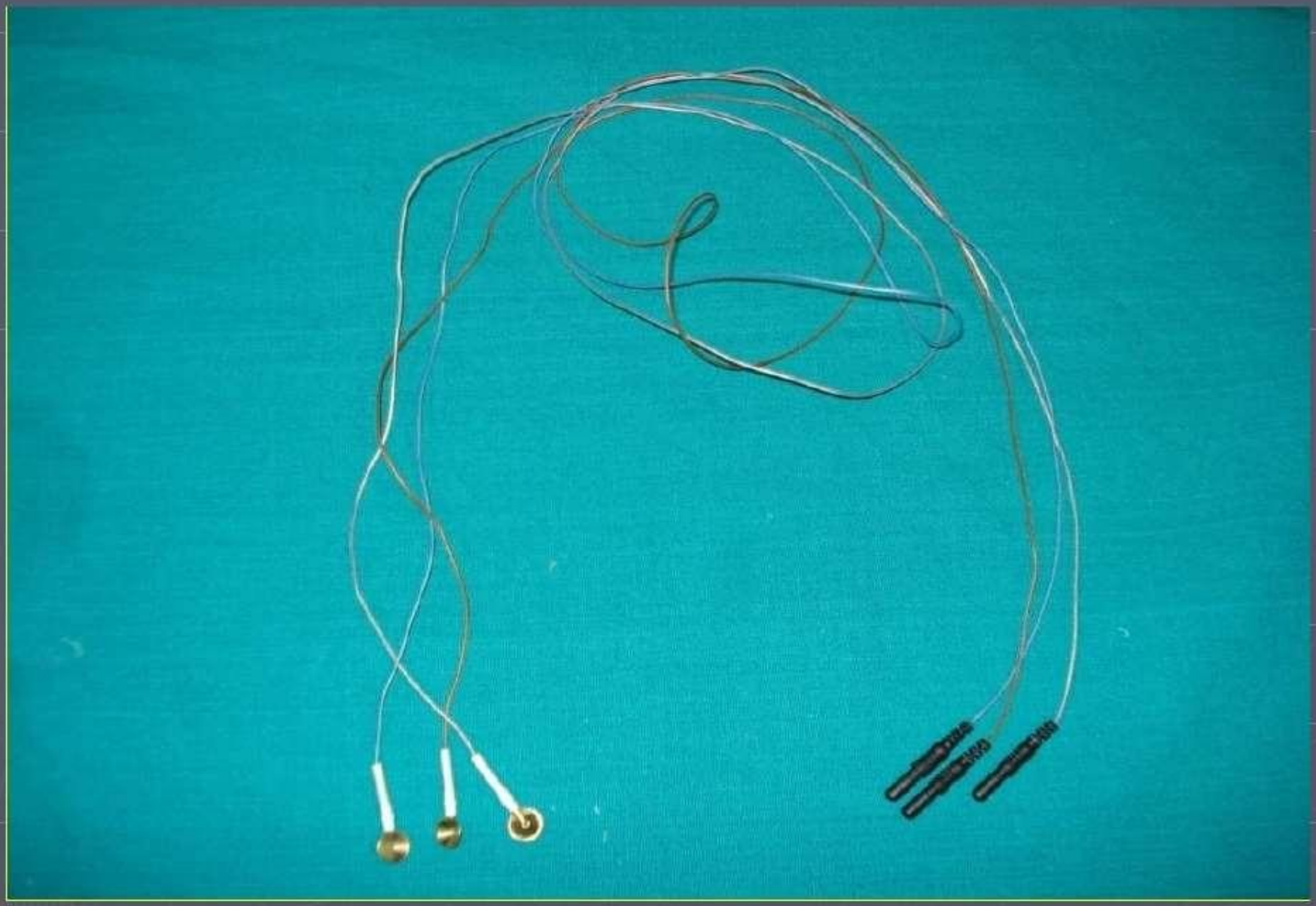
- Continue their usual medications on the night of the PSG, including sleep aids
- The medications should be recorded by the technician so that the results can be optimally interpreted
- For patients who have a history of insomnia, especially when sleeping in a new environment, zolpidem may be prescribed
- Avoid stimulants, including medications for narcolepsy
- Avoid naps on the day of the sleep study

PSG Components

Electroencephalography - EEG

- To distinguish between wakefulness and the various stages of sleep

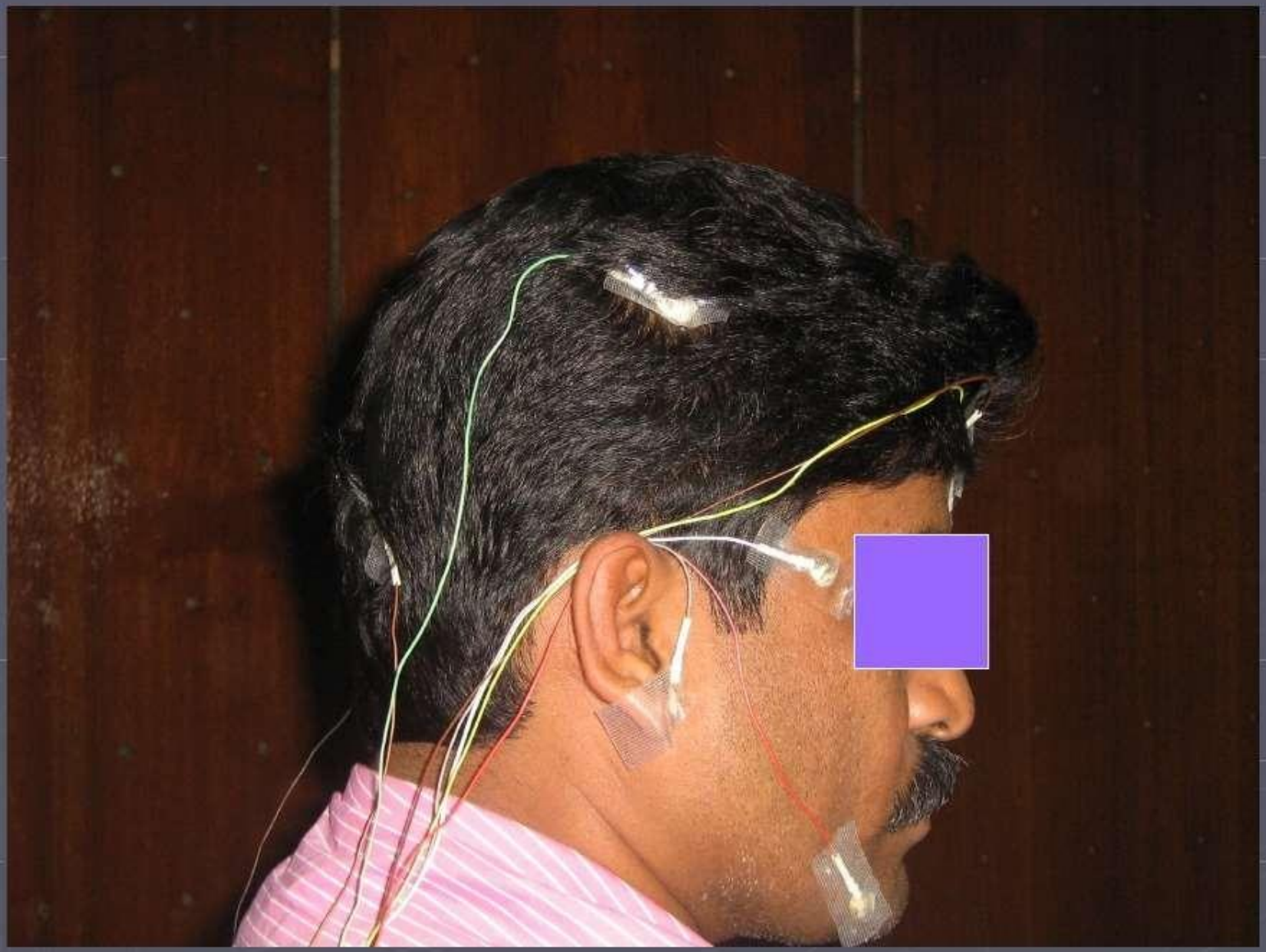
- A minimum of three channels representing the right frontal, central, and occipital electrodes referenced to the contralateral mastoid electrode is recommended *(2007 AASM Manual for the Scoring of Sleep and Associated Events)*



EEG Electrodes



EEG electrodes: occipital electrodes



EEG central electrodes, EOG electrodes

Electro-oculography - EOG

- Two recommended electrodes are labeled E1 (1 cm below the left outer canthus) and E2 (placed 1 cm above the right outer canthus), both referenced to the right mastoid.

- This allows simultaneous recording of both vertical eye movements (such as blinking) and horizontal eye movements (both slow and rapid).

- Documents the onset of rapid eye movement (REM) sleep, and note the presence of slow-rolling eye movements that usually accompany the onset of sleep.

Electromyography - EMG

- Help to determine sleep stage
- Help to diagnos and classify a variety of parasomnias

- Minimum components are chin EMG channels recording activity from the mentalis and submental muscles (the mylohyoid and anterior belly of the digastric) and bilateral leg EMG channels recording activity from the tibialis anterior muscles

- Tonic EMG level in axial muscles usually decreases from wakefulness through stages 1, 2, 3, and 4 of NREM sleep, and is normally absent in REM sleep

EMG Monitoring

Utility of limb EMG:

- Periodic limb movements in sleep.
- Restless leg syndrome.
- Other movement disorders.
- To document the hand and arm gestures of REM sleep behavior disorder.
- Record convulsive movements during nocturnal epileptic seizures.



Limb EMG electrode placement

Respiratory Monitoring

- Upper airway airflow
- Thoracoabdominal movement.
- Endoesophageal (intrathoracic) pressure recording.
- Snoring Monitors.
- Indirect Arterial Blood Gas Monitoring.

Upper airway airflow

- Oronasal thermal devices (thermistors or thermocouples) or nasal cannula–pressure transducers

- **Thermistor/ thermocouple:** placed between the nose and mouth is commonly used to monitor airflow by detecting changes in temperature

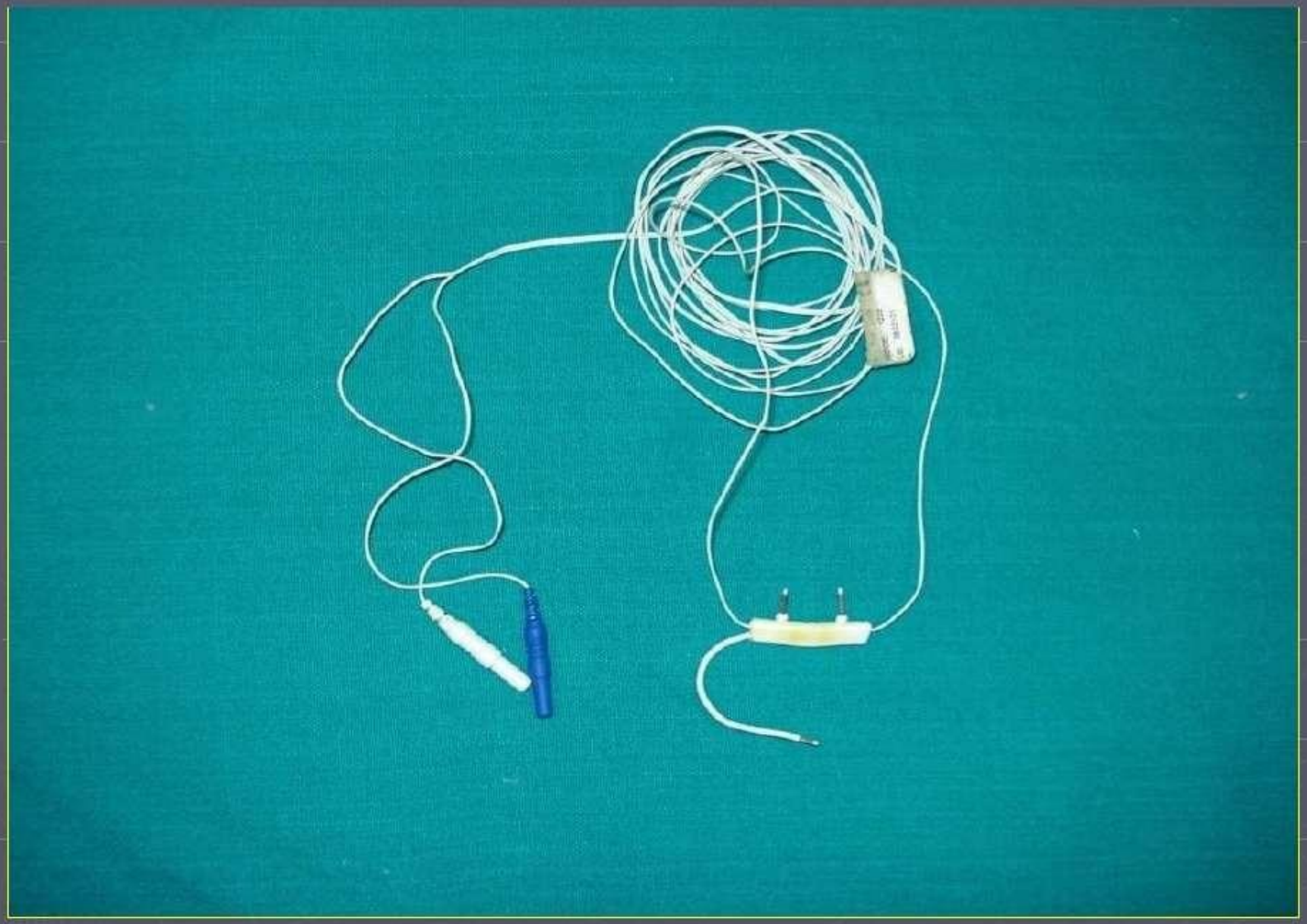
- Thermistor consisting of wires records changes in electrical resistance
- Thermocouples consisting of dissimilar metals (e.G., Copper and constantan) register changes in voltage that result from temperature variation

Upper airway airflow

- Nasal prongs connected to a pressure transducer detect inspiratory flow and may be the most accurate method to identify subtle inspiratory flow limitation - hypopneas

- An important limitation of nasal pressure transducers is that they cannot detect mouth breathing. To overcome this limitation, a thermistor is usually added.

- Nasal pressure transducers are necessary for the diagnosis of hypopneas and thermistors are necessary for the diagnosis of apneas



Thermistor

Thoracoabdominal Movement

Respiratory Inductive Plethysmography:

- Measures changes in thoracoabdominal cross-sectional areas, and the sum of these two compartments is proportional to airflow

- Sensors are two wire coils, one placed around the chest and the other around the abdomen.

- A change in mean cross-sectional coil area produces a proportional variation in coil inductance, which is converted into a voltage change by a variable frequency oscillator.



Sensors for respiratory effort



Transducer for thoracoabdominal movement

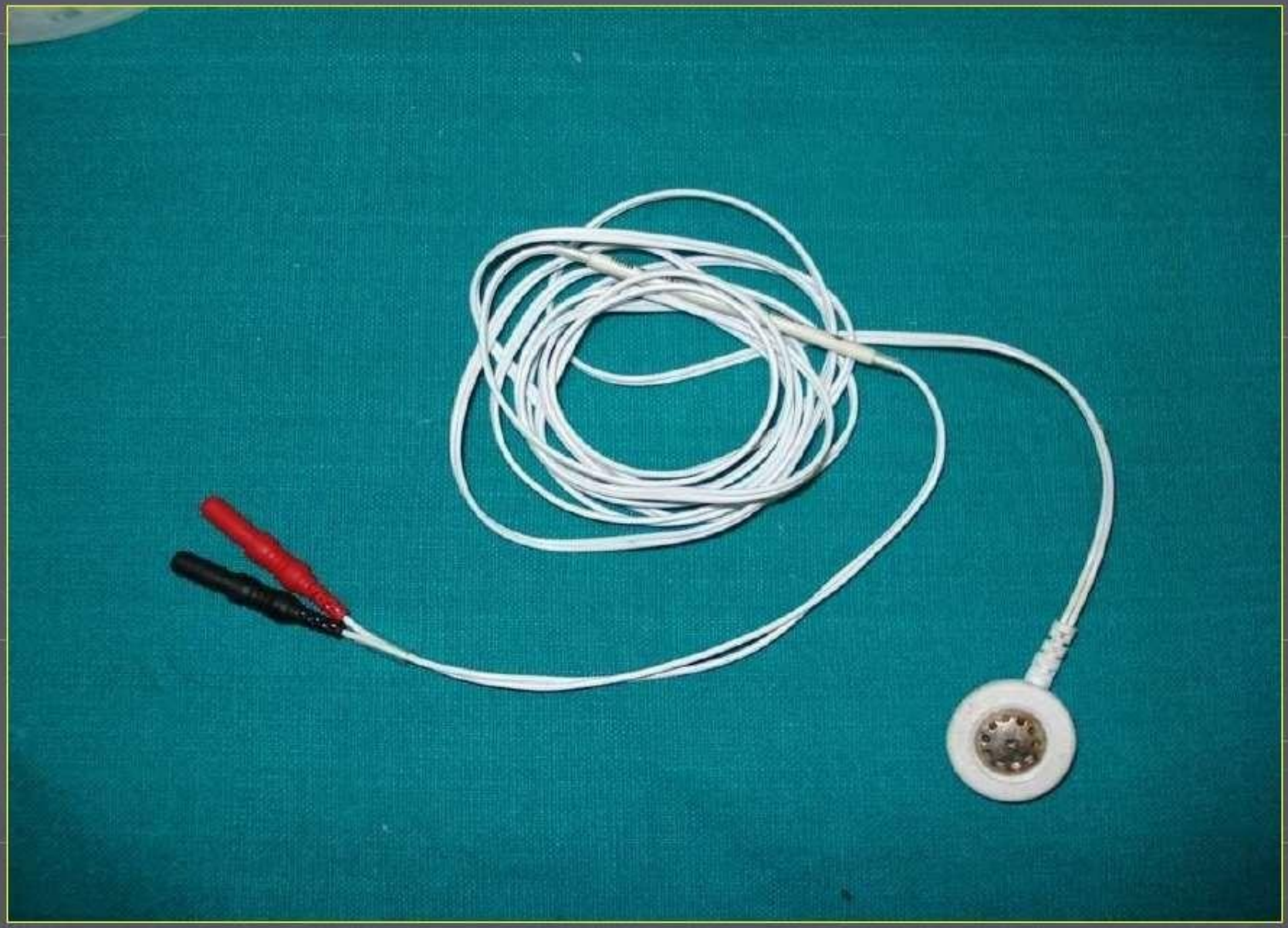


Transducer for thoracoabdominal movement

Snoring Monitors

- Although snoring can be monitored by placing a miniature microphone on the patient's neck, there is no accepted grading system to quantify the intensity of this parameter.

- In practice the technologist's notations as the study is being recorded, as well as the polysomnographer's review of the audio as the study is being read, provide a better estimation of the degree of snoring



Snoring monitors



Snoring monitor

Intrathoracic Pressure Monitoring

Endoesophageal pressure probe:

- Most sensitive detection of heightened respiratory effort.
- An endoesophageal tube is passed nasally till the probe is about 5 cm above the esophageal-gastric junction.

- Measures increases in intrathoracic negative pressure to overcome increased upper airway resistance.

- Gold standard for measuring respiratory effort
- Not a routine practice , because of patient discomfort and the technical skill required

Expired Carbon Dioxide

- Capnography, or end-tidal CO2 (ETCO2), monitoring detects the expired carbon dioxide (CO2) level, which closely approximates intra-alveolar CO2.

- An infrared analyzer over the nose and mouth detects CO2 in the expired air, which qualitatively measures the airflow

- Costly and therefore not used in most laboratories

ABG

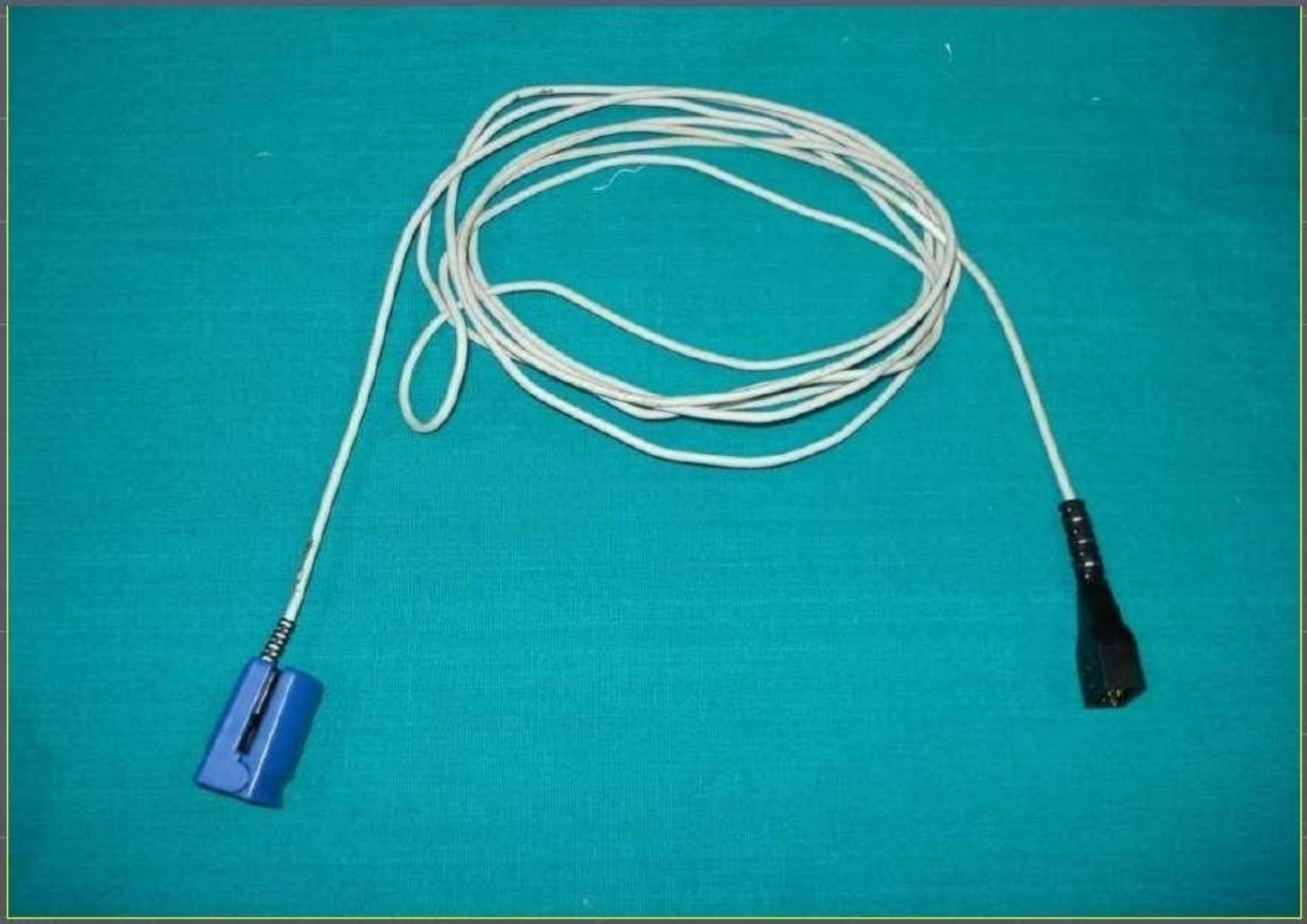
- An alternative to capnography is measurement of the (Paco2) in the morning after their sleep study to be compared to their waking Paco2

- Adults who have an increase in their paco2 in sleep by 10 mm hg or more compared to an awake supine paco2 have sleeprelated hypoventilation

Oxygen Saturation

- Continuous oxygen saturation monitoring by finger pulse oximetry is routine .

- PSG reports mention the time the patient spent with an Sao2 below 90%.



Oxymetry sensor

Electrocardiogram

- ECG abnormalities in sleep apnea patients:

  Marked sinus arrhythmia.
  Extra systoles.
  Prolonged asystolic episodes.
  Atrial or ventricular fibrillation.
  Nocturnal angina may show ST segment deviation.

Body position

- Some patients only have abnormalities when sleeping in certain positions. Therefore, body position (eg, supine, left lateral, right lateral, prone) is monitored throughout the test using a position sensor and/or video monitor.

Optional parameters that can be monitored

1) Esophageal pH

- Gastro-esophageal reflux of acidic stomach contents into the lower esophagus may cause insomnia.
- pH probe is introduced nasally and swallowed to about 5 cm above the esophageal sphincter.

2) Penile Tumescence

- Psychogenic Vs organic causes of impotence.
- In normal adult men, penile tumescence occurs during REM sleep
- Psychogenic cases: Normal REM sleep-related erections.

3) Core Body Temperature

DERIVED INFORMATION

- Total sleep time – The total sleep time (TST) is the total duration of light sleep (stages N1 and N2), deep sleep (stage N3), and rapid eye movement (REM) sleep
- Sleep efficiency – Sleep efficiency (SE) is the TST divided by the total recording time (ie, the time in bed).

- Sleep stage percentage – The sleep stage percentage (SSP) for a particular sleep stage is the duration of that sleep stage divided by the TST.
- Sleep stage latency – The latency to any sleep stage is the duration from sleep onset to the initiation of that sleep stage.

DERIVED INFORMATION

- Arousals – Arousals range from full awakenings to three-second transient electroencephalography (EEG) shifts to a lighter stage of sleep (alpha, theta, and/or frequencies greater than 16 Hz, but not sleep spindles, with at least 10 seconds of stable sleep preceding the change).
- Arousals are generally counted and then divided by the TST to give the number of arousals per hour of sleep (ie, arousal index).

DERIVED INFORMATION

- Apnea is defined by the American Academy of Sleep Medicine (AASM) as the cessation of airflow for at least 10 seconds.
- Hypopnea is defined as decrease in airflow of ≥30 % (by a valid measure of airflow) lasting ≥10 s, associated with either ≥3 % desaturation from the pre-event baseline or an arousal

- Respiratory effort–related arousal (RERA)

  is an event characterized by increasing respiratory effort for 10 seconds or longer leading to an arousal from sleep but one that does not fulfill the criteria for a hypopnea or apnea.

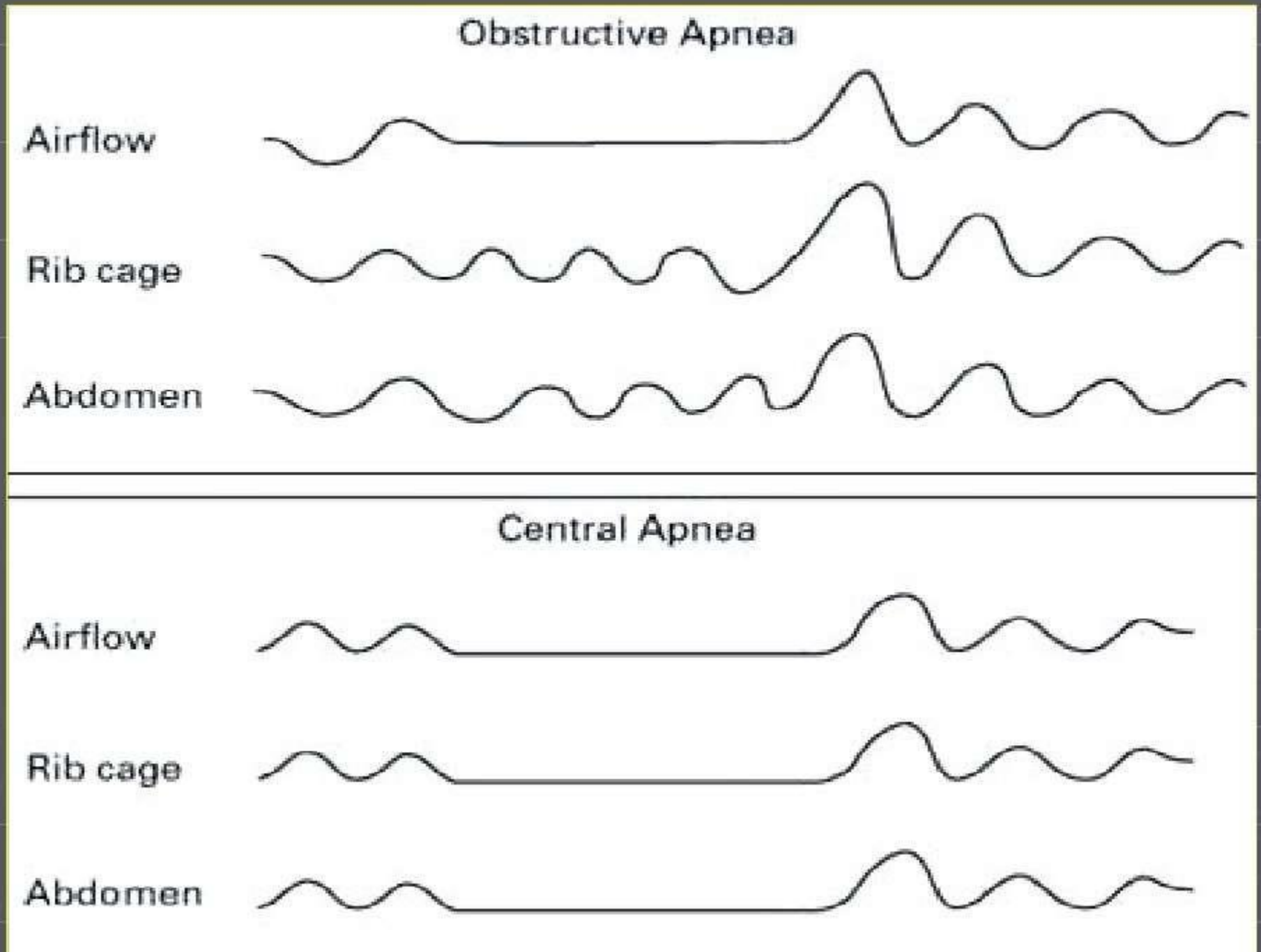
Indices for sleep-disordered breathing

- Apnea-hypopnea index (AHI)

  The AHI is defined as the average number of episodes of apnea and hypopnea per hour.

  Respiratory disturbance index (RDI)

  Defined as the average number of respiratory disturbances (obstructive apneas, hypopneas, and respiratory event–related arousals [RERAs]) per hour.


Obstructive Apnea
Airflow
Rib cage
Abdomen
Central Apnea
Airflow
Rib cage
Abdomen

AASM CRITERIA FOR DIAGNOSIS OF OSA

SEVERITY	*AHI*
Normal	< 5
Mild	5 -15
Moderate	15 - 30
Severe	> 30

Sleep related Breathing disorders based on PSG

SRBD	AHI	Arousal Index	Snoring	Daytime alertness
Simple Snoring	<5	<10	+	Normal
UARS	<10	Often >15	+/-	Impaired
OSAS-Mild	5-15	5-20	+	Mild impairment
OSAS-Moderate	15-30	10-30	+	Moderate impairment
OSAS-Severe	>30	>20	++	Severe impairment
CSAS	>5 Central Apnoea	>10	+/-	Variable

PSG Types

- Four types based on the number of parameters they measure and the degree of attendance required.

- Level 1 devices - Traditional attended in-laboratory PSGs

- Level 2 through 4 refer to home studies recorded by portable devices with progressively fewer channels measuring progressively fewer parameters

Types

- Level II devices require a minimum of seven channels, including EEG,EOG, chin EMG, ECG, oximetry, airflow, and respiratory effort channels. Thus they permit sleep scoring.

- Level III device: This device has a minimum of 4 channels, including ventilation or airflow (at least 2 channels of respiratory movement or airflow), heart rate or ECG, and oxygen saturation.

- Level IV device: This type of device does not meet requirements for other types, and many measure only 1-2 parameters (eg, oxygen saturation or airflow).

Split night studies

- Diagnosis of OSA is established during the first portion of the study and the amount of positive airway pressure that is necessary to prevent upper airway collapse during sleep is determined during the remaining portion.

Limitations of PSG

First Night Effect:

- Reduced sleep efficiency.
- Increased awakenings and arousals.
- Prolonged sleep and REM latency.
- Decreased percentage of REM and slow-wave sleep.
- Increased percentage of light sleep.

Technology, technician, technique dependant.

Episodic disorders may be missed: eg seizures, parasomnias.

Night- to- night variability: eg in case of apnea.

VARIABILITY

- Night to night variability makes it possible for a single study to underestimate the severity of OSA
- Nasal patency, body position, or disruptive environmental factors may all be important factors in producing such variability.
- Therefore, it is reasonable to repeat the baseline PSG if there is a strong clinical suspicion for OSA

SUMMARY

- Attended, in-laboratory polysomnography (PSG) is considered the gold standard diagnostic test for obstructive sleep apnea (OSA)

- Diagnostic evaluation of suspected OSA, titration of positive airway pressure therapy, and assessment of the effectiveness of therapy are the most common indications for PSG.

Courtesy

Pictures in this presentation are taken from another presentation in slideshare Polysomnography: recording and sleep staging by pramod krishnan

Annexure 2

Bharath Institute of Higher Education and Research

SLIMS

1	U17MB251	AANNIE SHERLINE RAJAM.L
2	U17MB252	AARTHISEKAR . D
3	U17MB253	AARYA R BABU
4	U17MB254	ABHIJITH.K
5	U17MB255	ABHISHEIK.J
6	U17MB256	ABHISHEK KUMAR VISHWAKARMA
7	U17MB257	ADITYA RAI
8	U17MB258	ADWIZA RAI
9	U17MB259	AFZAN.M
10	U17MB260	AGARWAL RIDHAM RAJESHBHAI
11	U17MB261	AISWARYA.S.NAIR

ANNEXURE 3

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES PUDUCHERRY

TOPIC: Polysomnography **(ENT12)**
STUDENT NAME:
UNIVERSITY NO:

1. Sleep apnea is:
   a. A chronic disorder that affects your sleep b. Talking in your sleep
   c. Tossing and turning in your sleep

2. Sleep apnea can be treated by:
   a. An oncologist b. A dentist
   c. A chiropractor

3. Symptoms of sleep apnea include:
   a. Snoring b. Breathing lapses while sleeping
   c. Snorting or gasping d. All of the above

4. Sleep apnea symptoms only affect:
   a. The snorer b. The snorer's family members
   c. The snorer's significant other d. All of the above

5. Sleep apnea can:
   a. Be potentially dangerous b. Prevent you from obtaining a deep, restful sleep
   c. Cause sleepwalking d. B.oth A and B

6. The three types of sleep apnea are:
   a. Daytime and nighttime sleep apnea b. Obstructive, central, and complex sleep apnea
   c. Disruptive and non-disruptive sleep apnea d. None of the above

7. Obstructive sleep apnea is:
   a. The least common form b. The least dangerous form
   c. The most common form d. None of the above.

8 . False Regarding obstructive sleep apnoea (OSA):

a. Up to 25% of cases with moderate to severe cases of OSA may remain undiagnosed

b. It is mainly a neurological disorder associated with poor quality of sleep.

c. Obesity is associated with a 2- to 3-fold increased risk of OSA relative to normal weight individuals.
d. It is linked to cardiovascular disease, psychiatric disorders and gastro-oesophageal reflux.

9. Polysomnography during an episode of OSA typically demonstrates:

a. Complete cessation of airflow and cessation of breathing efforts for more than 10 s.

b. Partial reduction in airflow despite continuing breathing efforts.

c. Oxygen desaturation followed by arousal and re-establishment of airflow.

d. Preserved balance between rapid eye movement (REM) and non-REM sleep.

e. REM-related OSA, which is more common in women and young patients.

10.Regarding common treatment options for OSA syndrome (OSAS):

a. All patients with OSA should start preoperative continuous positive airway pressure (CPAP).

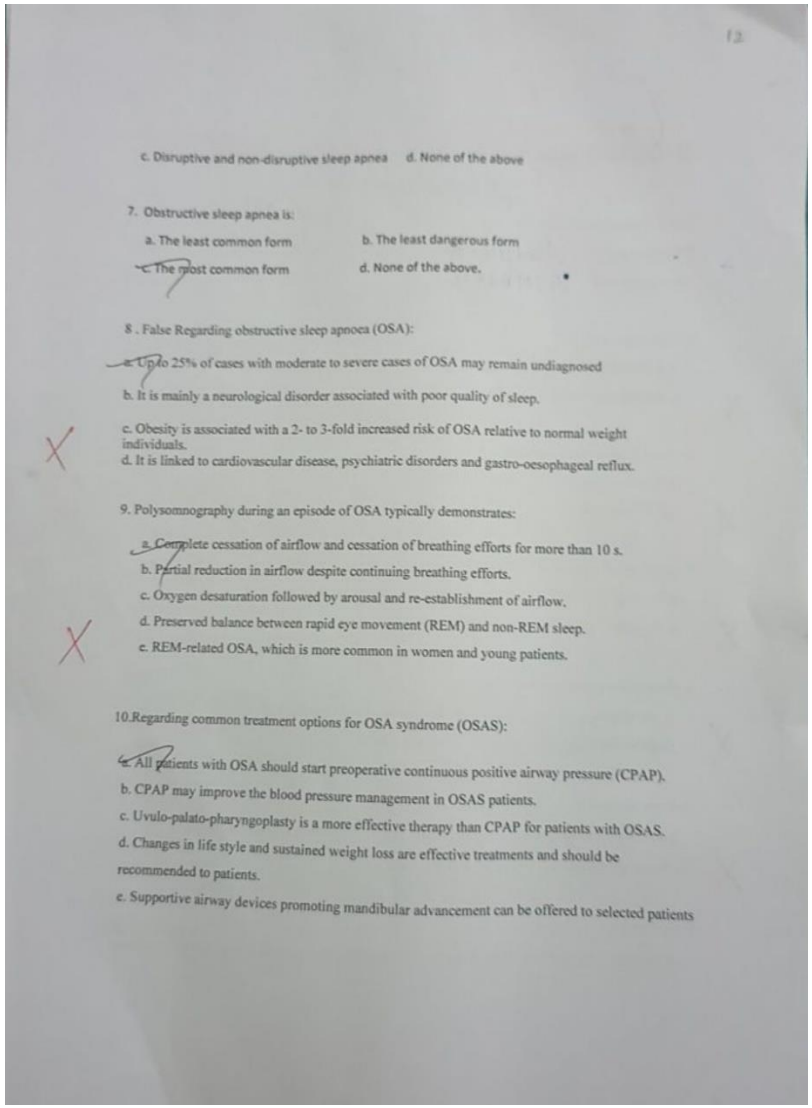
b. CPAP may improve the blood pressure management in OSAS patients.

c. Uvulo-palato-pharyngoplasty is a more effective therapy than CPAP for patients with OSAS.

d. Changes in life style and sustained weight loss are effective treatments and should be recommended to patients.

e. Supportive airway devices promoting mandibular advancement can be offered to selected patients

PRE TEST



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ANNEXURE 3

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

PUDUCHERRY

3

TOPIC: Polysomnography **(ENT12)**

STUDENT NAME: Abhijith. K

UNIVERSITY NO: VITMB254.

1. Sleep apnea is:

a. A chronic disorder that affects your sleep b. Talking in your sleep

X c. Tossing and turning in your sleep

2. Sleep apnea can be treated by:

a. An oncologist b. A dentist

X c. A chiropractor

3. Symptoms of sleep apnea include:

a. Snoring b. Breathing lapses while sleeping

X c. Snorting or gasping d. All of the above

4. Sleep apnea symptoms only affect:

a. The snorer b. The snorer's family members

X c. The snorer's significant other d. All of the above

5. Sleep apnea can:

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ANNEXURE 3

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

PUDUCHERRY

TOPIC: Polysomnography **(ENT12)**

2

STUDENT NAME: Afgan . M

UNIVERSITY NO: U17MB259.

1. Sleep apnea is:

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   a. Be potentially dangerous b. Prevent you from obtaining a deep, restful sleep

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POST TEST

c. Disruptive and non-disruptive sleep apnea d. None of the above

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c. The most common form d. None of the above.

8 . False Regarding obstructive sleep apnoea (OSA):

a. Up to 25% of cases with moderate to severe cases of OSA may remain undiagnosed

b. It is mainly a neurological disorder associated with poor quality of sleep.

c. Obesity is associated with a 2- to 3-fold increased risk of OSA relative to normal weight individuals.

d. It is linked to cardiovascular disease, psychiatric disorders and gastro-oesophageal reflux.

9. Polysomnography during an episode of OSA typically demonstrates:

a. Complete cessation of airflow and cessation of breathing efforts for more than 10 s.

b. Partial reduction in airflow despite continuing breathing efforts.

c. Oxygen desaturation followed by arousal and re-establishment of airflow.

d. Preserved balance between rapid eye movement (REM) and non-REM sleep.

e. REM-related OSA, which is more common in women and young patients.

10.Regarding common treatment options for OSA syndrome (OSAS):

a. All patients with OSA should start preoperative continuous positive airway pressure (CPAP).

b. CPAP may improve the blood pressure management in OSAS patients.

c. Uvulo-palato-pharyngoplasty is a more effective therapy than CPAP for patients with OSAS.

d. Changes in life style and sustained weight loss are effective treatments and should be recommended to patients.

e. Supportive airway devices promoting mandibular advancement can be offered to selected patients

8

ANNEXURE 3

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

PUDUCHERRY

TOPIC: Polysomnography **(ENT12)**

STUDENT NAME: Abhijith. K

UNIVERSITY NO: U17MB255

1. Sleep apnea is:

~~a. A~~ chronic disorder that affects your sleep b. Talking in your sleep

c. Tossing and turning in your sleep

2. Sleep apnea can be treated by:

a. An oncologist ~~b. A~~ dentist

c. A chiropractor

3. Symptoms of sleep apnea include:

a. Snoring b. Breathing lapses while sleeping

c. Snorting or gasping d. ~~All of~~ the above

4. Sleep apnea symptoms only affect:

a. The snorer b. The snorer's family members

c. The snorer's significant other ~~d. All of~~ the above

5. Sleep apnea can:

~~a. Be~~ potentially dangerous b. Prevent you from obtaining a deep, restful sleep

c. Cause sleepwalking d. B.oth A and B

6. The three types of sleep apnea are:

X ~~a.~~ Daytime and nighttime sleep apnea b. Obstructive, central, and complex sleep apnea

c. Disruptive and non-disruptive sleep apnea d. None of the above

7. Obstructive sleep apnea is:

a. The least common form b. The least dangerous form

c. The most common form d. None of the above.

8 . False Regarding obstructive sleep apnoea (OSA):

a. Up to 25% of cases with moderate to severe cases of OSA may remain undiagnosed

b. It is mainly a neurological disorder associated with poor quality of sleep.

c. Obesity is associated with a 2- to 3-fold increased risk of OSA relative to normal weight individuals.

d. It is linked to cardiovascular disease, psychiatric disorders and gastro-oesophageal reflux.

9. Polysomnography during an episode of OSA typically demonstrates:

a. Complete cessation of airflow and cessation of breathing efforts for more than 10 s.

b. Partial reduction in airflow despite continuing breathing efforts.

c. Oxygen desaturation followed by arousal and re-establishment of airflow.

d. Preserved balance between rapid eye movement (REM) and non-REM sleep.

e. REM-related OSA, which is more common in women and young patients.

10.Regarding common treatment options for OSA syndrome (OSAS):

a. All patients with OSA should start preoperative continuous positive airway pressure (CPAP).

b. CPAP may improve the blood pressure management in OSAS patients.

c. Uvulo-palato-pharyngoplasty is a more effective therapy than CPAP for patients with OSAS.

d. Changes in life style and sustained weight loss are effective treatments and should be recommended to patients.

e. Supportive airway devices promoting mandibular advancement can be offered to selected patients

(9)

ANNEXURE 3

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

PUDUCHERRY

TOPIC: Polysomnography **(ENT12)**

STUDENT NAME: Afsan · M

UNIVERSITY NO: U17MB259.

1. Sleep apnea is:

a. A chronic disorder that affects your sleep b. Talking in your sleep

c. Tossing and turning in your sleep

2. Sleep apnea can be treated by:

a. An oncologist b. A dentist

c. A chiropractor

3. Symptoms of sleep apnea include:

a. Snoring b. Breathing lapses while sleeping

c. Snorting or gasping d. All of the above

4. Sleep apnea symptoms only affect:

a. The snorer b. The snorer's family members

c. The snorer's significant other d. All of the above

5. Sleep apnea can:

a. Be potentially dangerous b. Prevent you from obtaining a deep, restful sleep

c. Cause sleepwalking d. Both A and B

6. The three types of sleep apnea are:

a. Daytime and nighttime sleep apnea b. Obstructive, central, and complex sleep apnea

ANNEXURE 4

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that _____ has actively participated in the Value Added Course on Diagnosis of OSA using polysomnography held during Jan 2020 – June 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr.R.Venkataramanan
RESOURCE PERSON

Dr.S.Ganesh
COORDINATOR

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that Dr.Afzan.M (U17MB259) has actively participated in the Value Added Course on Diagnosis of OSA using polysomnography held during Jan 2020 – June 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.



Dr.R.Venkataramanan

RESOURCE PERSON



Dr.S.Ganesh

COORDINATOR

Annexure 5

Course/Training Feedback Form

Student Feedback Form

Course Name: Preventing Medical Errors in Audiology

Subject Code: **ENT12**

Name of Student: _____ Roll No.: _____

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear					
2	Course contents met with your expectations					
3	Lecturer sequence was well planned					
4	Lectures were clear and easy to understand					
5	Teaching aids were effective					
6	Instructors encourage interaction and were helpful					
7	The level of the course					
8	Overall rating of the course	1	2	3	4	5

**** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory***

Suggestions if any:

Annexure 5

Course/Training Feedback Form

Student Feedback Form

Course Name: Preventing Medical Errors in Audiology

Subject Code: ENT12

Name of Student: ABHIJITH . K Roll No.: U17MB254

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear				✓	
2	Course contents met with your expectations			✓		
3	Lecturer sequence was well planned		✓			
4	Lectures were clear and easy to understand				✓	
5	Teaching aids were effective				✓	
6	Instructors encourage interaction and were helpful			✓		
7	The level of the course		✓			
8	Overall rating of the course	1	2	3	✓	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

Satisfactory

Annexure 5

Course/Training Feedback Form

Student Feedback Form

Course Name: Preventing Medical Errors in Audiology

Subject Code: ENT12

Name of Student: Aishwarya S.Nair Roll No.: U17MB261

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear			✓		
2	Course contents met with your expectations			✓		
3	Lecturer sequence was well planned				✓	
4	Lectures were clear and easy to understand		✓			
5	Teaching aids were effective			✓		
6	Instructors encourage interaction and were helpful				✓	
7	The level of the course			✓		
8	Overall rating of the course	1	2	✓	4	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

ANNEXURE 6

Date : 15/6/2020

From
Dr.Venkataramanan.K,
Dept of Otorhinolaryngology,
SLIMS
Bharath Institute of Higher Education and Research,
Puducherry.

Through Proper Channel

To
The Dean,
SLIMS,
Bharath Institute of Higher Education and Research,
Puducherry.

Sub: Completion of value-added course: Diagnosis of OSA using polysomnography reg.

Dear Sir,

With reference to the subject mentioned above, the department has conducted thevalue-added course titled:**Diagnosis of OSA using polysomnography**on Jan 2020 to June 2020. We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards
Dr.Venkataramanan.K










SERWEL
EAR NOSE THROAT

Sri Lakshmi Narayana Institute of Medical Sciences
Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

Annexure 1

Date: 2nd Jan 2020

From
Dr. Sitalal Rathod,
Professor and Head,
Department of Forensic Medicine,
Sri Lakshmi Narayana Institute of Medical Sciences,
Bharath Institute of Higher Education and Research,
Chennai.

To
The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences,
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: Forensic Anthropology.

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **Forensic Anthropology** on Jan 2020 – Jun 2020. We solicit your kind permission for the same.

Kind Regards

Dr. Sitalal Rathod

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: Dr. BALAGURUNATHAN

The HOD: Dr S N RATHOD

The Expert: Dr S N RATHOD

The committee has discussed about the course and is approved.

Dean (Sign & Seal)

Subject Expert (Sign & Seal)

HOD (Sign & Seal)

DEAN
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
OSUDU, AGARAM VILLAGE,
KOODAPAKKAM POST,
PUDUCHERRY - 605 502

Professor & Head
Dept. of Forensic Medicine
Sri Lakshmi Narayana Institute of
Medical Sciences, Puducherry.

Professor & Head
Dept. of Forensic Medicine
Sri Lakshmi Narayana Institute of
Medical Sciences, Puducherry.

Sri Lakshmi Narayana Institute of Medical Sciences
Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

Circular

3rd Jan 2020

Sub: Organising Value-added Course: Mortuary- Structure, Function and Maintenance reg

With reference to the above-mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research**, is organizing **Forensic Anthropology.** The course content and registration form is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before Jan 15th 2020. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

DEAN
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SC
OSUDU AM VILLAGE,
KOCDA AM POST,
PUDUCHERRY - 605 502

Encl: Copy of Course content and Registration form.

Sri Lakshmi Narayana Institute of Medical Sciences
Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

Annexure 5

Date: 01st July 2020

From
Dr. Sitalal Rathod
Forensic Medicine & Toxicology
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To
The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: Forensic Anthropology

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled **Forensic Anthropology** on Jan 2020 – June 2020. We solicit your kind action to send certificates for the participants that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards

Dr. Jayalakshmi

Dr. Sitalal Rathod

Professor & Head
Dept. of Forensic Medicine
Sri Lakshmi Narayana Institute of
Medical Sciences, Puducher

Encl: Certificates

Photographs

Annexure 4

Course/Training Feedback Form

Course: **Forensic Anthropology**
Date: **Jan 2020 – June 2020**
Name:
Reg NO.
Department: Forensic medicine and toxicology

Q 1: Please rate your overall satisfaction with the format of the course:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 2: Please rate course notes:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 3: The lecture sequence was well planned

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 4: The lectures were clear and easy to understand

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 5: Please rate the quality of pre-course administration and information:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 6: Any other suggestions:

Comments:

Thank you for taking the time to complete this survey, your comments are much appreciated.

***OPTIONAL Section*:** Name _____

Signature _____ Date _____

Annexure- II

VALUE ADDED COURSE

Mortuary- Structure, Function and Maintenance and FMT VAC 03

List of Students Enrolled July 2016 – Dec 2016

2nd Year MBBS Student		
Sl. No	**Name of the Student**	**Roll No**
1	SONALI HESSA	U18MB374
2	SOUMITRA MOHANTY	U18MB375
3	SREEHARI S NAIR	U18MB376
4	SREELEKSHMI S NAIR	U18MB377
5	SREENIDHI N B	U18MB378
6	SUBALAKSHMI V	U18MB379
7	SUDHARSAN .S	U18MB380
8	SUHAIL AHMAD	U18MB381
9	SUMAN KALYAN SAHOO	U18MB382
10	SUSMITA KHAN	U18MB383

RESOURCE PERSON

Professor & Head
Dept. of Forensic Medicine
Sri Lakshmi Narayana Institute of
Medical Sciences Puducherry

COORDINATOR (DEAN)

VALUE ADDED COURSE

1. Name of the programme & Code

Forensic anthropology & (FMT VAC 10)

2. Duration & Period

30 hrs, from July 2019– December 2019 & January 2020 – June 2020.

3. Information Brochure and Course Content of Value-Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Mini CEX- *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

(2) July 2019– December 2019 & January 2020 – June 2020.

8. Year of discontinuation: 2020

9. Summary report of each program year-wise

Value Added Course- July 2019 - June 2000					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	FMT VAC 03	**Forensic anthropology**	Dr. Sitalal Rathod	2nd MBBS	10 (July 2019 – Dec 2020)
2	FMT VAC 03	**Forensic anthropology**	Dr. Sitalal Rathod	2nd MBBS	10 (Jan 2020- June 2020)

10. Course Feed Back

Enclosed as Annexure- V

RESOURCE PERSON

Dr. S.V. Rathod

COORDINATOR (DEAN)

Annexure- II

VALUE ADDED COURSE

Mortuary- Structure, Function and Maintenance and FMT VAC 03

List of Students Enrolled Jan 2019 – Jun 2019

2nd Year MBBS Student		
Sl. No	**Name of the Student**	**Roll No**
11	THENDRAL NILAVAN .M	U18MB389
12	TINA CAROLINE J	U18MB390
13	URVASHI PAL	U18MB391
14	VAISHNAVI TRIPATHI	U18MB392
15	VARSHITHA .N	U18MB393
16	VIKAASH .M	U18MB394
17	VIKAS SHORAN	U18MB395
18	VIKRANT SINGH	U18MB396
19	K. C VINITHA	U18MB397
20	VISWAS ANIL	U18MB398

Professor & Head
Dept of Forensic Medicine
Sri Lakshmi Narayana Institute of
Medical Sciences Puducherry

RESOURCE PERSON **COORDINATOR**

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - IV

Forensic anthropology

MCQ

Course Code: FMT VAC 10

1. Dental numbering can be done by all, except:
A. FDI two digit system
B. Anatomic and diagrammatic charting
C. Palmer notation
D. Universal system

2. An order for exhumation can be given by:
A. District collector
B. Additional district magistrate
C. Sub-collector
D. Any of the above

3. Ideal time to start exhumation:
A. Mid night
B. Late evening
C. Afternoon in proper light
D. Early morning

4 .Time limit of exhumation in India is:
A. 1 month
C. Ten years
D. No limit

5. Stature is determined by which formula:
A. Hasse
B. Widmark
C. Trotter and Gleser
D. Locard

6. Krogman's formula is related to:
A. Race
B. Age
C. Sex
D. Stature

7. Most useful for sex determination is:
A. Skull
B. Femur
C. Pelvis
D. Tibia

Annexure 1

Date: 2nd July 2019

From
Dr. Sitalal Rathod,
Professor and Head,
Department of Forensic Medicine,
Sri Lakshmi Narayana Institute of Medical Sciences,
Bharath Institute of Higher Education and Research, Chennai.

To
The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences,
Bharath Institute of Higher Education and Research, Chennai.

Sub: Permission to conduct value-added course: Mortuary- Structure, Function and Maintenance

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **Forensic Anthropology** on July 2019 – Dec 2019. We solicit your kind permission for the same.

Kind Regards

Dr. Sitalal Rathod

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean:

The HOD: Dr SN Rathod

The Expert: Dr SN Rathod

The committee has discussed about the course and is approved.

Dean	Subject Expert	HOD
(Sign & Seal)	(Sign & Seal)	(Sign & Seal)

Professor & Head
Dept. of Forensic Medicine
Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry.

Professor & Head
Dept. of Forensic Medicine
Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry.

Sri Lakshmi Narayana Institute of Medical Sciences
Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

Circular

3rd July 2019

Sub: Organising Value-added Course: Forensic Anthropology regarding..

With reference to the above-mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research**, is organizing **Forensic Anthropology**. The course content and registration form is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before June 15th 2019. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

Encl: Copy of Course content and Registration form.

Student Feedback Form

Course Name: **Forensic Anthropology**

Subject Code: **FMT VAC 10**

Name of Student: _____ Roll No.: _____

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear					
2	Course contents met with your expectations					
3	Lecturer sequence was well planned					
4	Lectures were clear and easy to understand					
5	Teaching aids were effective					
6	Instructors encourage interaction and were helpful					
7	The level of the course					
8	Overall rating of the course	1	2	3	4	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

Signature

Date:

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that _____ has actively participated in the Value Added Course on " **Forensic Anthropology** " held during Jan 2020 – Jun 2020 Organized by **Sri Lakshmi Narayana Institute of Medical Sciences**, Pondicherry- 605 502, India.

Dr. Sitalal Rathod
RESOURCE PERSON

Dr. Jayalakshmi
COORDINATOR

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act, 1956)

CERTIFICATE OF MERIT

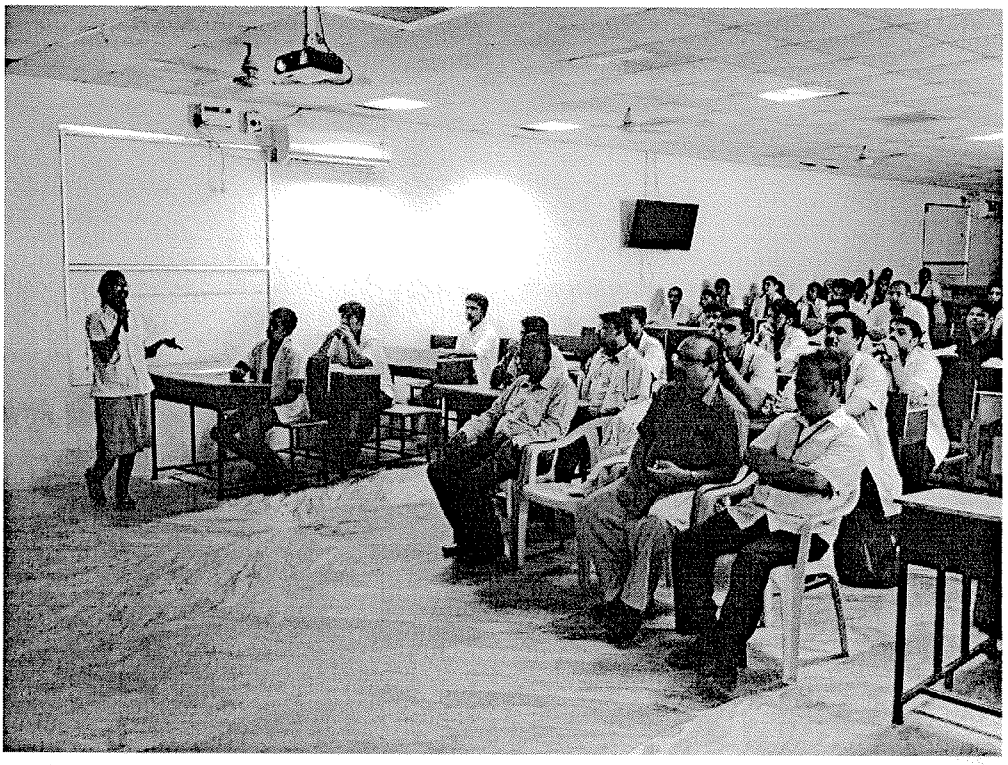
This is to certify that _____ has actively participated in the Value Added Course on " **Forensic Anthropology** " held during July 2019 – Dec 2019 Organized by **Sri Lakshmi Narayana Institute of Medical Sciences**, Pondicherry- 605 502, India.

Dr. Sitalal Rathod
RESOURCE PERSON

Dr. Jayalakshmi
COORDINATOR

Sri Lakshmi Narayana Institute of Medical Sciences
Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

Annexure 6 - SAMPLE CERTIFICATE TO BE ATTACHED



Sri Lakshmi Narayana Institute of Medical Sciences
Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that _____ has actively participated in the Value Added Course on " **Forensic Anthropology** " held during July 2019 – Dec 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502. India.

Dr. Sitalal Rathod
RESOURCE PERSON

Dr. Jayalakshmi
COORDINATOR

Annexure 5

Date: 01st Jan 2020

From
Dr. Sitalal Rathod
Forensic Medicine & Toxicology
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To
The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: Forensic Anthropology

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled **Forensic Anthropology** on July 2019 – Dec 2019. We solicit your kind action to send certificates for the participants that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards

Dr. Jayalakshmi

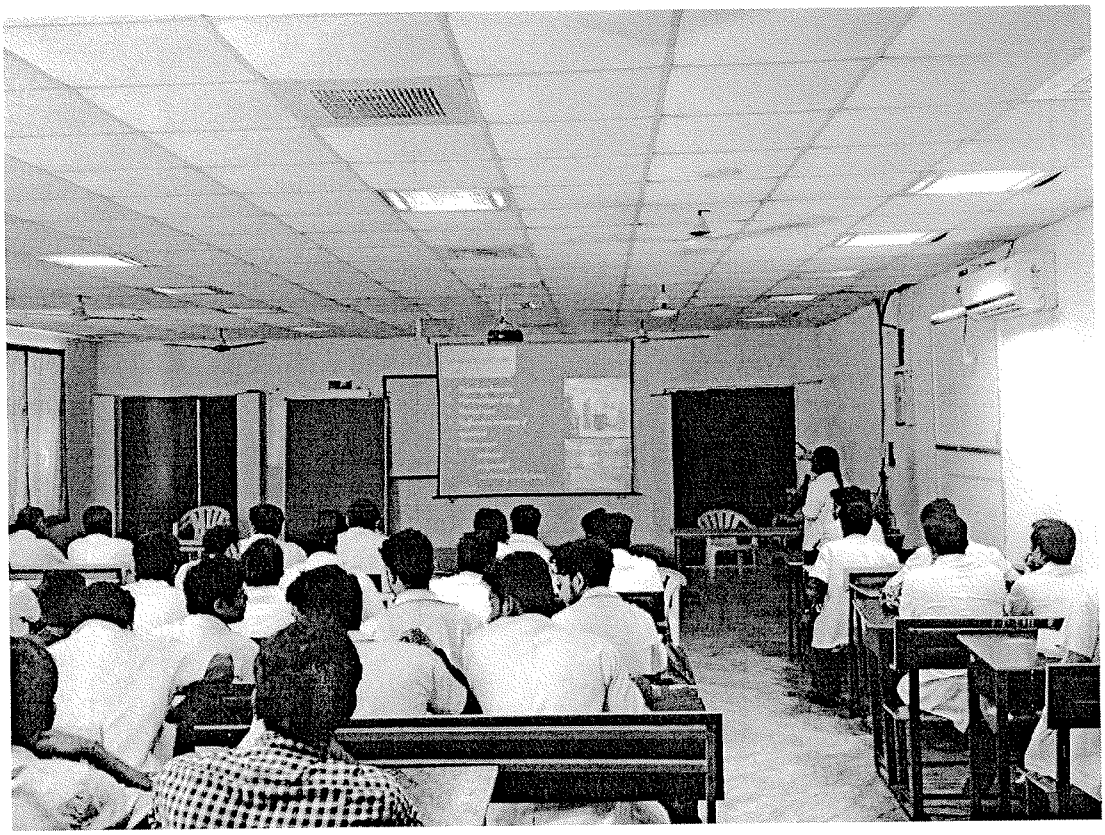
Dr. Sitalal Rathod

Encl: Certificates

Photographs

Sri Lakshmi Narayana Institute of Medical Sciences
Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

Annexure 6 - SAMPLE CERTIFICATE TO BE ATTACHED



Sri Lakshmi Narayana Institute of Medical Sciences
Affiliated to Bharath Institute of Higher Education & Research
(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that _____ has actively participated in the Value Added Course on " **Forensic Anthropology** " held during Jan 2020 – Jun 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. Sitalal Rathod
RESOURCE PERSON

Dr. Jayalakshmi
COORDINATOR

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

Date:2.10.2019

From
Dr. Kalarani
Professor and HOD,
Department of Obstetrics and Gynaecology
Sri Lakshmi narayana Institute of Medical Sciences,
Bharath Institute of Higher Education and Research,
Chennai.

To
The Dean,
Sri Lakshmi Narayana Institue Of Medical Sciences,
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course : UTERINE TRANSPLANTATION FOR UTERINE INFERTILITY

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **UTERINE TRANSPLANTATION FOR UTERINE INFERTILITY** on Jan 2020 to Jun 2020. We solicit your kind permission for the same.

Kind Regards

Dr.Kalarani,

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean : Dr. Balagurunathan

The HOD: Dr. Kakarani

The Expert: Dr. Sangeetha

The committee has discussed about the course and is approved.

Dean | Subject Expert | HOD

DEAN
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
OSUDU, AGARAM VILLAGE,
KOODAPAKKAM POST,
PUDUCHERRY - 605 502

ASSISTANT PROFESSOR
DEPT. OF OBSTETRICS & GYNAECOLOGY
Sri Lakshmi Narayana Institute of
Medical Sciences
OSUDU, PUDUCHERRY.

PROFESSOR
DEPT. OF OBSTETRICS & GYNAECOLOGY
Sri Lakshmi Narayana Institute of
Medical Sciences
OSUDU, PUDUCHERRY.

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

Circular

10.12.2019

Sub: Organising Value-added Course: Uterine Transplantation for Uterine Infertility - reg

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research**, is organizing **" Uterine Transplantation for Uterine Infertility"**. The course content and registration form is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before 30.12.2019. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

DEAN
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
OSUDU, AGARAM VILLAGE,
KOODAPAKKAM POST,
PUDUCHERRY - 605 502

Course Proposal

Course Title: Uterine Transplantation for Uterine Infertility

Course Objective:

1. **Obstetric emergency -overview**
2. **Conduct of an Labour drills**
3. **Practical skills - PPH**
4. **Practical skills - Maternal collapse**
5. **Practical skills - Eclampsia**
6. **Practical skills - Sepsis**
7. **Practical skills - category 1 C-section**
8. **Problem based case scenario**
9. **Role of anaesthesia in emergency**
10. **Role play**

Course Outcome: To gain Knowledge about Labour Ward Drills

Course Audience: Final MBBS Undergraduates

Course Coordinator: Dr.DURGA

Course Faculties with Qualification and Designation:

1. **Dr. Kalarani, Prof. and HOD, OG**
2. **Dr. Sangeetha, Assistant Professor, OG**

Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Time	Hours
1	2.01.2019	Obs emergency - overview	4.00pm -7.00pm	3
2	10.01.2019	Conduct of an labour drill	4.00pm -7.00pm	3
3	8.02.2019	Practical skills - PPH	4.00pm -7.00pm	3
4	16.02.2019	Practical skills - Maternal collapse	4.00pm -7.00pm	3
5	3.03.2019	Practical skills -Eclampsia	4.00pm -7.00pm	3
6	12.03.2019	Practical skills - Sepsis	4.00pm-7.00pm	3
7	26.03.2019	Practical skills - Category 1 C SEC	4.00pm -7.00pm	3
8	5.04.2019	Problem based case scenario	4.00pm -7.00pm	3
9	11.04.2019	Role of Anaesthesia in emergency	4.00pm -7.00pm	3
10	25.04.2019	Role play	4.00pm -7.00pm	3
			Total Hours	30

REFERENCE BOOKS: (Minimum 2)

1. **Willaims Obstetrics Edition 21**
2. **Strat OG**

VALUE ADDED COURSE

1. Name of the programme& Code

Uterine Transplantation for Uterine Infertility OBGY 12

2. Duration& Period

30 hrs & JANUARY 2020 TO JUNE 2020

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Multiple choice questions- *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7.No. of times offered during the same year:

1-JANUARY 2020 TO JUNE 2020

8. Year of discontinuation: 2020

9. Summary report of each program year-wise

Value Added Course					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength& Year**
1	OBGY 12	Uterine Transplantation for Uterine Infertility	Dr. Sangeetha	Final year MBBS	JANUARY 2020 TO JUNE 2020

10. Course Feed Back

Enclosed as Annexure- V

RESOURCE PERSON

ASSISTANT PROFESSOR
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Sri Lakshmi Narayana Institute of
Medical Sciences
OSUDU, PUDUCHERRY.

COORDINATOR

DEAN
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OSUDU, AGARAM VILLAGE,
KOODAPAKKAM POST,
PUDUCHERRY - 605 502

UTERINE TRANSPLANTATION FOR UTERINE INFERTILITY

PARTICIPANT HAND BOOK

BIHER SLIMS

UTERINE TRANSPLANTATION FOR UTERINE INFERTILITY

Reproductive Organ Transplantation.A scientific overview.

- Reproductive organ transplantation are old ideas acquiring fresh courtesy.

- During the last 2—3 decades the clinical fields of transplantation surgery and reproductive medicine have been the birthplaces of several clinical innovations.

- In the last decade, the discipline of transplantation surgery is including:

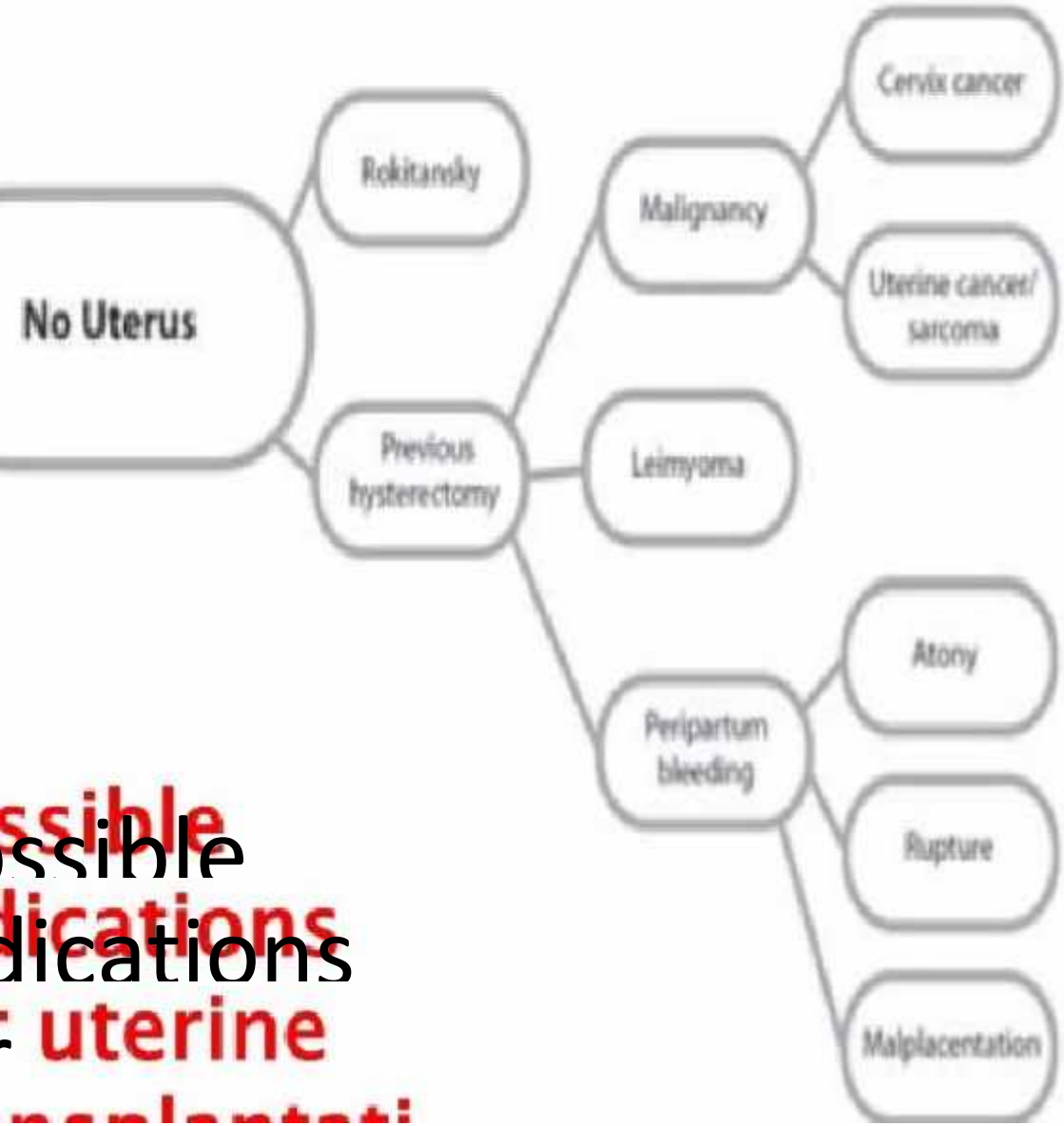
- Transplantation essential for life to continue.
- Transplantation essential to have better quality Of life.
- The inability to experience a pregnancy, give birth, and bring up a child because of infertility issues may be one of the most traumatic and devastating situations to affect a woman or couple, with the capacity to have a severely detrimental effect on the quality of life of both parties

- In this presentation, I will discuss an overview on ovarian and uterine transplantation.

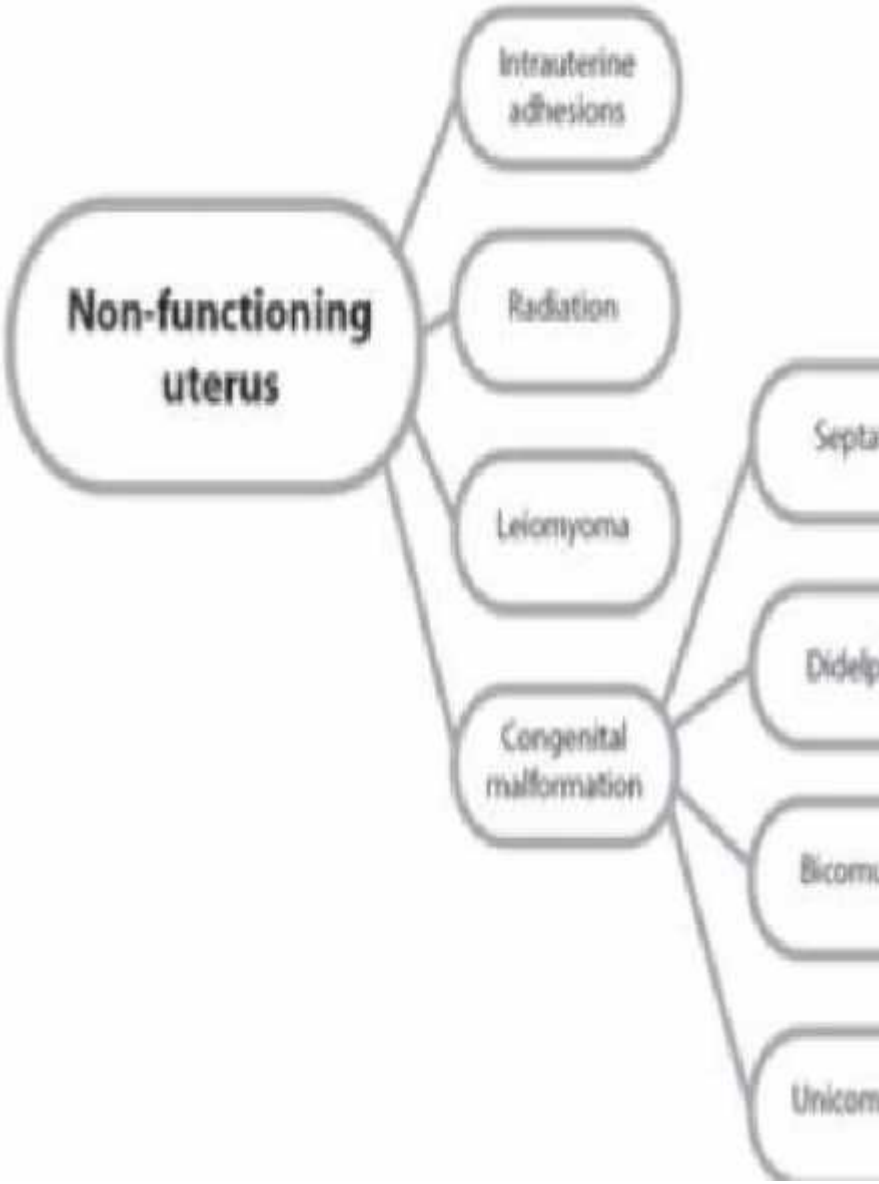
Uterine Transplantation (Utx) (Utn)

Scope of the problem

- Absolute uterine factor infertility patients is present in 3% of all infertile couples.
- 12000-15000 potential uterus transplantation patients in UK
- 2000-3000 potential uterus transplantation patients in the Nordic countries
- Uterine infertile patients can today has one of 4 options:
- Attain genetic parenthood by use of gestational surrogacy, which is permitted in some countries although most societies disapprove of its use because of ethical, religious or legal reasons.
- Adoption.
- Lifetime infertility
- Uterine transplantation.

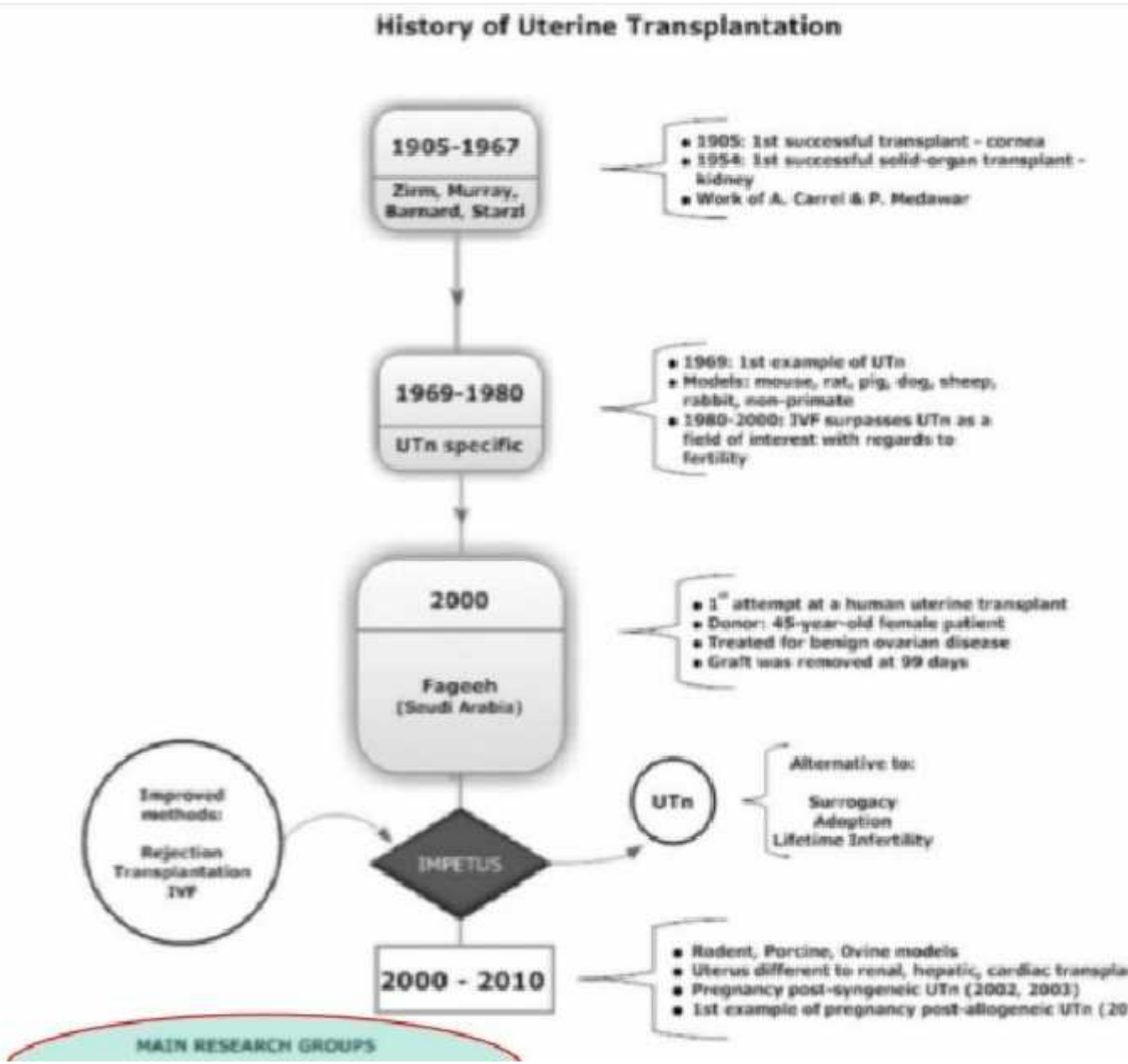


ssible
dications
uterine



snapshot at the past

Organ	Surgeon (Place of Transplantation)
Cornea	Eduard Zirm (Czech Republic)
Kidney	Joseph Murray (United States)
Pancreas	Richard Lillehei (United States)
	William Kelly (United States)
Heart	Christiaan Barnard (South Africa)
Liver	Thomas Starzl (USA)
Heart-Lung	Bruce Reitz (United States)
Hand	Earl Owen Jean-Michael Dubernard




2000, Wafa Fageeh: 99 days. 2 menses then amenorrhea. Thrombosed uterus
2010, Diaz-Garcia, Sweden, first successful allogenic u terus transplantation, in a rat, with healthy offspring
10/2014. Brannstrom. Sweden first baby born to uterine transplant. 31 weeks. PET. CS. Male.
2012, Brannstrom. Sweden. Mother-to-daughter
9/8/2011, dr/ Omar Ozkan. Turkey. Dead-to-living uterus donation. Mrs sert got pregnant by ICSI but missed miscarriage

Why Utx is coming too late?

- Uterus is a dynamic, complex organ. It is hugely blood-flow dependent
- It warrants many additional but essential steps:
- LIVE.
- Hysterectomy of the transplanted uterus. after 1-2 child bearings. It is ephemeral.
- It is expensive and there are some alternate ways of management.
- It isn't a life saving but rather life-improving surgery.
- Maintaining a healthy pregnancy that is defined as:
- Without evidence of malformations in the newborn

- Without worsening of graft function in the mother.

- The initial story of Dr wafacase !!!!

Learning much from a painful lesson !!!

- UTn was first performed in a human in 2000 on a 26year-old female who had previously lost her uterus as a result of PPH.

- The lesson was:

1- Uterine transplantation should follow a slow methodological approach.
2- Animal based studies are a must.
3- Simultaneous working by different institutions.

4- Simultaneous working on several important issues:

Surgery.

Immunity.

Reproduction.

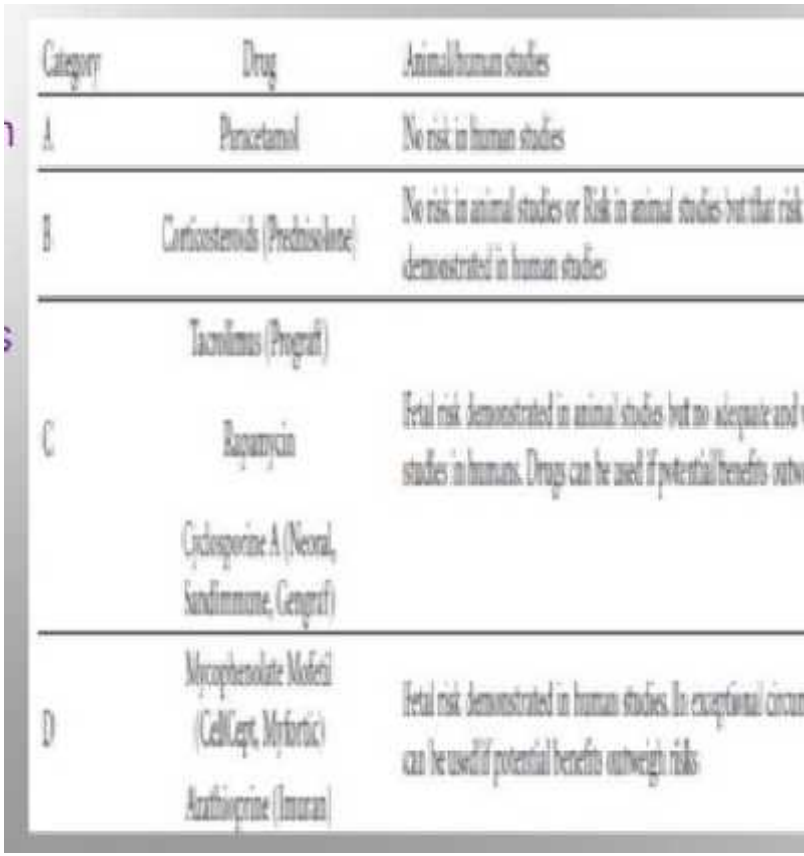
Why Utx is assumed to progress rapidly?

1- Considerable improvements in 2 fields; surgical methodology and immunology. since 1956, the date of first successful renal transplant, the field progressed rapidly because of

2- The concept of "syngenic" or "syngeneic" graft: means genetically identical, or sufficiently identical and immunologically compatible as to allow for transplantation.

3- Good knowledge about nonspecific suppression of the host immune system and other drawbacks : bacterial and viral infections, nephrotoxicity and neurotoxicity with chronic renal failure, newly diagnosed DM, hyperlipidaemia, leucopoenia, and even cancer

4- Abolishing the old thinking that IAS are perfect teratogens !!. Since their first record of the use of in pregnancy was in 1967, it is now realized that the risks posed by including the potential teratogenicity of certain agents are overestimated. > 14,000 births among transplant women have been reported worldwide.



Successful pregnancies are now considered the norm in transplant recipient. However, there is increased risk Ofprematurityy SGA, preec/ampsia.

Principles in Uterine Transplantation

1. Counselling.
2. Donor uterus.
3. Investigations for the recipient.
4. IVF for the recipient.
5. The process of Uterine transplantation.
6. Ensuring stability of the graft for 1 .5 years by immunosuppressives.
7. Embryo transfer.
8. Careful close observation Of pregnancy till the end.
9. Hysterectomy of the transplanted uterus.
10. Adhering to ethical issues as regards transplantation discipline.

Why IVF before Utx ?

- To ascertain that fertility, in terms of fertilization and initial embryo development, existed within the couple. The candidate patient may have lower than normal response and fertilization rates.

- IVF procedure after transplantation might be more difficult than before transplantation:
- Abnormal uterine vascular pedicles and anastomosis sites that might increase the risk of bleeding at oocyte pick-up.
- The immunosuppressed patient may have an increased risk of pelvic infection after the pick-up procedure.

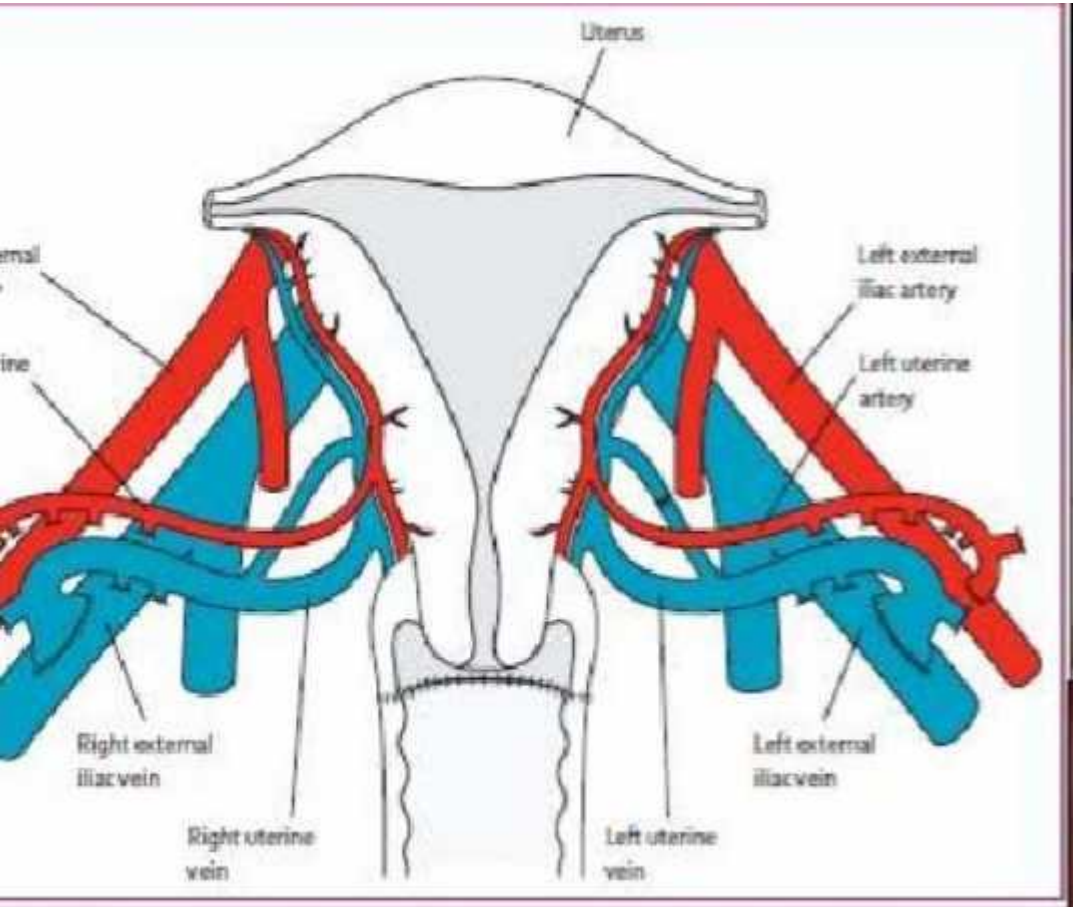
Technical steps of uterine transplantation

1. Surgery and vascular anastomosis
2. Fixation of transplanted uterus
3. Avoiding Ischemia — reperfusion injury
4. Immunosuppression
5. Management of rejection.

A- Surgery and vascular anastomosis

1. Procurement (technique similar to radical hysterectomy)
    1. Dissection of ureters
    2. Isolation of arterial supply: isolation of the uterus with bilateral, long venous, and arterial vascular pedicles.
2. Back table preparation
3. Vascular anastomosis: end-to-side bilateral vascular anastomoses
    1. Connect the uterine veins to the external iliac veins (with 8-0 polypropylene sutures).
    2. Connect the anterior divisions of the internal iliac arteries to the external iliac arteries (with 7-0 polypropylene sutures).

- Ensure that good pulses existed distal to the arterial anastomosis sites and that the uterine tissue changed from pale to reddish, which is a sign of peripheral tissue perfusion.
- Blood flow : 40 mL per min.


Uterus
Left external iliac artery
Left uterine artery
Right external iliac vein
Left external iliac vein
Right uterine vein
Left uterine vein


A


B

B- Fixation of transplanted uterus

- Vaginal rim anastomosis.
- Round ligaments.
- the extensive bladder peritoneum on the uterine graft on top of the recipient's bladder to provide extra structural support.

QAvoid spontaneous labor

C- Prevention of Ischemia (cold/warm) — Reperfusion injury

- Cold ischemia (+4 ^{0}C) at preservation of graft ex vivo
- Energy depletion

- Membrane polarity change
- Warm ischemia and reperfusion
- Major damage
- Organelle destruction (ROS)
- Inflammation

24 h preservation at 49 C in UW [University of Wisconsin preservation] / PER [Perfadex]. Metabolic stabilization at reperfusion within 1 h after 3h iscemia (1 h cold, 2h warm)

D- Pregnancy Rate

- Pregnancy rate
- Animal studies: normal rate.
- Human studies: successful pregnancy outcome is reported.

E-

Rejection

u Types:

❑Hyperacute rejection (min to h)

OAcute rejection (days to months)

QChronic rejection (from day 1 , slow process)

OIndicators:

OCD+4/CD+8 ratio in blood.

❑Doppler of uterine blood flow.

QCervical/endometrial biopsy.

u Induction immunosuppressive.

OIV anti-thymocyte globulin 2 • 5 mg/kg just before surgery and 12 h later. OIV methylprednisolone: 500 mg just before uterine reperfusion.

a Maintenance immunosuppressive.

QC)ral tacrolimus aiming at trough levels of 5—1 0 ng/mL

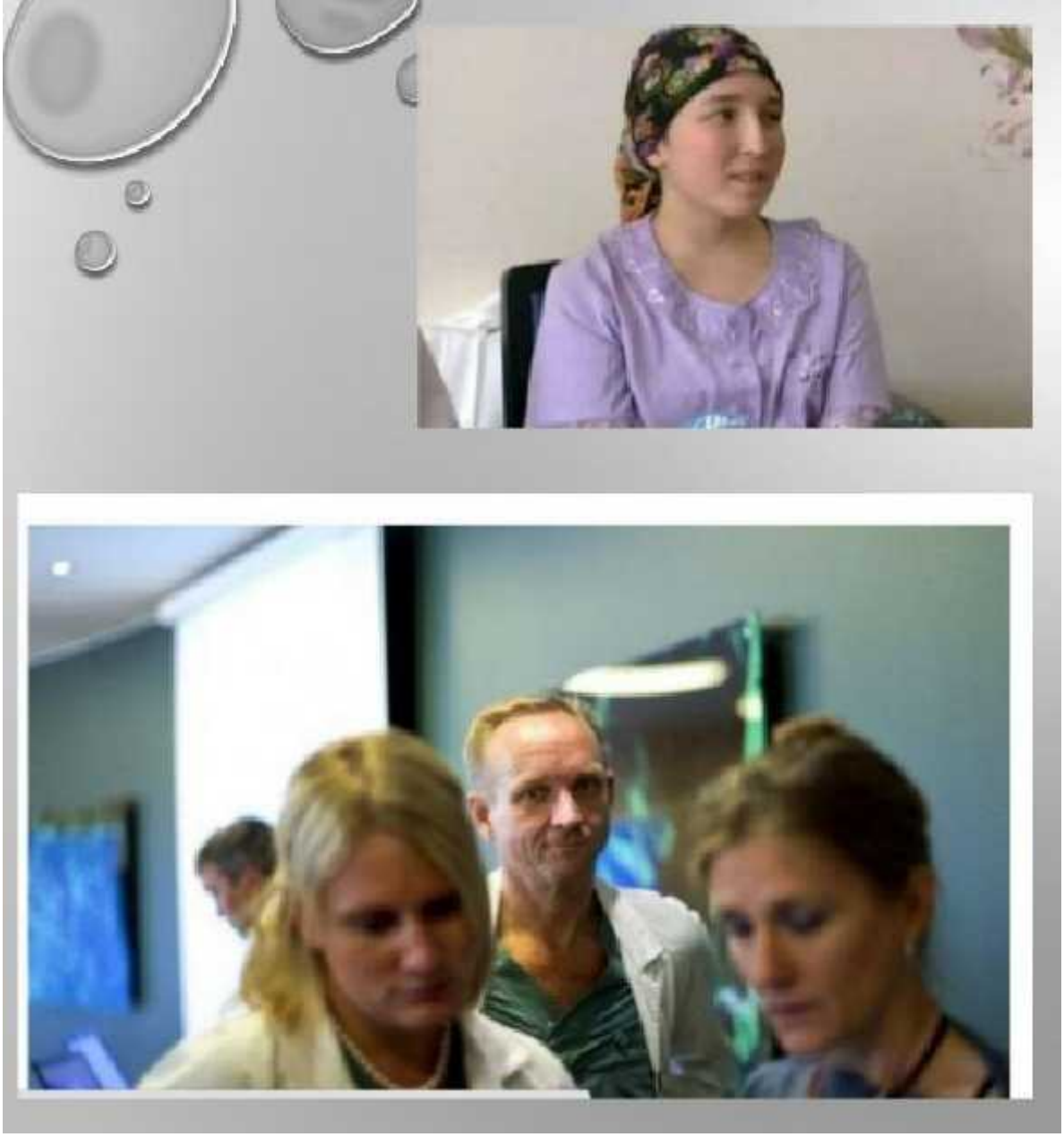
ZB/lyco phenolate mofetil aiming at trough levels of 40—60 mg for the first 10 months

JAzathioprine 2 mg/kg per day replaced MM after 10 months, to avoid the potentially teratogenic effects of mycophenolate mofetil in the run-up to the embryo transfer attempts.

JPrednisolone 5 mg daily is added from month 6 post-transplantation.



Ethics (Montreal Criteria)





Livebirth □*” uterus transplantat

i
o
n

Introduction :

It is a surgical procedure whereby a healthy uterus is transplanted into women in whom the uterus is absent or diseased.Infertility affects 10 - 15% of couples of reproductive age. 1 in 500 women have absolute uterine factor infertilitywith unexpected uterine agenesis (Mayer Rokitansky Kuster Hauser syndrome), or unexpected hysterectomy or sequelae of infection/surgery. For these women the only available option is child adoption or surrogacy, until the first childbirth occurred following uterine transplantation from living donors inGothenberg , Sweden, in September 2014.A recent report summarizes the first 45 cases of uterine transplantation with known outcomes as MRKH was the cause of absolute uterine factor infertility in 89% of the uterine transplant recipients . Live donors were used in 36 whereas the organs came from deceased donors in the remaining 9 cases. 11% of the live donors suffered severe complications (uterine injury,fistula formation, vaginal cuff dehiscence), graft failure occurred in 13 women leading to emergency hysterectomies for thrombosis , ischemia or infection.So far 18 live births have been reported – all were born by caesarean section.[1][2]

Methods:

This procedure is a part of research protocol approved by the Ethics committee school of medicine and Brazilian national transplantation system. The patient agreed to participate by informed consent. The donors family consented to donation of her heart, liver, kidneys, and separately to uterus donation. It is intended to be temporary.The recipient will undergo a hysterectomy after 1 or 2 successful pregnancies to avoid the need for her to take immunosuppressive drugs for life.[3][4]

Montreal criteria[5]

Criteria for recipient:

Cisgender female with no medical contraindications to transplantation.Female who has uterine diseases that has failed other therapy. Has personal or legal contraindications to

other options like surogacy , adoption. She should be suitable for motherhood , psychologically fit is likely to be complaint with treatment and understands the risks of procedure.[6][7]

Criteria for donor :

Female of reproductive age with no contraindications to the procedure. Women who has concluded her child bearing or consented donating her uterus after her death. The donor is responsible and capable of making informed decisions. Women who has no history of uterine damage or disease.[8][9]

Criteria for health care team:

The institution should meet Moore's hird criterion – laboratory background , field strength , institutional stability.It has provided informed consent to both parties

Technical steps of uterus transplantation:

Surgery and vascular anastomosis, fixation of transplanted uterus, reperfusion therapy for avoiding ischaemia, immunosuppression, management of rejection.Uterus was dissected along with its ligaments to suspend it after implantation Dissection of ovarian veins, and the uterine vessels .Vagina was sectioned at sufficient length (2 cm) for anastomosis in recipient preservation solution – histidine - tryptophan – ketoglutarate. Recipient - midline incision – external iliac vessels were dissected and prepared for anastomosis. Vaginal vault was separated from the bladder and rectum. Sutures were placed bilaterally through the round ligaments,uterosacralligaments,paravaginal connective tissues. End to end vascular anastomosis done to connect uterine veins to external iliac veins and the ant division of internal iliac arteries to external iliac arteries on both sides.

Indian experience of uterine transplant :

On May 2017, Menakshiwalan got uterine transplantation from her mother and 17 months later she delivered a baby at galaxy care hospital Pune. It was a female child weighing 1.45 kg and it was a LSCS – indication – her BP began to rise suddenly and they constantly monitored the baby's growth and they found that the fluid around the baby had started reducing so the was delivered prematurely.[12]

Complications due to surgery :

Wound healing, infection, pain , bleeding.

Pregnancy complications

Maternal :

Diabetes Mellitus, hypertension, graft rejection, infection.

Fetal :

Fetal Growth Restriction, pretermlabor, low birth weight.

Conclusion :

Uterus transplantation is now at its initial experimental stage. The extensive animal-research that preceded a structured and scientific introduction of human uterine transplantation, with an initial prospective observational study, was most likely important for that several births now have been reported from the nine women that entered the trial. It is essential that new human attempts of uterine transplantation are done within the framework of clinical trials in order to accumulate data to further optimize the procedure in relation to safety and efficiency. In this regard the creation of a global registry to follow donors, recipients and children born after uterine transplantation is central.[13]

It may well be that classical uterine transplantation procedure, with transplantation from live or deceased donors, will only stay as the predominant infertility treatment for absolute uterine factor infertility. Women for one or two decades, since creation of a bioengineered uterus may enter the clinical arena in the future. However, the research on this bioengineered uterus solution has only been ongoing for a few years and there are likely several obstacles that have to be solved before that can be tested in a human setting.[14][15]

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9. Testa G, Koon EC, Johannesson L, McKenna GJ, Anthony T, Klintmalm GB, et al. Living donor uterus transplantation: a single center's observations and lessons learned from early setbacks to technical success. Am J Transplant 2017;17:2901-10.

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12. Testa G, Anthony T, McKenna GJ, Koon EC, Wallis K, Klintmalm GB, et al. Deceased donor uterus retrieval: a novel technique and workflow. Am J Transplant 2018;18:679-83.

13. Castellon LAR, Amador MIG, Gonzalez RED, Eduardo MSJ, Diaz-Garcia C, Kvarnstrom N, et al. The history behind successful uterine transplantation in humans. JBRA assisted reproduction : 2017.

14. Hellstrom M, El-Akouri RR, Sihlbom C, Olsson BM, Lengqvist J, Backdahl H, et al. Towards the development of a bioengineered uterus: comparison of different protocols for rat uterus decellularization. Acta Biomater 2014;

15. Jones BP, Saso S, Yazbek J, Smith JR. Uterine transplantation: past, present and future. BJOG 2016;

VALUE ADDED COURSE

UTERINE TRANSPLANTATION FOR UTERINE INFERTILITY

List of Students Enrolled Jan 2020 – Jun2020

SL.NO	REG. NO	NAME	SIGNATURE
1.	U17MB291	DISHAL K P	
2.	U17MB292	DIVYA PRIYA K	
3.	U17MB293	DIVYANSHI SINGH	
4.	U17MB294	ELAKIYA BALA	
5.	U17MB295	FEMI SREE.R.A.	
6.	U17MB296	GANJI KARTHIK	
7.	U17MB297	GAUTHAMAN.M	
8.	U17MB298	GOKULAVAANI G K	
9.	U17MB299	GOWTHAM BJ	
10.	U17MB300	GRANDHI KARISHMA	
11.	U17MB301	GREESHMA SHAJI .K	
12.	U17MB302	GUDDATI KOTA SATYA SAI NAGA S RAMESH	
13.	U17MB303	GURUNATHAN S	
14.	U17MB304	HARSH BHARTI	
15.	U17MB305	HENRITTA.I	
16.	U17MB306	HIYA SAIKIA	
17.	U17MB307	HRITHICK MANICKAM R	
18.	U17MB308	JAYASHREE SAIKIA	
19.	U17MB309	JITHU MOHAN	
20.	U17MB310	KAILA PRASANTH KUMAR	

UTERINE TRANSPLANTATION FOR UTERINE INFERTILITY

MCQs

1.Which of the following is the absolute cause of infertility ?

a) Adenomyosis b) PCOD c) MRKH d) Endometriosis

2. First child birth occured following uterine transplantation in.....

a) Italy b) Sweden c) Germany d) England

3. Among 45 cases, How many received Uterus from live Donor ?

a) 30 b) 32 c) 39 d) 36

4. Complications of Uterine Transplantation from live donor includes.....

a) Graft failure b) Uterus injury c) Vaginal cuff dehisecence d) All the above

5. Identify the correct sequence of Uterus transplantation

1.Fixation if transplanted Uterus 2.Management of rejection 3.Surgery and Vascular Anastomosis 4.Reperfusion tl avoid ischemia

a) 3,1,4,2 b) 1,3,2,4 c) 3,4,1,2 d) 4,1,3,2

6. Criteria for health care team.....

a) John Moore's criteria b) Moore's hird criteria

c) all the above d) None of the above

7. In a Uterus Transplanted recipient patient..... to be avoided

a) LSCS b) ART c) SVD d) Assisted delivery

8. All are maternal complications EXCEPT

a) Diabetes Mellitus, b) hypertension, c) graft rejection d) preterm labour

9. Absolute uterine factor infertility patients is present in…….of all infertile couples.

a) 10% b) 2% c) 1% d) 3%

10. Uterine Transplantation was first performed in a human in……on a 26year-old female who had previously lost her uterus as a result of PPH.

a) 2000 b)2019 c)2020 d) 2014

REG NO -
U17MB303

UTERINE TRANSPLANTATION FOR UTERINE INFERTILITY

MCQs

(12)

8/10

1.Which of the following is the absolute cause of infertility ?

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Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that **DHISHAL.K.P** has actively participated in the Value Added Course on **UTERINE TRANSPLANTATION FOR UTERINE INFERTILITY** held during Jan 2020 – June 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

RESOURCE PERSON

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COORDINATOR

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OSUDU, AGARAM VILLAGE,
KOODAPAKKAM POST,
PUDUCHERRY - 605 502

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that G. HIYA SAIKIYA has actively participated in the Value Added Course on Uterine transplantation held during Jan 2020 – June 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

RESOURCE PERSON

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COORDINATOR

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OSUDU, AGARAM VILLAGE,
KOODAPAKKAM POST,
PUDUCHERRY - 605 502

Annexure 4

Course/Training Feedback Form

Course:
Date:
Name:
Reg NO.
Department: Obstetrics and Gynaecology

Q 1: Please rate your overall satisfaction with the format of the course:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 2: Please rate course notes:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 3: The lecture sequence was well planned

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 4: The lectures were clear and easy to understand

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 5: Please rate the quality of pre-course administration and information:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 6: Any other suggestions:

Comments:

Thank you for taking the time to complete this survey, your comments are much appreciated.

***OPTIONAL Section*:** Name _____
Signature _____ Date _____

Annexure 4

Course/Training Feedback Form

Course: UTERINE TRANSPLANTATION FOR UTERINE INFERTILITY
Date: 16/08/2016
Name: DISHAL KP
Reg NO. U17MB291
Department: Obstetrics and Gynaecology

Q 1: Please rate your overall satisfaction with the format of the course:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 2: Please rate course notes:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 3: The lecture sequence was well planned

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 4: The lectures were clear and easy to understand

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 5: Please rate the quality of pre-course administration and information:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 6: Any other suggestions: NILL

Comments:

Thank you for taking the time to complete this survey, your comments are much appreciated.

***OPTIONAL Section*:** Name _____
Signature _____ Date _____

Date: 24.06.2020

From
Dr. Sangeetha
Assistant Professor,
Obstetrics and Gynaecology,
Sri Lakshmi Narayana institute of Medical sciences,
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To
The Dean,
Sri Lakshmi Narayana institute of Medical Sciences,
Bharath Institute of Higher Education and Research,
Chennai.

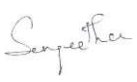
Sub: Completion of value-added course: Uterine Transplantation for Uterine Infertility

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: **Uterine Transplantation for Uterine Infertility** on JAN 2020- JUN 2020 . We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards

Dr.Sangeetha





VALUE ADDED COURSES

OBGY 12 UTERINE TRANSPLANTATION FOR UTERINE TRANSPLANTATION



Sri Lakshmi Narayana Institute of Medical Sciences

Date:02.12.2019

From
DR.V.R Sridhar
Professor and Head,
Department of Psychiatry,
Sri Lakshmi narayana institute of medical sciences,
Bharath Institute of Higher Education and Research,
Chennai.

To
The Dean,
Sri Lakshmi narayana institute of medical sciences,
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Schizophrenia subtypes, clinical features and its management

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **Schizophrenia subtypes, clinical features and its management** on 2/01/2020. We solicit your kind permission for the same.

Kind Regards

Dr.V.R. Sridhar

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: **Dr. Jayalakshmi**

The HOD: **Dr. Sridhar**

The Expert: **Dr. Arun Seetharaman.** The committee has discussed about the course and is approved.

Dean	Subject Expert	HOD
(Sign & Seal)	(Sign & Seal)	(Sign &Seal)

Dr. G. JAYALAKSHMI, BSC., MBBS., DTCD., M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Agaram, Kudapakkam Post,
Villianur Commune, Puducherry - 605502.

Dr. ARUN SEETHARAMAN, MD.,
Reg. No: 91440
Associate Professor, Psychiatry
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

Dr. V. R. SRIDHAR, MD.,D.P.M.,
Reg. No: 30995
Professor & HOD, Psychiatry
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.

[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affliated to Bharath University, Chennai - TN]

Circular

14.12.2019

Sub: Schizophrenia subtypes, clinical features and its management

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research** is organizing **"Schizophrenia subtypes, clinical features and its management"**. The course content and registration form is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before 31 December, 2019. Applications received after the mentioned date shall not be entertained under any circumstances.



Dean

Dr. G. JAYALAKSHMI, BSC., MBBS., DTCD., M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Agaram, Kudapakkam Post,
Villianur Commune, Puducherry - 605502.

Encl: Copy of Course content

Course Proposal

Course Title: **Schizophrenia subtypes, clinical features and its management**

Course Objective:

Epidemiology

Etiology

Diagnosis, signs & symptoms

Types

Laboratory & psychological tests

Pathophysiology

Psychodynamic factors

Differential diagnosis

Course and prognosis

Treatment

Interviewing techniques

Course Outcome:

Course Audience: CRRI STUDENTS of 2020 Batch
Course Coordinator: Dr.V.R. Sridhar
Course Faculties with Qualification and Designation:
1.Dr.V.R.SRIDHAR, Professor & HOD
2.Dr.Arun, Associate Professor
Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Resource person	Time	Hours
1.	02.01.2020	• **Introduction and Overview**	Dr.Arun	4-5p.m	1
2.	04.01.2020	• **Phenomenology of Schizophrenia.** • **Worldwide Burden of Schizophrenia**	Dr.Arun	2-3p.m	1
3.	06.01.2020	• **The Clinical Epidemiology of Schizophrenia** • **Cellular and Molecular Neuropathology of Schizophrenia**	Dr.Arun	4-6p.m	2
4.	09.01.2020	• **Structural Brain Imaging in Schizophrenia** • **Functional Brain Imaging in Schizophrenia** • **Molecular Brain Imaging in Schizophrenia**	Dr.Arun	4-6p.m	2
5.	11.01.2020	• **Neuro-cognition in Schizophrenia** • **Phenotypes of Psychosis**	Dr.Arun	4-6p.m	2

6.	13.01.2020	• **Schizophrenia: Pharmacological Treatment**	Dr.Arun	4-5p.m	2
7.	16.01.2020	• **Psychiatric Rehabilitation**	Dr.Arun	4-5P.M	1
8.	18.01.2020	• **Medical Health in Schizophrenia**	Dr.Arun	4-5p.m	1
9.	20.01.2020	• **Recovery in Schizophrenia**	Dr. Shridhar	4-6p.m	1
10.	23.01.2020	• **Psychosis as a Defining Dimension in Schizophrenia**	Dr.Arun	4-6p.m	2
11.	25.01.2020	• **Other Psychotic Disorders**	Dr.Arun	4-6p.m	1
12.	27.01.2020	• **Genetics of Schizophrenia**	Dr.Arun	4-6p.m	2
13.	30.01.2020	Pre course and Post Course evaluation, Feedback analysis from Likert scale	Dr.Arun	2-5p.m	3
		Practical Class I	Dr. Shridhar		
13.	01.02.2020	HISTORY TAKING	Dr. Shridhar	2-3 PM	1
14.	03.02.2020	MENTAL STATUS EXAMINATION	Dr. Shridhar	2-3 PM	1
15.	06.02.2020	CASE PRESENTATION	Dr. Shridhar	2-4 PM	2
16.	08.02.2020	FAMILY THERAPY	Dr. Shridhar	2-4 PM	2
17.	10.02.2020	TOKEN ECONOMY	Dr. Shridhar	2-4p.m	2
		Total			30 hrs

REFERENCE BOOKS:

- **Comprehensive textbook of psychiatry – Kaplan & Saddock**
- **Oxford Textbook Of Psychiatry**
- **Synopsis - Kaplan & Saddock**
- **Stahl's essential psychopharmacology**

VALUE ADDED COURSE

1. Name of the programme & Code

Schizophrenia subtypes, clinical features and its management

2. Duration & Period

January– March 2020

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Assessment Evolution by MCQ method - *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

1 time January– March 2020

8. Year of discontinuation: 2020

9. Summary report of each program year-wise

Value Added Course- January– March 2020					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	**PSYC11**	Schizoprenia subtypes,clinical features and its management	Dr. V.R. Sridhar Dr.Arun Seetharaman	CRRI Interns	15 students JAN-MARCH 2020

10. Course Feed Back

Enclosed as Annexure- V

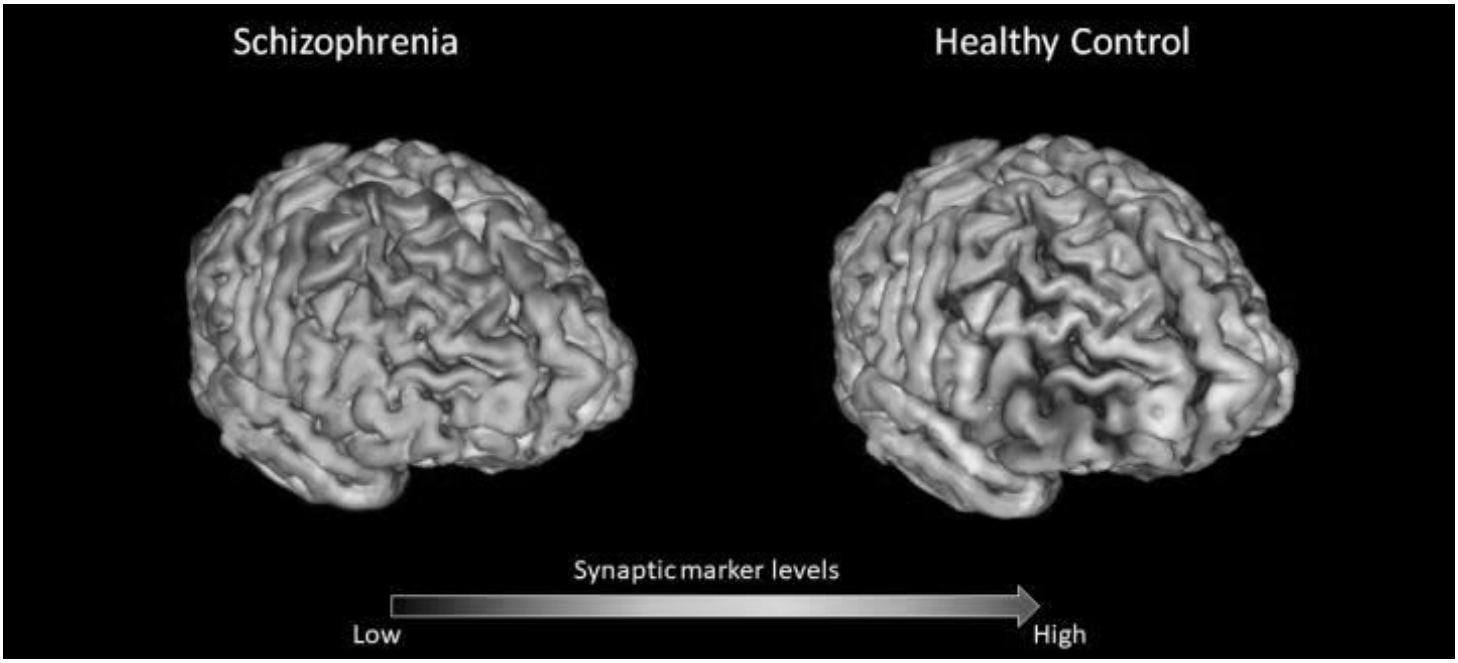
RESOURCE PERSON

1. **Dr.V.R. Sridhar**
2. **Dr. Arun Seetharaman**

COORDINATOR

Dr. .V.R. Sridhar

SCHIZOPHRENIA



PARTICIPANT HAND BOOK

BIHER SLIMS

COURSE DETAILS

Particulars	**Description**
Course Title	SCHIZOPHRENIA
Course Code	PSYC11
Objective	1. Introduction 2. Epidemiology 3. Etiology 4. Diagnosis, signs & symptoms 5. Types 6. Laboratory & psychological tests 7. Pathophysiology 8. Psychodynamic factors 9. Differential diagnosis 10. Course and prognosis 11. Treatment 12. Interviewing techniques
Further learning opportunities	Schizophrenia and its management
Key Competencies	On successful completion of the course the students will have skill in handling and managing schizophrenic patients
Target Student	FINAL YEAR STUDENTS
Duration	30hrs Every January – March 2020
Theory Session	10hrs
Practical Session	20hrs
Assessment Procedure	Multiple choice questions

Introduction

Schizophrenia is usually discussed as a single disease but it probably comprises a group of disorders along a spectrum with heterogeneous etiologies and is characterized by disturbances in cognition, emotion, perception, thinking, and behavior. Schizophrenia is well established as a brain disorder, with structural and functional abnormalities visible in neuroimaging studies and a genetic component as seen in twin studies. The disorder is usually chronic, with a course encompassing a prodromal phase, an active phase, and a residual phase. The active phase has symptoms such as hallucinations, delusions, and disorganized thinking. The prodromal and residual phases are characterized by attenuated forms of active symptoms, such as odd beliefs and magical thinking, as well as deficits in self-care and interpersonal relatedness. Since the 1970s, the number of schizophrenic patients in hospitals has decreased by over 50% (deinstitutionalization). Of those being treated, over 80% are managed as out-patients.

Schizophrenia is a psychiatric disorder characterized by continuous or relapsing episodes of psychosis.[5] Major symptoms include hallucinations (typically hearing voices), delusions, and disorganized thinking.[7] Other symptoms include social withdrawal, decreased emotional expression, and apathy.[5][13] Symptoms typically come on gradually, begin in young adulthood, and in many cases never resolve.[3][7] There is no objective diagnostic test; diagnosis is based on observed behavior, a history that includes the person's reported experiences, and reports of others familiar with the person.[7] To be diagnosed with schizophrenia, symptoms and functional impairment need to be present for six months (DSM-5) or one month (ICD-11).[7][11] Many people with schizophrenia have other mental disorders that often includes an anxiety disorder such as panic disorder, an obsessive–compulsive disorder, or a substance use disorder.[7]

About 0.3% to 0.7% of people are affected by schizophrenia during their lifetime.[14] In 2017, there were an estimated 1.1 million new cases and in 2019 a total of 20 million cases globally.[2][15] Males are more often affected and on average have an earlier onset.[2] The causes of schizophrenia include genetic and environmental factors.[5] Genetic factors include a variety of common and rare genetic variants.[16] Possible environmental factors include

being raised in a city, cannabis use during adolescence, infections, the ages of a person's mother or father, and poor nutrition during pregnancy.[5][17]

About half of those diagnosed with schizophrenia will have a significant improvement over the long term with no further relapses, and a small proportion of these will recover completely.[7][18] The other half will have a lifelong impairment,[19] and severe cases may be repeatedly admitted to hospital.[18] Social problems such as long-term unemployment, poverty, homelessness, exploitation, and victimization are common consequences of schizophrenia.[20][21] Compared to the general population, people with schizophrenia have a higher suicide rate (about 5% overall) and more physical health problems,[22][23] leading to an average decrease in life expectancy by 20 years.[10] In 2015, an estimated 17,000 deaths were caused by schizophrenia.[12]

The mainstay of treatment is antipsychotic medication, along with counselling, job training, and social rehabilitation.[5] Up to a third of people do not respond to initial antipsychotics, in which case the antipsychotic clozapine may be used.[24] In situations where there is a risk of harm to self or others, a short involuntary hospitalization may be necessary.[25] Long-term hospitalization may be needed for a small number of people with severe schizophrenia.[26] In countries where supportive services are limited or unavailable, long-term hospital stays are more typical.[27]

Signs and symptoms



My Eyes at the Moment of the Apparitions by German artist August Natterer, who had schizophrenia

Schizophrenia is a mental disorder characterized by significant alterations in perception, thoughts, mood, and behavior.[28] Symptoms are described in terms of positive, and negative, and cognitive symptoms.[3][29] The positive symptoms of schizophrenia are the same for any psychosis and are sometimes referred to as psychotic symptoms. These may be present in any of the different psychoses, and are often transient making early diagnosis of schizophrenia problematic. Psychosis noted for the first time in a person who is later diagnosed with schizophrenia is referred to as a first-episode psychosis (FEP).[30][31]

Positive symptoms

Positive symptoms are those symptoms that are not normally experienced, but are present in people during a psychotic episode in schizophrenia. They include delusions, hallucinations, and disorganized thoughts and speech, typically regarded as manifestations of psychosis.[30] Hallucinations most commonly involve the sense of hearing as hearing voices but can sometimes involve any of the other senses of taste, sight, smell, and touch.[32] They are also typically related to the content of the delusional theme.[33] Delusions are bizarre or persecutory in nature. Distortions of self-experience such as feeling as if one's thoughts or feelings are not really one's own, to believing that thoughts are being inserted into one's mind, sometimes termed passivity phenomena, are also common.[34] Thought disorders can include thought blocking, and disorganized speech – speech that is not understandable is known as word salad.[3][35] Positive symptoms generally respond well to medication,[5] and become reduced over the course of the illness, perhaps related to the age-related decline in dopamine activity.[7]

Negative symptoms

Negative symptoms are deficits of normal emotional responses, or of other thought processes. The five recognised domains of negative symptoms are: blunted affect – showing flat expressions or little emotion; alogia – a poverty of speech; anhedonia – an inability to feel pleasure; asociality – the lack of desire to form relationships, and avolition – a lack of motivation and apathy.[36][37] Avolition and anhedonia are seen as motivational deficits resulting from impaired reward processing.[38][39] Reward is the main driver of motivation and this is mostly mediated by dopamine.[39] It has been suggested that negative symptoms are multidimensional and they have been categorised into two subdomains of apathy or lack of motivation, and diminished expression.[36][40] Apathy includes avolition, anhedonia, and social withdrawal; diminished expression includes blunt effect, and alogia.[41] Sometimes diminished expression is treated as both verbal and non-verbal.[42] Apathy accounts for around 50 per cent of the most often found negative symptoms and affects functional outcome and subsequent quality of life. Apathy is related to disrupted cognitive processing affecting memory and planning including goal-directed behaviour.[43] The two subdomains has suggested a need for separate treatment approaches.[44] A lack of distress – relating to a reduced experience of depression and anxiety is another noted negative symptom.[45] A distinction is often made between those negative symptoms that are inherent to schizophrenia, termed primary; and those that result from positive symptoms, from the side effects of antipsychotics, substance abuse, and social deprivation - termed secondary negative symptoms.[46] Negative symptoms are less responsive to medication and the most difficult to treat.[44] However if properly assessed, secondary negative symptoms are amenable to treatment.[40]

Scales for specifically assessing the presence of negative symptoms, and for measuring their severity, and their changes have been introduced since the earlier scales such as the PANNS that deals with all types of symptoms.[44] These scales are the *Clinical Assessment Interview for Negative Symptoms* (CAINS), and the *Brief Negative Symptom Scale* (BNSS) also known as second-generation scales.[44][45][47] In 2020, ten years after its introduction a cross-cultural study of the use of BNSS found valid and reliable psychometric evidence for the five-domain structure cross-culturally.[45] The BNSS is designed to assess both the presence and severity and change of negative symptoms of the five recognised domains, and the additional item of reduced normal distress.[45] BNSS can register changes in negative symptoms in relation to psychosocial and pharmacological intervention trials. BNSS has also been used to study a proposed non-D2 treatment called SEP-363856. Findings supported the favouring of five domains over the two-dimensional proposition.[45]

Cognitive symptoms

See also: Visual processing abnormalities in schizophrenia

Cognitive deficits are the earliest and most constantly found symptoms in schizophrenia. They are often evident long before the onset of illness in the prodromal stage, and may be present in early adolescence, or childhood.[48][49] They are a core feature but not considered to be core symptoms, as are positive and negative symptoms.[50][51] However, their presence and degree of dysfunction is taken as a better indicator of functionality than the presentation of core symptoms.[48] Cognitive deficits become worse at first episode psychosis but then return to baseline, and remain fairly stable over the course of the illness.[52][53]

The deficits in cognition are seen to drive the negative psychosocial outcome in schizophrenia, and are claimed to equate to a possible reduction in IQ from the norm of 100 to 70–85.[54][55] Cognitive deficits may be of neurocognition (nonsocial) or of social cognition.[56] Neurocognition is the ability to receive and remember information, and includes verbal fluency, memory, reasoning, problem solving, speed of processing, and auditory and visual perception.[53] Verbal memory and attention are seen to be the most affected.[55][57] Verbal memory impairment is associated with a decreased level of semantic processing (relating meaning to words).[58] Another memory impairment is that of episodic memory.[59] An impairment in visual perception that is consistently found in schizophrenia is that of visual backward masking.[53] Visual processing impairments include an inability to perceive complex visual illusions.[60] Social cognition is concerned with the mental operations needed to interpret, and understand the self and others in the social world.[53][56] This is also an associated impairment, and facial emotion perception is often found to be difficult.[61][62] Facial perception is critical for

ordinary social interaction.[63] Cognitive impairments do not usually respond to antipsychotics, and there are a number of interventions that are used to try to improve them; cognitive remediation therapy has been found to be of particular help.[51]

Onset

Further information: Basic symptoms of schizophrenia

See also: Childhood schizophrenia and Adolescence § Changes in the brain

Onset typically occurs between the late teens and early 30s, with the peak incidence occurring in males in the early to mid twenties, and in females in the late twenties.[3][7][11] Onset before the age of 17 is known as early-onset,[64] and before the age of 13, as can sometimes occur, is known as childhood schizophrenia or very early-onset.[7][65] A later stage of onset can occur between the ages of 40 and 60, known as late-onset schizophrenia.[56] A later onset over the age of 60, which may be difficult to differentiate as schizophrenia, is known as very-late-onset schizophrenia-like psychosis.[56] Late onset has shown that a higher rate of females are affected; they have less severe symptoms and need lower doses of antipsychotics.[56] The tendency for earlier onset in males is later seen to be balanced by a post-menopausal increase in the development in females. Estrogen produced pre-menopause has a dampening effect on dopamine receptors but its protection can be overridden by a genetic overload.[66] There has been a dramatic increase in the numbers of older adults with schizophrenia.[67] An estimated 70% of those with schizophrenia have cognitive deficits, and these are most pronounced in early onset and late-onset illness.[56][68]

Onset may happen suddenly or may occur after the slow and gradual development of a number of signs and symptoms, a period known as the prodromal stage.[7] Up to 75% of those with schizophrenia go through a prodromal stage.[69] The negative and cognitive symptoms in the prodrome stage can precede FEP by many months and up to five years.[52][70] The period from FEP and treatment is known as the duration of untreated psychosis (DUP) which is seen to be a factor in functional outcome. The prodromal stage is the high-risk stage for the development of psychosis.[53] Since the progression to first episode psychosis is not inevitable, an alternative term is often preferred of at risk mental state[53] Cognitive dysfunction at an early age impact a young person's usual cognitive development.[71] Recognition and early intervention at the prodromal stage would minimize the associated disruption to educational and social development and has been the focus of many studies.[52][70] It is suggested that the use of anti-inflammatory compounds such as D-serine may prevent the transition to schizophrenia.[52] Cognitive symptoms are not secondary to positive symptoms or to the side effects of antipsychotics.[53]

Cognitive impairments in the prodromal stage become worse after first episode psychosis (after which they return to baseline and then remain fairly stable), making early intervention to prevent such transition of prime importance.[52] Early treatment with cognitive behavioral therapies are the gold standard.[70] Neurological soft signs of clumsiness and loss of fine motor movement are often found in schizophrenia, which may resolve with effective treatment of FEP.[11][72]

Risk factors

Main article: Risk factors of schizophrenia

See also: Developmental psychobiology

Schizophrenia is described as a neurodevelopmental disorder with no precise boundary, or single cause, and is thought to develop from gene–environment interactions with involved vulnerability factors.[5][73][74] The interactions of these risk factors are complex, as numerous and diverse insults from conception to adulthood can be involved.[74] A genetic predisposition on its own, without interacting environmental factors, will not give rise to the development of schizophrenia.[74][75] The genetic component means that prenatally brain development is disturbed, and environmental influence affects the postnatal development of the brain.[76] Evidence suggests that genetically susceptible children are more likely to be vulnerable to the effects of environmental risk factors.[76]

Genetic

Estimates of the heritability of schizophrenia are between 70% and 80%, which implies that 70% to 80% of the individual differences in risk to schizophrenia is associated with genetics.[16][77] These estimates vary because of the difficulty in separating genetic and environmental influences, and their accuracy has been queried.[78][79] The greatest risk factor for developing schizophrenia is having a first-degree relative with the disease (risk is 6.5%); more than 40% of identical twins of those with schizophrenia are also affected.[80] If one parent is affected the risk is about 13% and if both are affected the risk is nearly 50%.[77] However, DSM-5 points out that most people with schizophrenia have no family history of psychosis.[7] Results of candidate gene studies of schizophrenia have generally failed to find consistent associations,[81] and the genetic loci identified by genome-wide association studies explain only a small fraction of the variation in the disease.[82]

Many genes are known to be involved in schizophrenia, each with small effect and unknown transmission and expression.[16][83] The summation of these effect sizes into a polygenic risk score can explain at least 7% of the variability in liability for schizophrenia.[84] Around 5% of cases of schizophrenia are understood to be at least partially attributable to rare copy-number

variations (CNVs); these structural variations are associated with known genomic disorders involving deletions at 22q11.2 (DiGeorge syndrome) and 17q12 (17q12 microdeletion syndrome), duplications at 16p11.2 *16p11.2 duplication* (most frequently found) and deletions at 15q11.2 (Burnside-Butler syndrome).[85] Some of these CNVs increase the risk of developing schizophrenia by as much as 20-fold, and are frequently comorbid with autism and intellectual disabilities.[85]

The genes CRHR1 and CRHBP have been shown to be associated with a severity of suicidal behavior. These genes code for stress response proteins needed in the control of the HPA axis, and their interaction can affect this axis. Response to stress can cause lasting changes in the function of the HPA axis possibly disrupting the negative feedback mechanism, homeostasis, and the regulation of emotion leading to altered behaviors.[75]

The question of how schizophrenia could be primarily genetically influenced, given that people with schizophrenia have lower fertility rates, is a paradox. It is expected that genetic variants that increase the risk of schizophrenia would be selected against due to their negative effects on reproductive fitness. A number of potential explanations have been proposed, including that alleles associated with schizophrenia risk confers a fitness advantage in unaffected individuals.[86][87] While some evidence has not supported this idea,[79] others propose that a large number of alleles each contributing a small amount can persist.[88]

Environmental

Further information: Prenatal nutrition, Prenatal stress, and Neuroplastic effects of pollution

Environmental factors, each associated with a slight risk of developing schizophrenia in later life include oxygen deprivation, infection, prenatal maternal stress, and malnutrition in the mother during prenatal development.[89] A risk is also associated with maternal obesity, in increasing oxidative stress, and dysregulating the dopamine and serotonin pathways.[90] Both maternal stress and infection have been demonstrated to alter fetal neurodevelopment through an increase of pro-inflammatory cytokines.[91] There is a slighter risk associated with being born in the winter or spring possibly due to vitamin D deficiency[92] or a prenatal viral infection.[80] Other infections during pregnancy or around the time of birth that have been linked to an increased risk include infections by *Toxoplasma gondii* and *Chlamydia*.[93] The increased risk is about five to eight percent.[94] Viral infections of the brain during childhood are also linked to a risk of schizophrenia during adulthood.[95]

Adverse childhood experiences (ACEs), severe forms of which are classed as childhood trauma, range from being bullied or abused, to the death of a

parent.[96] Many adverse childhood experiences can cause toxic stress and increase the risk of psychosis.[96][97][98] Chronic trauma can promote lasting inflammatory dysregulation throughout the nervous system.[99] It is suggested that early stress may contribute to the developmenmt of schizophrenia through these alterations in the immune system.[99] Schizophrenia was the last diagnosis to benefit from the link made between ACEs and adult mental health outcomes.[100]

Living in an urban environment during childhood or as an adult has consistently been found to increase the risk of schizophrenia by a factor of two,[22][101] even after taking into account drug use, ethnic group, and size of social group.[102] A possible link between the urban environment and pollution has been suggested to be the cause of the elevated risk of schizophrenia.[103]

Other risk factors of importance include social isolation, immigration related to social adversity and racial discrimination, family dysfunction, unemployment, and poor housing conditions.[80][104] Having a father older than 40 years, or parents younger than 20 years are also associated with schizophrenia.[5][105] It has been suggested that apart from gene-environment interactions, environment-environment interactions also be taken into account as each environmental risk factor on its own is not enough.[89]

Substance use

Further information: Risk factors of schizophrenia § Substance use

About half of those with schizophrenia use recreational drugs, including cannabis, tobacco, and alcohol excessively.[106][107] Use of stimulants such as amphetamine and cocaine can lead to a temporary stimulant psychosis, which presents very similarly to schizophrenia. Rarely, alcohol use can also result in a similar alcohol-related psychosis.[80][108] Drugs may also be used as coping mechanisms by people who have schizophrenia, to deal with depression, anxiety, boredom, and loneliness.[106][109] The use of cannabis and tobacco are not associated with the development of cognitive deficits, and sometimes a reverse relationship is found where their use improves these symptoms.[51] However, substance abuse is associated with an increased risk of suicide, and a poor response to treatment.[110]

Cannabis-use may be a contributory factor in the development of schizophrenia, potentially increasing the risk of the disease in those who are already at risk.[17] The increased risk may require the presence of certain genes within an individual.[17] Its use is associated with doubling the rate.[111] The use of more potent strains of cannabis having a high level of its active ingredient tetrahydrocannabinol (THC), increases the risk further. One of these strains is well known as skunk.[112][113]

Mechanisms

Main article: Mechanisms of schizophrenia

See also: Aberrant salience

The mechanisms of schizophrenia are unknown, and a number of models have been put forward to explain the link between altered brain function and schizophrenia.[22] The prevailing model of schizophrenia is that of a neurodevelopmental disorder, and the underlying changes that occur before symptoms become evident are seen as arising from the interaction between genes and the environment.[114] Extensive studies support this model.[69] Maternal infections, malnutrition and complications during pregnancy and childbirth are known risk factors for the development of schizophrenia, which usually emerges between the ages of 18-25 a period that overlaps with certain stages of neurodevelopment.[115] Gene-environment interactions lead to deficits in the neural circuitry that affect sensory and cognitive functions.[69]

The common dopamine and glutamate models proposed are not mutually exclusive; each is seen to have a role in the neurobiology of schizophrenia.[116] The most common model put forward was the dopamine hypothesis of schizophrenia, which attributes psychosis to the mind's faulty interpretation of the misfiring of dopaminergic neurons.[117] This has been directly related to the symptoms of delusions and hallucinations.[118][119][120] Abnormal dopamine signaling has been implicated in schizophrenia based on the usefulness of medications that affect the dopamine receptor and the observation that dopamine levels are increased during acute psychosis.[121][122] A decrease in D_1 receptors in the dorsolateral prefrontal cortex may also be responsible for deficits in working memory.[123][124]

The glutamate hypothesis of schizophrenia links alterations between glutamatergic neurotransmission and the neural oscillations that affect connections between the thalamus and the cortex.[125] Studies have shown that a reduced expression of a glutamate receptor – NMDA receptor, and glutamate blocking drugs such as phencyclidine and ketamine can mimic the symptoms and cognitive problems associated with schizophrenia.[125][126][127] Post-mortem studies consistently find that a subset of these neurons fail to express GAD67 (GAD1),[128] in addition to abnormalities in brain morphometry. The subsets of interneurons that are abnormal in schizophrenia are responsible for the synchronizing of neural ensembles needed during working memory tasks. These give the neural oscillations produced as gamma waves that have a frequency of between 30 and 80 hertz. Both working memory tasks and gamma waves are impaired in schizophrenia, which may reflect abnormal interneuron functionality.[128][129][130][131]

Deficits in executive functions, such as planning, inhibition, and working memory, are pervasive in schizophrenia. Although these functions are separable, their dysfunction in schizophrenia may reflect an underlying deficit in the ability to represent goal related information in working memory, and to utilize this to direct cognition and behavior.[132][133] These impairments have been linked to a number of neuroimaging and neuropathological abnormalities. For example, functional neuroimaging studies report evidence of reduced neural processing efficiency, whereby the dorsolateral prefrontal cortex is activated to a greater degree to achieve a certain level of performance relative to controls on working memory tasks. These abnormalities may be linked to the consistent post-mortem finding of reduced neuropil, evidenced by increased pyramidal cell density and reduced dendritic spine density. These cellular and functional abnormalities may also be reflected in structural neuroimaging studies that find reduced grey matter volume in association with deficits in working memory tasks.[134]

Positive symptoms have been linked to cortical thinning in the superior temporal gyrus.[135] Severity of negative symptoms has been linked to reduced thickness in the left medial orbitofrontal cortex.[136] Anhedonia, traditionally defined as a reduced capacity to experience pleasure, is frequently reported in schizophrenia. However, a large body of evidence suggests that hedonic responses are intact in schizophrenia,[137] and that what is reported to be anhedonia is a reflection of dysfunction in other processes related to reward.[138] Overall, a failure of reward prediction is thought to lead to impairment in the generation of cognition and behavior required to obtain rewards, despite normal hedonic responses.[139]

It has been hypothesized that in some people, development of schizophrenia is related to intestinal tract dysfunction such as seen with non-celiac gluten sensitivity or abnormalities in the gut microbiota.[140] A subgroup of persons with schizophrenia present an immune response to gluten differently from that found in people with celiac, with elevated levels of certain serum biomarkers of gluten sensitivity such as anti-gliadin IgG or anti-gliadin IgA antibodies.[141]

Another theory links abnormal brain lateralization to the development of being left-handed which is significantly more common in those with schizophrenia.[142] This abnormal development of hemispheric asymmetry is noted in schizophrenia.[143] Studies have concluded that the link is a true and verifiable effect that may reflect a genetic link between lateralization and schizophrenia.[142][144]

An important process that may be disrupted in neurodevelopment is astrogenesis – the formation of astrocytes. Astrocytes are crucial in contributing to the formation and maintenance of neural circuits and it is believed that

disruption in this role can result in a number of neurodevelopmental disorders including schizophrenia.[145]

Bayesian models of brain functioning have been utilized to link abnormalities in cellular functioning to symptoms.[146][147] Both hallucinations and delusions have been suggested to reflect improper encoding of prior expectations, thereby causing expectation to excessively influence sensory perception and the formation of beliefs. In approved models of circuits that mediate predictive coding, reduced NMDA receptor activation, could in theory result in the positive symptoms of delusions and hallucinations.[148][149][150]

Diagnosis

Main article: Diagnosis of schizophrenia

There is no objective test or biomarker to confirm diagnosis. Psychoses can occur in several conditions and are often transient making early diagnosis of schizophrenia difficult. Psychosis noted for the first time in a person that is later diagnosed with schizophrenia is referred to as a first-episode psychosis (FEP).

Criteria

Schizophrenia is diagnosed based on criteria in either the *Diagnostic and Statistical Manual of Mental Disorders* (DSM) published by the American Psychiatric Association or the International Statistical Classification of Diseases and Related Health Problems (ICD) published by the World Health Organization. These criteria use the self-reported experiences of the person and reported abnormalities in behavior, followed by a psychiatric assessment. The mental status examination is an important part of the assessment.[151] An established tool for assessing the severity of positive and negative symptoms is the Positive and Negative Syndrome Scale (PANSS).[152] This has been seen to have shortcomings relating to negative symptoms, and other scales – the *Clinical Assessment Interview for Negative Symptoms* (CAINS), and the *Brief Negative Symptoms Scale* (BNSS) have been introduced.[44] The DSM-5, published in 2013, gives a *Scale to Assess the Severity of Symptom Dimensions* outlining eight dimensions of symptoms.[50]

DSM-5 states that to be diagnosed with schizophrenia, two diagnostic criteria have to be met over the period of one month, with a significant impact on social or occupational functioning for at least six months. One of the symptoms needs to be either delusions, hallucinations, or disorganized speech. A second symptom could be one of the negative symptoms, or severely disorganized or catatonic behaviour.[7] A different diagnosis of schizophreniform disorder can be made before the six months needed for the diagnosis of schizophrenia.[7]

In Australia the guideline for diagnosis is for six months or more with symptoms severe enough to affect ordinary functioning.[153] In the UK diagnosis is based on having the symptoms for most of the time for one month, with

symptoms that significantly affect the ability to work, study, or to carry on ordinary daily living, and with other similar conditions ruled out.[154]

The ICD criteria are typically used in European countries; the DSM criteria are used predominantly in the United States and Canada, and are prevailing in research studies. In practice, agreement between the two systems is high.[155] The current proposal for the ICD-11 criteria for schizophrenia recommends adding self-disorder as a symptom.[34]

A major unresolved difference between the two diagnostic systems is that of the requirement in DSM of an impaired functional outcome. WHO for ICD argues that not all people with schizophrenia have functional deficits and so these are not specific for the diagnosis.[50]

Changes made

Both manuals have adopted the chapter heading of *Schizophrenia spectrum and other psychotic disorders*; ICD modifying this as *Schizophrenia spectrum and other primary psychotic disorders*.[50] The definition of schizophrenia remains essentially the same as that specified by the 2000 text revised DSM-IV (DSM-IV-TR). However, with the publication of DSM-5, the APA removed all sub-classifications of schizophrenia.[50] ICD-11 has also removed subtypes. The removed subtype from both, of catatonic has been relisted in ICD-11 as a *psychomotor disturbance* that may be present in schizophrenia.[50]

Another major change was to remove the importance previously given to Schneider's first-rank symptoms.[156] DSM-5 still uses the listing of schizophreniform disorder but ICD-11 no longer includes it.[50] DSM-5 also recommends that a better distinction be made between a current condition of schizophrenia and its historical progress, to achieve a clearer overall characterization.[156]

A dimensional assessment has been included in DSM-5 covering eight dimensions of symptoms to be rated (using the *Scale to Assess the Severity of Symptom Dimensions*) – these include the five diagnostic criteria plus cognitive impairments, mania, and depression.[50] This can add relevant information for the individual in regard to treatment, prognosis, and functional outcome; it also enables the response to treatment to be more accurately described.[50][157]

Two of the negative symptoms – avolition and diminished emotional expression, have been given more prominence in both manuals.[50]

Comorbidities

Many people with schizophrenia may have one or more other mental disorders, such as panic disorder, obsessive-compulsive disorder, or substance use disorder. These are separate disorders that require treatment.[7] When comorbid with schizophrenia, substance use disorder and antisocial personality

disorder both increase the risk for violence.[158] Comorbid substance abuse also increases risk for suicide.[110]

Sleep disorders often co-occur with schizophrenia, and may be an early sign of relapse.[159] Sleep disorders are linked with positive symptoms such as disorganized thinking and can adversely affect cortical plasticity and cognition.[159] The consolidation of memories is disrupted in sleep disorders.[160] They are associated with severity of illness, a poor prognosis, and poor quality of life.[161][162] Sleep onset and maintenance insomnia is a common symptom, regardless of whether treatment has been received or not.[161] Genetic variations have been found associated with these conditions involving the circadian rhythm, dopamine and histamine metabolism, and signal transduction.[163] Limited positive evidence has been found for the use of acupuncture as an add-on.[164]

Differential diagnosis

See also: Dual diagnosis and Comparison of bipolar disorder and schizophrenia

To make a diagnosis of schizophrenia other possible causes of psychosis need to be excluded.[165] Psychotic symptoms lasting less than a month may be diagnosed as brief psychotic disorder, or as schizophreniform disorder. Psychosis is noted in *Other specified schizophrenia spectrum and other psychotic disorders* as a DSM-5 category. Schizoaffective disorder is diagnosed if symptoms of mood disorder are substantially present alongside psychotic symptoms. Psychosis that results from a general medical condition or substance is termed secondary psychosis.[7] Psychotic symptoms may be present in several other conditions, including bipolar disorder,[8] borderline personality disorder,[9] substance intoxication, substance-induced psychosis, and a number of drug withdrawal syndromes. Non-bizarre delusions are also present in delusional disorder, and social withdrawal in social anxiety disorder, avoidant personality disorder and schizotypal personality disorder. Schizotypal personality disorder has symptoms that are similar but less severe than those of schizophrenia.[7] Schizophrenia occurs along with obsessive-compulsive disorder (OCD) considerably more often than could be explained by chance, although it can be difficult to distinguish obsessions that occur in OCD from the delusions of schizophrenia.[166] There can be considerable overlap with the symptoms of post-traumatic stress disorder.[167]

A more general medical and neurological examination may be needed to rule out medical illnesses which may rarely produce psychotic schizophrenia-like symptoms, such as metabolic disturbance, systemic infection, syphilis, HIV-associated neurocognitive disorder, epilepsy, limbic encephalitis, and brain lesions. Stroke, multiple sclerosis, hyperthyroidism, hypothyroidism, and dementias such as Alzheimer's disease, Huntington's

disease, frontotemporal dementia, and the Lewy body dementias may also be associated with schizophrenia-like psychotic symptoms.[168] It may be necessary to rule out a delirium, which can be distinguished by visual hallucinations, acute onset and fluctuating level of consciousness, and indicates an underlying medical illness. Investigations are not generally repeated for relapse unless there is a specific *medical* indication or possible adverse effects from antipsychotic medication. In children hallucinations must be separated from typical childhood fantasies.[7] It is difficult to distinguish childhood schizophrenia from autism.[65]

Prevention

Prevention of schizophrenia is difficult as there are no reliable markers for the later development of the disorder.[169] There is tentative though inconclusive evidence for the effectiveness of early intervention to prevent schizophrenia in the prodrome phase.[170] There is some evidence that early intervention in those with first-episode psychosis may improve short-term outcomes, but there is little benefit from these measures after five years.[22] Cognitive behavioral therapy may reduce the risk of psychosis in those at high risk after a year[171] and is recommended in this group, by the National Institute for Health and Care Excellence (NICE).[28] Another preventive measure is to avoid drugs that have been associated with development of the disorder, including cannabis, cocaine, and amphetamines.[80]

Antipsychotics are prescribed following a first-episode psychosis, and following remission a preventive maintenance use is continued to avoid relapse. However, it is recognised that some people do recover following a single episode and that long-term use of antipsychotics will not be needed but there is no way of identifying this group.[172]

Management

Main article: Management of schizophrenia

The primary treatment of schizophrenia is the use of antipsychotic medications, often in combination with psychosocial interventions and social supports.[22][173] Community support services including drop-in centers, visits by members of a community mental health team, supported employment,[174] and support groups are common. The time between the onset of psychotic symptoms to being given treatment – the duration of untreated psychosis (DUP) is associated with a poorer outcome in both the short term and the long term.[175]

Voluntary or involuntary admittance to hospital may be needed to treat a severe episode, however, hospital stays are as short as possible. In the UK large mental hospitals termed asylums began to be closed down in the 1950s with the advent of antipsychotics, and with an awareness of the negative impact of long-term hospital stays on recovery.[20] This process was known as deinstitutionalization, and community and supportive services were developed in order to support this

change. Many other countries followed suit with the US starting in the 60s.[176] There will still remain a few people who do not improve enough to be discharged.[20][26] In those countries that lack the necessary supportive and social services long-term hospital stays are more usual.[27]

Medication



Risperidone (trade name Risperdal) is a common atypical antipsychotic medication.

The first-line treatment for schizophrenia is an antipsychotic. The first-generation antipsychotics, now called typical antipsychotics, are dopamine antagonists that block D2 receptors, and affect the neurotransmission of dopamine. Those brought out later, the second-generation antipsychotics known as atypical antipsychotics, can also have effect on another neurotransmitter, serotonin. Antipsychotics can reduce the symptoms of anxiety within hours of their use but for other symptoms they may take several days or weeks to reach their full effect.[30][177] They have little effect on negative and cognitive symptoms, which may be helped by additional psychotherapies and medications.[178] There is no single antipsychotic suitable for first-line treatment for everyone, as responses and tolerances vary between people.[179] Stopping medication may be considered after a single psychotic episode where there has been a full recovery with no symptoms for twelve months. Repeated relapses worsen the long-term outlook and the risk of relapse following a second episode is high, and long-term treatment is usually recommended.[180][181]

Tobacco smoking increases the metabolism of some antipsychotics, by strongly activitating CYP1A2, the enzyme that breaks them down, and a significant difference is found in these levels between smokers and non-smokers.[182][183][184] It is recommended that the dosage for those smokers on clozapine be increased by 50%, and for those on olanzapine by 30%.[183] The result of stopping smoking can lead to an increased concentration of the antipsychotic that may result in toxicity, so that monitoring of effects would need to take place with a view to decreasing the dosage; many symptoms may

be noticeably worsened, and extreme fatigue, and seizures are also possible with a risk of relapse. Likewise those who resume smoking may need their dosages adjusted accordingly.[182][185] The altering effects are due to compounds in tobacco smoke and not to nicotine; the use of nicotine replacement therapy therefore has the equivalent effect of stopping smoking and monitoring would still be needed.[182]

About 30 to 50 percent of people with schizophrenia fail to accept that they have an illness or comply with their recommended treatment.[186] For those who are unwilling or unable to take medication regularly, long-acting injections of antipsychotics may be used,[187] which reduce the risk of relapse to a greater degree than oral medications.[188] When used in combination with psychosocial interventions, they may improve long-term adherence to treatment.[189]

Research findings suggested that other neurotransmission systems, including serotonin, glutamate, GABA, and acetycholine, were implicated in the development of schizophrenia, and that a more inclusive medication was needed.[184] A new first-in-class antipsychotic that targets multiple neurotransmitter systems called lumateperone (ITI-007), was trialed and approved by the FDA in December 2019 for the treatment of schizophrenia in adults.[184][190][191] Lumateperone is a small molecule agent that shows improved safety, and tolerance. It interacts with dopamine, serotonin, and glutamate in a complex, uniquely selective manner, and is seen to improve negative and positive symptoms, and social functioning.[192] Lumateperone was also found to reduce potential metabolic dysfunction, have lower rates of movement disorders, and have lower cardiovascular side effects such as a fast heart rate.[184]

Side effects

Typical antipsychotics are associated with a higher rate of movement disorders including akathisia. Some atypicals are associated with considerable weight gain, diabetes and the risk of metabolic syndrome.[193] Risperidone (atypical) has a similar rate of extrapyramidal symptoms to haloperidol (typical).[193] A rare but potentially lethal condition of neuroleptic malignant syndrome (NMS) has been associated with the use of antipsychotics. Through its early recognition, and timely intervention rates have declined. However, an awareness of the syndrome is advised to enable intervention.[194] Another less rare condition of tardive dyskinesia can occur due to long-term use of antipsychotics, developing after many months or years of use. It is more often reported with use of typical antipsychotics.[195]

Clozapine is associated with side effects that include weight gain, tiredness, and hypersalivation. More serious adverse effects include seizures, NMS, neutropenia, and agranulocytosis (lowered white blood cell count) and its use needs careful monitoring.[196][197] Studies have found that antipsychotic

treatment following NMS and neutropenia may sometimes be successfully rechallenged (restarted) with clozapine.[198][199]

Clozapine is also associated with thromboembolism (including pulmonary embolism), myocarditis, and cardiomyopathy.[200][201] A systematic review of clozapine-associated pulmonary embolism indicates that this adverse effect can often be fatal, and that it has an early onset, and is dose-dependent. The findings advised the consideration of using a prevention therapy for venous thromboembolism after starting treatment with clozapine, and continuing this for six months.[201] Constipation is three times more likely to occur with the use of clozapine, and severe cases can lead to ileus and bowel ischemia resulting in many fatalities.[196]

However, the risk of serious adverse effects from clozapine is low, and there are the beneficial effects to be gained of a reduced risk of suicide, and aggression.[202][203] Typical antipsychotics and atypical risperidone can have a side effect of sexual dysfunction.[80] Clozapine, olanzapine, and quetiapine are associated with beneficial effects on sexual functioning helped by various psychotherapies.[204] Unwanted side effects cause people to stop treatment, resulting in relapses.[205]

Treatment resistant schizophrenia

About half of those with schizophrenia will respond favourably to antipsychotics, and have a good return of functioning.[206] However, positive symptoms persist in up to a third of people. Following two trials of different antipsychotics over six weeks, that also prove ineffective, they will be classed as having treatment resistant schizophrenia (TRS), and clozapine will be offered.[207][24] Clozapine is of benefit to around half of this group although it has the potentially serious side effect of agranulocytosis (lowered white blood cell count) in less than 4% of people.[22][80][208] Between 12 and 20 per cent will not respond to clozapine and this group is said to have ultra treatment resistant schizophrenia.[207][209] ECT may be offered to treat TRS as an add-on therapy, and is shown to sometimes be of benefit.[209] A review concluded that this use only has an effect on medium-term TRS and that there is not enough evidence to support its use other than for this group.[210]

TRS is often accompanied by a low quality of life, and greater social dysfunction.[211] TRS may be the result of inadequate rather than inefficient treatment; it also may be a false label due to medication not being taken regularly, or at all.[203] About 16 per cent of people who had initially been responsive to treatment later develop resistance. This could relate to the length of time on APs, with treatment becoming less responsive.[212] This finding also supports the involvement of dopamine in the development of schizophrenia.[203] Studies suggest that TRS may be a more heritable form.[213]

TRS may be evident from first episode psychosis, or from a relapse. It can vary in its intensity and response to other therapies.[211] This variation is seen to possibly indicate an underlying neurobiology such as dopamine supersensitivity (DSS), glutamate or serotonin dysfunction, inflammation and oxidative stress.[207] Studies have found that dopamine supersensitivity is found in up to 70% of those with TRS.[214] The variation has led to the suggestion that treatment responsive and treatment resistant schizophrenia be considered as two different subtypes.[207][213] It is further suggested that if the subtypes could be distinguished at an early stage significant implications could follow for treatment considerations, and for research.[209] Neuroimaging studies have found a significant decrease in the volume of grey matter in those with TRS with no such change seen in those who are treatment responsive.[209] In those with ultra treatment resistance the decrease in grey matter volume was larger.[207][209]

A link has been made between the gut microbiota and the development of TRS. The most prevalent cause put forward for TRS is that of mutation in the genes responsible for drug effectiveness. These include liver enzyme genes that control the availability of a drug to brain targets, and genes responsible for the structure and function of these targets. In the colon the bacteria encode a hundred times more genes than exist in the human genome. Only a fraction of ingested drugs reach the colon, having been already exposed to small intestinal bacteria, and absorbed in the portal circulation. This small fraction is then subject to the metabolic action of many communities of bacteria. Activation of the drug depends on the composition and enzymes of the bacteria and of the specifics of the drug, and therefore a great deal of individual variation can affect both the usefulness of the drug and its tolerability. It is suggested that parenteral administration of antipsychotics would bypass the gut and be more successful in overcoming TRS. The composition of gut microbiota is variable between individuals, but they are seen to remain stable. However, phyla can change in response to many factors including ageing, diet, substance-use, and medications – especially antibiotics, laxatives, and antipsychotics. In FEP, schizophrenia has been linked to significant changes in the gut microbiota that can predict response to treatment.[215]

Psychosocial interventions

Further information: Management of schizophrenia § Psychosocial

A number of psychosocial interventions that include several types of psychotherapy may be useful in the treatment of schizophrenia such as: family therapy,[216] group therapy, cognitive remediation therapy,[217] cognitive behavioral therapy, and metacognitive training.[218] Skills training, and help with substance use, and weight management– often needed as a side effect of an antipsychotic, are also offered.[219] In the US, interventions for first episode psychosis have been brought together in an overall approach known as coordinated speciality care (CSC) and also includes support for

education.[30] In the UK *care across all phases* is a similar approach that covers many of the treatment guidelines recommended.[28] The aim is to reduce the number of relapses and stays in hospital.[216]

Other support services for education, employment, and housing are usually offered. For people suffering from severe schizophrenia, and discharged from a stay in hospital, these services are often brought together in an integrated approach to offer support in the community away from the hospital setting. In addition to medicine management, housing, and finances, assistance is given for more routine matters such as help with shopping and using public transport. This approach is known as assertive community treatment (ACT) and has been shown to achieve positive results in symptoms, social functioning and quality of life.[220][221] Another more intense approach is known as *intensive care management* (ICM). ICM is a stage further than ACT and emphasises support of high intensity in smaller caseloads, (less than twenty). This approach is to provide long-term care in the community. Studies show that ICM improves many of the relevant outcomes including social functioning.[222]

Some studies have shown little evidence for the effectiveness of cognitive behavioral therapy (CBT) in either reducing symptoms or preventing relapse.[223][224] However, other studies have found that CBT does improve overall psychotic symptoms (when in use with medication) and has been recommended in Canada, but it has been seen here to have no effect on social function, relapse, or quality of life.[225] In the UK it is recommended as an add-on therapy in the treatment of schizophrenia, but is not supported for use in treatment resistant schizophrenia.[224][226] Arts therapies are seen to improve negative symptoms in some people, and are recommended by NICE in the UK.[177][227] This approach however, is criticised as having not been well-researched, and arts therapies are not recommended in Australian guidelines for example.[227][228][229] Peer support, in which people with personal experience of schizophrenia, provide help to each other, is of unclear benefit.[230]

Other

Exercise including aerobic exercise has been shown to improve positive and negative symptoms, cognition, working memory, and improve quality of life.[231][232] Exercise has also been shown to increase the volume of the hippocampus in those with schizophrenia. A decrease in hippocampal volume is one of the factors linked to the development of the disease.[231] However, there still remains the problem of increasing motivation for, and maintaining participation in physical activity.[233] Supervised sessions are recommended.[232] In the UK healthy eating advice is offered alongside exercise programs.[234]

An inadequate diet is often found in schizophrenia, and associated vitamin deficiencies including those of folate, and vitamin D are linked to the risk

factors for the development of schizophrenia and for early death including heart disease.[235][236] Those with schizophrenia possibly have the worst diet of all the mental disorders. Lower levels of folate and vitamin D have been noted as significantly lower in first episode psychosis.[235] The use of supplemental folate is recommended.[237] A zinc deficiency has also been noted.[238] Vitamin B12 is also often deficient and this is linked to worse symptoms. Supplementation with B vitamins has been shown to significantly improve symptoms, and to put in reverse some of the cognitive deficits.[235] It is also suggested that the noted dysfunction in gut microbiota might benefit from the use of probiotics.[238]

Violence

Most people with schizophrenia are not aggressive, and are more likely to be victims of violence rather than perpetrators.[7] However, though the risk of violence in schizophrenia is small the association is consistent, and there are minor subgroups where the risk is high.[158] This risk is usually associated with a comorbid disorder such as a substance use disorder - in particular alcohol, or with antisocial personality disorder.[158] Substance abuse is strongly linked, and other risk factors are linked to deficits in cognition and social cognition including facial perception and insight that are in part included in theory of mind impairments.[239][240] Poor cognitive functioning, decision-making, and facial perception may contribute to making a wrong judgement of a situation that could result in an inappropriate response such as violence.[241] These associated risk factors are also present in antisocial personality disorder which when present as a comorbid disorder greatly increases the risk of violence.[242][243]

A review in 2012 showed that schizophrenia was responsible for 6 percent of homicides in Western countries.[242] Another wider review put the homicide figure at between 5 and 20 percent.[244] There was found to be a greater risk of homicide during first episode psychosis that accounted for 38.5 percent of homicides.[244] The association between schizophrenia and violence is complex. Homicide is linked with young age, male sex, a history of violence, and a stressful event in the preceding year. Clinical risk factors are severe untreated psychotic symptoms - untreated due to either not taking medication or to the condition being treatment resistant.[242] A comorbid substance use disorder or an antisocial personality disorder increases the risk for homicidal behaviour by 8-fold, in contrast to the 2-fold risk in those without the comorbid disorders.[158] Rates of homicide linked to psychosis are similar to those linked to substance misuse, and parallel the overall rate in a region.[245] What role schizophrenia has on violence independent of substance misuse is controversial, but certain aspects of individual histories or mental states may be factors.[246]

Hostility is anger felt and directed at a person or group and has related dimensions of impulsiveness and aggression. When this impulsive-aggression is

evident in schizophrenia neuroimaging has suggested the malfunctioning of a neural circuit that modulates hostile thoughts and behaviours that are linked with negative emotions in social interactions. This circuit includes the amygdala, striatum, prefrontal cortex, anterior cingulate cortex, insula, and hippocampus. Hostility has been reported during acute psychosis, and following hospital discharge.[247] There is a known association between low cholesterol levels, and impulsivity, and violence. A review finds that people with schizophrenia, and lower cholesterol levels are four times more likely to instigate violent acts. This association is also linked to the increased number of suicides in schizophrenia. It is suggested that cholesterol levels could serve as a biomarker for violent and suicidal tendencies.[248]

A review found that just under 10 percent of those with schizophrenia showed violent behaviour compared to 1.6 percent of the general population. An excessive risk of violence is associated with drugs or alcohol and increases the risk by as much as 4-fold. Violence often leads to imprisonment. Clozapine is an effective medication that can be used in penal settings such as prisons. However, a condition of benign ethnic neutropenia in many African-Americans excludes them from the use of clozapine the most effective medication. Cognitive deficits are recognised as playing an important part in the origin and maintenance of aggression, and cognitive remediation therapy may therefore help to prevent the risk of violence in schizophrenia.[241]

Prognosis

Main article: Prognosis of schizophrenia

See also: Physical health in schizophrenia



Disability-adjusted life years lost due to schizophrenia per 100,000 inhabitants in 2004.

Schizophrenia has great human and economic costs.[5] It results in a decreased life expectancy of 20 years.[4][10] This is primarily because of its association with obesity, poor diet, a sedentary lifestyle, and smoking, with an increased rate of suicide playing a lesser role.[10][249] Side effects of antipsychotics may also increase the risk.[10] These differences in life expectancy increased between the 1970s and 1990s.[250] An Australian study puts the rate of early death at 25 years, and views the main cause to be related to heart disease.[200]

Several studies indicate that almost 40% of those with schizophrenia die from complications of cardiovascular disease including heart attacks, and sudden cardiac death which is seen to be increasingly associated.[236] An underlying factor of sudden cardiac death may be Brugada syndrome (BrS) – BrS mutations that overlap with those linked with schizophrenia are the calcium channel mutations.[236] BrS may also be drug-induced from certain antipsychotics and antidepressants.[236] Primary polydipsia, or excessive fluid intake, is relatively common in people with chronic schizophrenia.[251][252] This may lead to hyponatremia which can be life-threatening. Antipsychotics can lead to a dry mouth, but there are several other factors that may contribute to the disorder. It is suggested to lead to a reduction in life expectancy by 13 per cent.[252] A study has suggested that real barriers to improving the mortality rate in schizophrenia are poverty, overlooking the symptoms of other illnesses, stress, stigma, and medication side effects, and that these need to be changed.[253]

Schizophrenia is a major cause of disability. In 2016 it was classed as the 12th most disabling condition.[254] Approximately 75% of people with schizophrenia have ongoing disability with relapses[255] and 16.7 million people globally are deemed to have moderate or severe disability from the condition.[256] Some people do recover completely and others function well in society.[257] Most people with schizophrenia live independently with community support.[22] About 85% are unemployed.[5] In people with a first episode of psychosis in scizophrenia a good long-term outcome occurs in 31%, an intermediate outcome in 42% and a poor outcome in 31%.[258] Males are affected more often than females, and have a worse outcome.[259] Outcomes for schizophrenia appear better in the developing than the developed world.[260] These conclusions have been questioned.[261] Social problems, such as long-term unemployment, poverty, homelessness, exploitation, stigmatization and victimization are common consequences, and lead to social exclusion.[20][21]

There is a higher than average suicide rate associated with schizophrenia estimated at around 5% to 6%, most often occurring in the period following onset or first hospital admission.[11][23] Several times more (20 to 40%) attempt suicide at least once.[7][262] There are a variety of risk factors, including male gender, depression, a high IQ,[262] heavy smoking,[263] and substance abuse.[110] Repeated relapse is linked to an increased risk of suicidal behavior.[172] The use of clozapine can reduce the risk of suicide and aggression.[203]

A strong association between schizophrenia and tobacco smoking has been shown in worldwide studies.[264][265] Smoking is especially high in those diagnosed with schizophrenia, with estimates ranging from 80 to 90% being regular smokers, as compared to 20% of the general population.[265] Those who

smoke tend to smoke heavily, and additionally smoke cigarettes with high nicotine content.[33] Some propose that this is in an effort to improve symptoms.[266] Among people with schizophrenia use of cannabis is also common.[110]

Epidemiology

Main article: Epidemiology of schizophrenia



Deaths per million persons due to schizophrenia in 2012.

In 2017, the Global Burden of Disease Study estimated there were 1.1 million new cases, and in 2019 WHO reported a total of 20 million cases globally.[2][15] Schizophrenia affects around 0.3–0.7% of people at some point in their life.[14] It occurs 1.4 times more frequently in males than females and typically appears earlier in men[80] – the peak ages of onset are 25 years for males and 27 years for females.[267] Onset in childhood, before the age of 13 can sometimes occur.[7][65] A later onset can occur between the ages of 40 and 60, known as late onset, and also after 60 known as very late onset.[56]

Worldwide, schizophrenia is the most common psychotic disorder.[68] The frequency of schizophrenia varies across the world,[7][268] within countries,[269] and at the local and neighborhood level.[270] This variation has been estimated to be fivefold.[5] It causes approximately one percent of worldwide disability adjusted life years[80] and resulted in 17,000 deaths in 2015.[12]

In 2000, the World Health Organization found the percentage of people affected and the number of new cases that develop each year is roughly similar around the world, with age-standardized prevalence per 100,000 ranging from 343 in Africa to 544 in Japan and Oceania for men, and from 378 in Africa to 527 in Southeastern Europe for women.[271] About 1.1% of adults have schizophrenia in the United States.[272] However, in areas of conflict this figure can rise to between 4.0 and 6.5%.[273]

History

Main article: History of schizophrenia

Further information: Dementia praecox

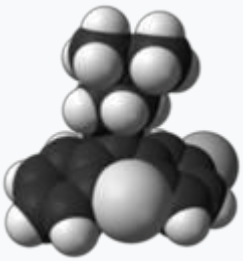


The term "schizophrenia" was coined by Eugen Bleuler.

Accounts of a schizophrenia-like syndrome are rare in records before the 19th century. The earliest cases detailed were reported in 1797, and 1809.[274] *Dementia praecox*, meaning premature dementia was used by German psychiatrist Heinrich Schüle in 1886, and then in 1891 by Arnold Pick in a case report of hebephrenia. In 1893 Emil Kraepelin used the term in making a distinction, known as the Kraepelinian dichotomy, between the two psychoses – dementia praecox, and manic depression (now called bipolar disorder).[10] Kraepelin believed that *dementia praecox* was probably caused by a systemic disease that affected many organs and nerves, affecting the brain after puberty in a final decisive cascade.[275] It was thought to be an early form of dementia, a degenerative disease.[10] When it became evident that the disorder was not degenerative it was renamed schizophrenia by Eugen Bleuler in 1908.[276]

The word *schizophrenia* translates roughly as "splitting of the mind" and is Modern Latin from the Greek roots *schizein* (σχίζειν, "to split") and *phrēn*, (φρεν, "mind")[277] Its use was intended to describe the separation of function between personality, thinking, memory, and perception.[276]

The term schizophrenia used to be associated with *split personality* by the general population but that usage went into decline when *split personality* became known as a separate disorder, first as *multiple identity disorder* , and later as dissociative identity disorder.[278] In 2002 in Japan the name was changed to *integration disorder*, and in 2012 in South Korea, the name was changed to *attunement disorder* to reduce the stigma, both with good results.[22][279][280]



A molecule of chlorpromazine, the first antipsychotic developed in the 1950s.

In the early 20th century, the psychiatrist Kurt Schneider listed the psychotic symptoms of schizophrenia into two groups of hallucinations, and delusions. The hallucinations were listed as specific to auditory, and the delusional included thought disorders. These were seen as the symptoms of first-rank importance and were termed first-rank symptoms. Whilst these were also sometimes seen to be relevant to the psychosis in manic-depression, they were highly suggestive of schizophrenia and typically referred to as first-rank symptoms of schizophrenia. The most common first-rank symptom was found to belong to thought disorders.[281][282] In 2013 the first-rank symptoms were excluded from the DSM-5 criteria.[156] First-rank symptoms are seen to be of limited use in detecting schizophrenia but may be of help in differential diagnosis.[283]

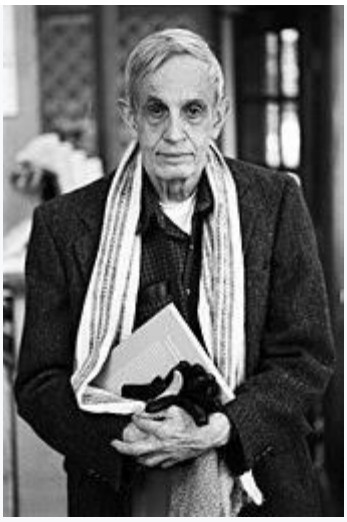
The earliest attempts to treat schizophrenia were psychosurgical, involving either the removal of brain tissue from different regions or the severing of pathways.[284] These were notably frontal lobotomies and cingulotomies which were carried out from the 1930s.[284][285] In the 1930s a number of shock therapies were introduced which induced seizures (convulsions) or comas.[286] Insulin shock therapy involved the injecting of large doses of insulin in order to induce comas, which in turn produced hypoglycemia and convulsions.[286][285] The use of electricity to induce seizures was developed, and in use as electroconvulsive therapy (ECT) by 1938.[287] Stereotactic surgeries were developed in the 1940s.[287] Treatment was revolutionized in the mid-1950s with the development and introduction of the first typical antipsychotic, chlorpromazine.[288] In the 1970s the first atypical antipsychotic clozapine, was introduced followed by the introduction of others.[289]

In the early 1970s in the US, the diagnostic model used for schizophrenia was broad and clinically-based using DSM II. It had been noted that schizophrenia was diagnosed far more in the US than in Europe which had been using the ICD-9 criteria. The US model was criticised for failing to demarcate clearly those people with a mental illness, and those without. In 1980 DSM III was published and showed a shift in focus from the clinically-based biopsychosocial model to a reason-based medical model.[290] DSM IV showed an increased focus to an evidence-based medical model.[291]

Subtypes of schizophrenia classified as paranoid, disorganized, catatonic, undifferentiated, and residual type were difficult to distinguish between and are no longer recognized as separate conditions by DSM-5 (2013)[292] or ICD-11.[293][294][295]

Society and culture

See also: Social construction of schizophrenia, List of people with schizophrenia, and Religion and schizophrenia



John Nash, an American mathematician and joint recipient of the 1994 Nobel Memorial Prize in Economic Sciences, who had schizophrenia. His life was the subject of the 1998 book, *A Beautiful Mind* by Sylvia Nasar.

In 2002, the term for schizophrenia in Japan was changed from *seishin-bunretsu-byō* (精神分裂病, lit. "mind-split disease") to *tōgō-shitchō-shō* (統合失調症, lit. "integration-dysregulation syndrome") to reduce stigma.[296] The new name also interpreted as "integration disorder" was inspired by the biopsychosocial model; it increased the percentage of people who were informed of the diagnosis from 37 to 70% over three years.[279] A similar change was made in South Korea in 2012 to *attunement disorder*.[280] A professor of psychiatry, Jim van Os, has proposed changing the English term to *psychosis spectrum syndrome*.[297] In 2013 with the reviewed DSM-5, the DSM-5 committee was in favor of giving a new name to schizophrenia but they referred this to WHO.[298]

In the United States, the cost of schizophrenia – including direct costs (outpatient, inpatient, drugs, and long-term care) and non-health care costs (law enforcement, reduced workplace productivity, and unemployment) – was estimated to be $62.7 billion in 2002.[299] In the UK the cost in 2016 was put at £11.8 billion per year with a third of that figure directly attributable to the cost of hospital and social care, and treatment.[5]

The book *A Beautiful Mind* chronicled the life of John Forbes Nash who had been diagnosed with schizophrenia but who went on to win the Nobel Memorial Prize in Economic Sciences. This was later made into the film with the same name. An earlier documentary was made with the title *A Brilliant Madness*.

In 1964 a lengthy case study of three males diagnosed with schizophrenia who each had the delusional belief that they were Jesus Christ was published as a book. This has the title of *The Three Christs of Ypsilanti*, and a film with the title *Three Christs* was released in 2020. Such religious delusions are a fairly common feature in psychoses including schizophrenia.[300][301]

Media coverage relating to violent acts by people with schizophrenia reinforces public perception of an association between schizophrenia and violence.[302] Such sensationalist reporting stigmatizes schizophrenia more than any other mental illness.[303] In the UK guidelines are given for the reporting of different conditions. Its campaigns have shown a reduction in negative reporting.[303][304]

Research directions

See also: Animal models of schizophrenia

Research into schizophrenia has made use of a number of animal models in particular rats, that have shown to be useful in evaluating the different aspects of its development and pathology.[305] Effects of early intervention is an active area of research, importantly focusing on the early detection of at-risk individuals and the development of risk calculators.[170][306] Methods for large-scale population screening are also included.[307]

Various agents have been explored for possible effectiveness in treating negative symptoms, for which antipsychotics have been of little benefit.[308] There have been trials on medications with anti-inflammatory activity, based on the premise that inflammation might play a role in the pathology of schizophrenia.[309]

Various brain stimulation techniques are being studied to treat the positive symptoms of schizophrenia, in particular auditory verbal hallucinations (AVHs).[310][311] A 2015 Cochrane review found unclear evidence of benefit.[312] Most studies focus on transcranial direct-current stimulation (tDCM), and repetitive transcranial magnetic stimulation (rTMS).[311] Techniques based on focused ultrasound for deep brain stimulation could provide insight for the treatment of AVHs.[311]

Another active area of research is the study of a variety of potential biomarkers that would be of invaluable help not only in the diagnosis but also in the treatment and prognosis of schizophrenia. Possible biomarkers include markers of inflammation, neuroimaging, BDNF, genetics, and speech analysis. Some inflammatory markers such as C-reactive protein are useful in

detecting levels of inflammation implicated in some psychiatric disorders but they are not disorder-specific. However, other inflammatory cytokines are found to be elevated in first episode psychosis and acute relapse that are normalized after treatment with antipsychotics, and these may be considered as state markers.[313] Deficits in sleep spindles in schizophrenia may serve as a marker of an impaired thalamocortical circuit, and a mechanism for memory impairment.[160] MicroRNAs are highly influential in early neuronal development, and their disruption is implicated in several CNS disorders; circulating microRNAs (cimiRNAs) are found in body fluids such as blood and cerebrospinal fluid, and changes in their levels are seen to relate to changes in microRNA levels in specific regions of brain tissue. These studies suggest that cimiRNAs have the potential to be early and accurate biomarkers in a number of disorders including schizophrenia.[314][315]

The use of choline as a supplement during pregnancy may have effect in the prevention of the later development of schizophrenia, and is an area of research.[316]

In 2020 over 3,000 clinical trials into drugs, symptom assessment tools, and treatments related to schizophrenia were listed with some recruiting, and some newly completed.[317]

Assessment Procedure

Multiple choice questions based assessment after successful completion of theory and practical sessions

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCE

VALUE ADDED COURSE STUDENT DETAILS

SCHIZOPRENIA SUBTYPES,CLINICAL FEATURES AND ITS MANAGEMENT FOR FINAL YEAR

S.No	Register No	Students List	Department	SIGNATURE
1	U16MB366	RUCHI YADAV	Psychiatry	
2	U16MB367	RUPESH RANJAN	Psychiatry	
3	U16MB368	SAI PAVAN KUMAR .B	Psychiatry	
4	U16MB369	SAJUTI DEY	Psychiatry	
5	U16MB370	SAKTHIMALAR .R	Psychiatry	
6	U16MB371	SANDHYA	Psychiatry	
7	U16MB372	SARA .R	Psychiatry	
8	U16MB373	SARASWATI .N	Psychiatry	
9	U16MB374	SATHYA VIJAYENDRAN P.U	Psychiatry	
10	U16MB375	SHAIKH IMRAN SHAIKH NAJIR	Psychiatry	
11	U16MB376	SHIKHA SONI	Psychiatry	

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12	U16MB377	SINGAMSETTY SANDEEP	Psychiatry	
13	U16MB378	SINGAMSETTY SRINIVAS	Psychiatry	
14	U16MB379	SNEHA	Psychiatry	
15	U16MB380	SNEHA SINGH	Psychiatry	

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Schizophrenia subtypes, clinical features and its management

Candidate Name	SARASWATHI.	Assessor Name	DR. SRIDHAR
Date of Assessment	9.3.2020	Assessor Position	HOD

U1SMB373 - REG.NO

7/10

MULTIPLE CHOICE QUESTIONS

Course Code: PSYC11

I. ANSWER ALL THE QUESTIONS

1) the phenomenon in Schizophrenia, known as 'downward drift' means which of the following?

- a) Falling to the bottom of the social ladder
- b) Become homeless
- c) Inability to hold down a job
- d) All of the above

2) Historically, Dementia praecox was a disease first identified by?

- a) Freud
- b) Beck
- c) Watson
- d) Kraepelin

3) In Schizophrenia psychotic symptoms such as hallucinations delusions, disorganised speech and grossly disorganised or catatonic behaviours are known as:

- a) Negative symptoms

b) Positive symptoms

c) Mediating symptoms

d) Catastrophic symptoms

4) Misinterpretation of perceptions or experiences in Schizophrenia are known as:

a) Hallucinations

b) Misperceptions

c) Delusions

d) Avolition

5)In Schizophrenia when an individual believes they are in danger, this is referred to as:

a) Delusions of grandeur

b) Delusions of persecution

c) Delusions of control

d) Nihilistic delusions

6) Which of the following refers to when an individual with Schizophrenia believes they are someone with fame or power?

a) Delusions of grandeur

b) Delusions of control

c) Delusions of reference

d) Nihilistic delusions

7) In Schizophrenia the when an individual believes that messages are being sent directly to him or her, this is referred to as:

a) Delusions of persecution

b) Nihilistic delusions

c) Delusions of reference

d) Delusions of persecution

8) Which of the following ways might hallucinations be experienced in Schizophrenia ?

a) Auditory

b) Olfactory

c) Gustatory

d) All of the above

9) In Schizophrenia a reality-monitoring deficit refers to which of the following:

a) Problems distinguishing between thoughts and ideas they generated themselves

b) Problems with memory loss

c) Problems with spatial ability

d) Problems distinguishing between what actually occurred and what did not

10) Which of the following come under the term disorganised speech in Schizophrenia?

a) Derailment

b) Loose associations

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c) Word salads

d) All of the above

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SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Schizophrenia subtypes, clinical features and its management

Candidate Name	SATHYA VIJAYANDRAN	Assessor Name	DR. SRIDHAR
Date of Assessment	9.3.2020	Assessor Position	HOD

UNI. REG. NO:- U16MB374.

6/10

MULTIPLE CHOICE QUESTIONS

Course Code: PSYC11

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Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that SHAKTHIMALAR.R has actively participated in the Value Added Course on Schizophrenia subtypes, clinical features and its management held during Jan- March 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. ARUN SEETHARAMAN

RESOURCE PERSON

Dr. ARUN SEETHARAMAN, MD.,
Reg. No. 91440
Associate Professor, Psychiatry
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

Dr. V.R.SRIDHAR

COORDINATOR

Dr. V. R. SRIDHAR, MD., D.P.M.,
Reg. No: 30995
Professor & HOD, Psychiatry
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that SAJUTI DEY has actively participated in the Value Added Course on Schizophrenia subtypes, clinical features and its management held during Jan – March 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. ARUN SEETHARAMAN

RESOURCE PERSON

Dr. ARUN SEETHARAMAN, MD.,
Reg. No: 91440
Associate Professor, Psychiatry
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

Dr. V.R.SRIDHAR

COORDINATOR

Dr. V. R. SRIDHAR, MD.,D.P.M.,
Reg. No: 30995
Professor & HOD, Psychiatry
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

Student Feedback Form

Course Name: **SCHIZOPHRENIA AND ITS SUBTYPES**
Subject Code: **PSYC11**

Name of Student: _____ Roll No.: _____

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear					
2	Course contents met with your expectations					
3	Lecturer sequence was well planned					
4	Lectures were clear and easy to understand					
5	Teaching aids were effective					
6	Instructors encourage interaction and were helpful					
7	The level of the course					
8	Overall rating of the course	1	2	3	4	5

**** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory***

Suggestions if any:

Signature

Date:

Student Feedback Form

Course Name: **SCHIZOPHRENIA**

Subject Code: **PSYC11**

Name of Student: SARA·R Roll No.: U16MB372

We are constantly looking to improve our classes and deliver the best training to you. Your

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Student Feedback Form

Course Name: **SCHIZOPHRENIA**

Subject Code: **PSYC11**

Name of Student: SANDHIYA Roll No.: U16MB371

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear					✓
2	Course contents met with your expectations				✓	
3	Lecturer sequence was well planned			✓		
4	Lectures were clear and easy to understand				✓	
5	Teaching aids were effective					✓
6	Instructors encourage interaction and were helpful			✓		
7	The level of the course				✓	
8	Overall rating of the course	1	2	3	4 ✓	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

Date: 31.3.2020

Signature

Date: 31-03-202

From

BIHER

Dr.V.R.Sridhar
Professor and Head,
Department of Psychiatry,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To

The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

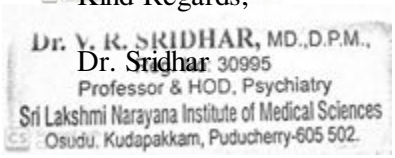
Sub: Completion of value-added course: Schizophrenia subtypes, clinical features and its management

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: **Schizophrenia subtypes, clinical features and its management**. We solicit your kind action to send certificates for the participants that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards,

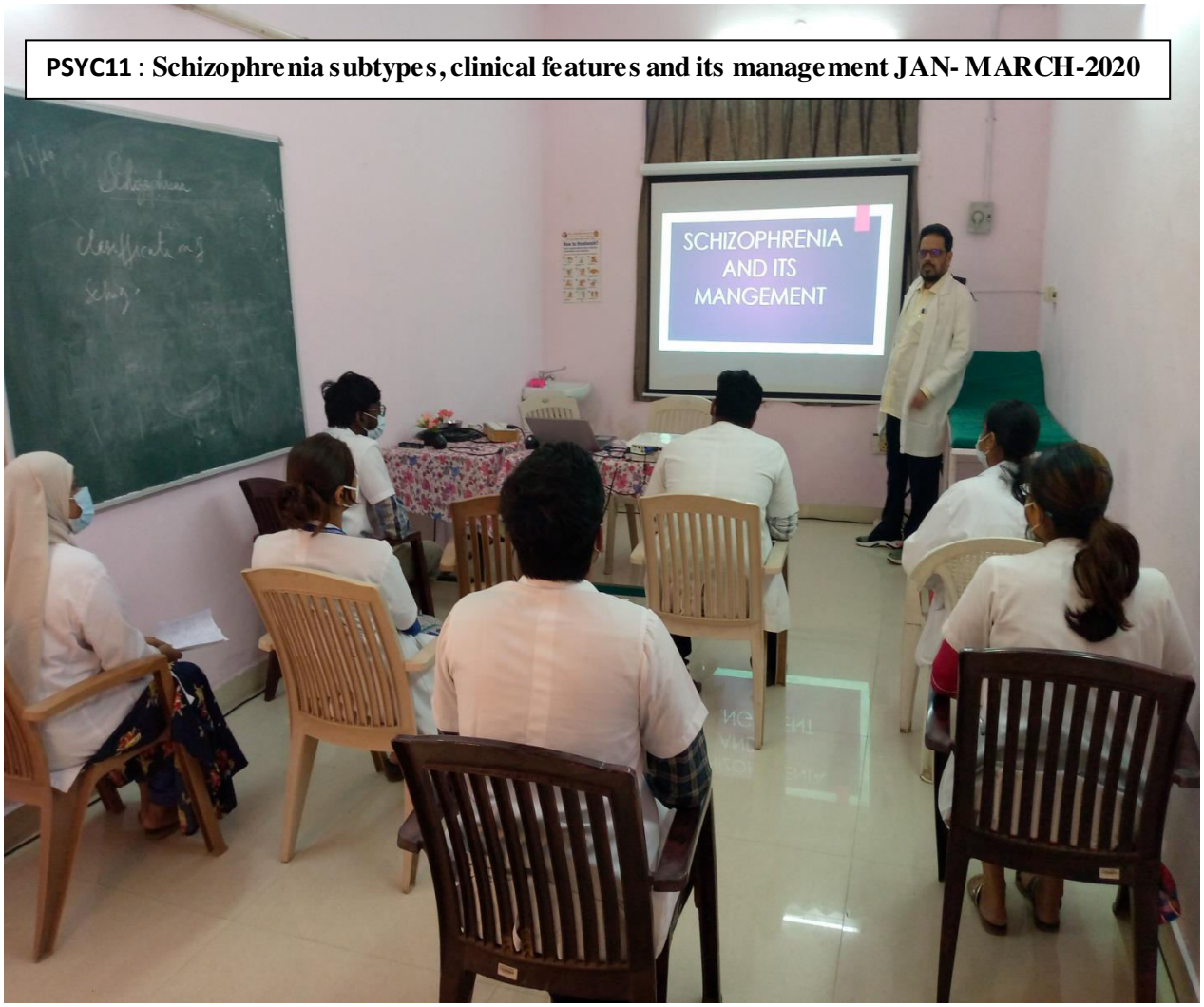
Dr. Sridhar



Encl: Certificates

Photographs

PSYC11 : **Schizophrenia subtypes, clinical features and its management JAN- MARCH-2020**



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SCHIZOPHRENIA
AND ITS
MANAGEMENT

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

OSUDU, AGARAM VILLAGE, KUDAPAKKAM POST, PUDUCHERRY-605502.

Date28.12.2019

From
DR.BALAJI SUBRAMANIYAN,
Professor and Head,
DEPARTMENT OF DENTISTRY
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
BHARATH INSTITUTE OF HIGHER EDUCATION AND RESEARCH,
CHENNAI.

To
The Dean,
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
BHARATH INSTITUTE OF HIGHER EDUCATION AND RESEARCH,
CHENNAI.

Sub: Permission to conduct value-added course: IMPLANTS

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **IMPLANTS** on 2.1.2020. We solicit your kind permission for the same.

Kind Regards

DR.BALAJI SUBRAMANIYAN

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: DR.BALAGURUNATHAN

The HOD: DR.BALAJI SUBRAMANIYAN.R

The Expert: DR.BALAJI SUBRAMANIYAN.

The committee has discussed about the course and is approved.

Dean	Subject Expert	HOD
DEAN SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES OSUDU, AGARAM VILLAGE, KOODAPAKKAM POST, PUDUCHERRY - 605 502	Dr. V. AMUTHAVALLI, MDS., Reg. No. [illegible] [illegible] Sri Laks[illegible] Osudu, Kudapakkam [illegible]	Dr. BALAJI SUBRAMANIAN, MDS., Reg. No. [illegible] Professor HOD Dental Sri Lakshmi Narayana Institute of Medical Sciences Osudu, Kudapakkam, Puducherry 605 502

OFFICE OF THE DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affiliated to Bharath University, Chennai - TN]

Circular

27.12.2020

Sub: Organising Value-added Course: IMPLANTS reg

With reference to the above mentioned subject, it is to bring to your notice that SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES, **Bharath Institute of Higher Education and Research**, is organising **"IMPLANTS ON 2.1.20"**. The course content and registration form is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before 31.12.19. Applications received after the mentioned date shall not be entertained under any circumstances.

DEAN
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
OSUDU, AGARAM VILLAGE,
KOODAPAKKAM POST,
PUDUCHERRY - 605 502

Dean

Encl: Copy of Course content and Registration form.

COURSE PROPOSAL

Course Title: IMPLANTS

Course Objective: To enlighten students about significance of implants

Course Outcome: In depth knowledge regarding IMPLANTS

Course Audience: MBBS STUDENTS

Course Coordinator: DR. BALAGURUNATHAN

Course Faculties with Qualification and Designation:

1. **DR. BALAJI SUBRAMANIYAN M.D.S & PROFESSOR**

Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Time	Hours
1.	2.1.20	methods of tooth replacement	4PM-7PM	3 hrs
2.	11.1.20	Mutilated occlusion	4pm-7 pm	3hrs
3.	19.1.20	Mastication	5pm-8pm	3 hrs
4.	27.1.20	Implant treatment for patients with diabetes	4pm-7pm	3hrs
5.	2.2.20	Removable dentures	5pm-8pm	3 hrs
6.	12.2.20	Indications for fixed dentures	5pm-8pm	3 hrs
7.	20.2.20	Zygomatic implants	4pm-7pm	3 hrs
8.	25.2.20	Removable and fixed denture	5pm-8pm	3 hrs
9.	3.3.20	General health status prior to implant therapy	5pm-8pm	3 hrs
10.	10.3.20	Maxilla facial implants	4pm-7pm	3 hrs
			Total Hours	30

REFERENCE BOOKS: (Minimum 2)
1.MISCH'S IMPLANT DENTISTRY
2.DR.VENKAT'S TEXT BOOK OF IMPLANTS

IMPLANTS

ABSTRACT

Dental implants are widely used and are considered to be one of several treatment options that can be used to replace missing teeth. A number of implant-supported treatment options have been used successfully to replace a single tooth and multiple teeth, as well as a completely edentulous jaw. However, as the number of patients who have dental implants is increasing, dental personnel are more likely to see patients with implant-supported restorations or prostheses.

Nevertheless, dental implants may fail as a result of mechanical complications, such as screw loosening or due to biological causes like peri-implant diseases. As result, dental personnel should be able to recognize these complications and the factors that have negative effects on the success of such implant-supported restorations or prostheses.

The ultimate goal of dental implant therapy is to satisfy the patient's desire to replace one or more missing teeth in an esthetic and functional manner with long-term success. To achieve this goal, clinicians must first accurately and comprehensively assess the patient's overall physical and mental health.

Treatment planning for implant dentistry usually requires a greater degree of attention to detail and precision than other forms of dentistry. This results from the less forgiving clinical situation if an implant's angulation is wrong or the implant-supported restorations are not in proper occlusion compared with when natural teeth are supporting dental prosthetics. In addition, anatomic factors should be considered owing to the nerves, maxillary sinus, nasal floor, and other important anatomic structures commonly present in the area where implants need to be placed. Thus, a close working relationship between the surgeon placing the implant and the clinician restoring the implant is critical from the time treatment planning

IMPLANTS

INTRODUCTION

Teeth are one of the major components of stomatognathic system, which provides a pleasing smile in addition to its functional aspect of mastication. Loss of tooth/teeth results in loss of structural balance, inefficient oral function, poor esthetics, positional change in the remaining natural teeth. In order to reduce the adverse effects following tooth loss, replacement of teeth is necessary.

One of the major advances in prosthetic dentistry is implant-supported prosthesis that provides comfort as well as confidence for the patient's satisfaction. Implants are used to replace missing teeth, re-build the craniofacial skeleton, provide anchorage during orthodontic treatment, and even to help form new bone in the process of distraction osteogenesis.Dental implants have become mostly acceptable method for replacing missing teeth. Most of the general dentists, do not perform the placement of implants.

During the implant placement some major criteria are important. They are careful patient selection, thorough evaluation of relavant anatomical sites, meticulous surgical technique and delay loading which are important for an implant placement.[3]

The advent of osseo integrated implants in dentistry holds great promise for the future of implants and for the prosthesis they will support. The phenomenon of Osseointegration accidentally discovered by .Branmark, has been a major advance in the replacement of missing natural teeth. Branmark has defined

osseointegration as a relationship where "bone is in direct contact with the implant, without any immediate connective tissue".

Because implants are elective procedure, a predictable outcome is necessary in prosthodontic rehabilitation with the tissue integrated prosthesis. To achieve predictable results, the restorative dentist must communicate to the surgeon for the optimum position of implants. If placement of the implants is solely determined by the surgeon, he will be guided only by the anatomy of the patient .It is often difficult for the surgeon to estimate proper placement, where there is extensive loss of oral structures, without the assistance of the pretreatment evaluation and guidance by the restorative dentist. The dentist must consider esthetics, tooth placement, tissue contour, lip line, thickness and extension of the prosthesis. Osseointegrated implants are of little value if improperly inclined such that they cannot be used prosthodontically.

Historically, surgeons placed implants where the greatest amount of bone was present, without regard to the placement of final restoration. This often led to a compromised final prosthesis with a jeopardized occlusal scheme and poor esthetics. More recently emphasis has shifted from relatively arbitrary implant placement in good available host bone to placing the implant with consideration of the final prosthetic outcome, soft tissue management, emergence profile and tooth morphology. The goal of implant dentistry is not the implant; but the tooth which is replaced .To facilitates accurate translation from the desired plan to the surgical reality, templates or surgical guides are used.

A template may be defined as a pattern or a gauge, such as a thin metal plate with a cut pattern, used as a guide in making or reproducing models accurately. Prosthetic templates are often acrylic replicas of the diagnostic wax-up which

allows pre surgical visualization of the prosthesis. There by aiding in accurate placement to establish a logical continuity between diagnosis, prosthetic planning and surgical phase use of transfer device is essential. The surgical template dictates the surgeon the implant body placement that offers the best combination of support for the repetitive forces of occlusion, esthetics and hygienic requirements.

Modern technology has offered a wide selection of modern diagnostic tools that vary from digital imaging to computer-aided design/computer-aided manufacturing (CAD/CAM) machines, surgical microscopes, computer guided surgical templates, laser technology, computer software simulation, and a wide array of bone-grafting materials and implant designs.[5] In addition, there are revolutionary new loading dental implant concepts. Today's new loading concepts are being used predictably and routinely to greatly reduce treatment time.

The role of prosthodontist is very critical because of the realization that implant placement is a prosthetically driven subject. It is important for the prosthodontists to be aware of the various guided surgical protocols and the templates which is used to achieve predictable positioning of implants.

RATIONALE FOR TEMPLATES

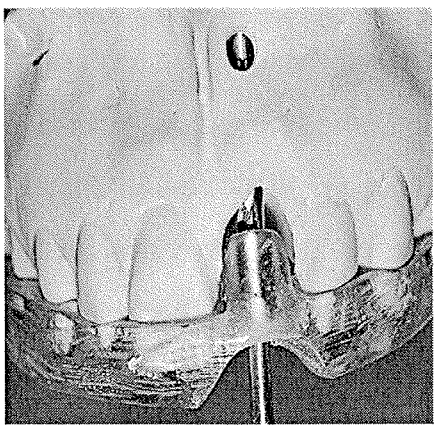
When a single missing tooth needs to be replaced the surgeon can free-hand the drill without a prefabricated template and hope to align the osteotomy perfectly between adjacent teeth in all direction (mesial, distal, facial, and lingual). The implant is positioned based upon the surgeon's idealized vision of the fixture within the bone, which may different from the restorative needs of that particular site.[6] In the fully edentulous arch, orientation and bone topography can vary greatly, creating an atmosphere wherein implants can be misaligned or worse.

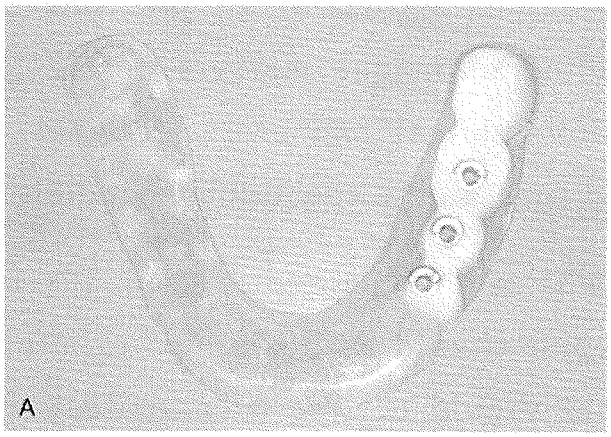
Templates can be created by various methods to help guide the surgical specialist or implantologist during the surgical placement of the implant, leaving most of the decision-making process at the pre surgical level, whether in partially edentulous or completely edentulous presentations.

In its elementary form, a template is a misnomer is fabricated based upon information of the final tooth form, not the bone. A template design based upon conventional prosthodontic protocols, including tooth morphology, emergence profile, occlusion, contacts and embrasures, guides the implant placement in the position that best allows for proper restoration.

M.J. Edge (1987)[7] described about the surgical guides keeping in mind about the prosthetic outcomes rather than placing them arbitrarily. He described about the most simplest way of fabricating a stent by sprinkle on technique which is used during the initial pilot hole drilling for alignment of implant.

David R. Burns (1988) described fabrication of stent with heat cure acrylic resin that had 10mmlength of 0.045inch round tubing that were centered over the outline of one of the artificial tooth.





Diagnostic TEMPLATE

There are a number of basic principles of radiography that should guide the clinician in selecting an appropriate imaging technique and judging whether the resulting images are of adequate quality for the purpose.

First, there should be an adequate number and type of images to provide the needed anatomic information. In implant dentistry, for example, this information includes the quantity and quality of bone, as well as the location of anatomic structures, which generally requires multiple images at right angles to each other.

Second, the type of imaging technique selected should be able to provide the required information with adequate precision and dimensional accuracy. Use of a technique that will allow accurate repositioning of the patient, such as with a cephalostat, is also helpful in comparing preoperative and postoperative images.

Third, there must be a way of relating the images to the patient's anatomy. For edentulous regions of the jaw, this generally means the use of a stent with radiopaque markers during imaging. The exact location of the longitudinal and cross-sectional views can thus be determined with respect to the edentulous mandible or maxilla.

Fourth, in whatever technique is used, the patient, x-ray beam and imaging receptor should be positioned to minimize distortion. In addition all images should be free from artifacts that might interfere with interpretation.

Finally, the desire for preoperative imaging information should be balanced with the radiation dose and financial cost to the patient.

The purpose of diagnostic radiographic templates is to incorporate the patient's proposed treatment plan into the radiographic examination. This requires development of a tentative treatment plan before the imaging procedure. Ideally, mounted diagnostic casts, a diagnostic wax-up, agreement between the practitioners on the number and location of proposed dental implants, and prior authorization of the proposed treatment by the patient make the diagnostic template a useful tool and many times the determining factor in the final treatment plan of the patient. The maxillary denture is converted to a radiographic template. (Fig.3) The pre prosthetic imaging procedure enables evaluation of the proposed implant site at the ideal position and orientation identified by radiographic markers incorporated into the template.

Variety of marker materials are used, including:

1. Five -mm lead[37] or steel spheres (the markers commonly used for conventional radiography)
2. Two-mm steel spheres
3. Gutta percha markers on a clear acrylic stent[38]
4. Barium sulfate mixed with varnish or polyurethane based concrete sealer (to coat dentures prior to the CT scan)[39]
5. Radiopaque materials such as barium sulfate mixed with the acrylic material used in the stent to simulate the prosthetic teeth of the denture (in this instance, the teeth themselves are rendered radiopaque and can serve as markers)
6. Radiopoque prosthetic teeth with specific sites demarcated by gutta percha-filled holes drilled into the stent between the base of the radiopaque teeth and the gingiva
7. Radiopaque stents with holes drilled vertically into simulated teeth at potential implant sites (the hole is not filled, and the air in the hole acts as a dark "negative" marker within the opaque simulated tooth on the filmed images)

First, the anatomic structures are evaluated radiographically with a radiographic template. Next, the planned implant sites are marked with steel balls, wire, or gutta-percha. These markers are held in position with the radiographic template. A panoramic radiograph often is the radiograph of choice. A comparison of the actual size of the markers with their size on the radiograph reveals the distortion factor involved. Because a radiograph is two-dimensional, a three dimensional evaluation is not possible with this technique. Computerized

tomographs (CTs) have been shown to be useful for the radiographic evaluation of hard tissues.

Annexure- II

VALUE ADDED COURSE

IMPLANTS
DI-12
List of Students Enrolled JAN 2020 – MARCH 2020

MBBS Student		
Sl. No	**Name of the Student**	**Roll No**
1	VIGNESH .S	U16MB396
2	VIJAY .M	U16MB397
3	VINDUJA VIJAY	U16MB398
4	VIPIN SHARMA	U16MB399
5	VISALINI .S	U16MB400

Dr. BALAJI SUBRAMANIYAN
RESOURCE PERSON

Dr. Jayalakshmi
COORDINATOR

Bharath Institute of Higher Education and Research

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

Participant list of Value added course: **IMPLANTS**

Sl.No	Reg.No	Name of the candidate	Signature
1	U16MB396	VIGNESH .S	
2	U16MB397	VIJAY .M	
3	U16MB398	VINDUJA VIJAY	
4	U16MB399	VIPIN SHARMA	
5	U16MB400	VISALINI .S	

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

IMPLANTS

QUESTIONS

Course Code:DI-12

ANSWER ALL THE QUESTIONS

1.What are methods of replacement of teeth?

2. Mastication?

3. difference between removable and fixed denture?

4. Replacement with implants in patients with diabetes?

5. Indications for fixed dentures?

Implants

Name: VIGNESH.S
ROLLNO: U16HB396

Implants:

1. Implants are small sterile solid masses consisting of a highly purified drug made by compression or molding or extrusion.

principles of Implant surgery.

- patient preparation.
- Implant site preparation
- one stage versus two stage implant surgeries.

Implant surgery:

- Mucoperiosteal flap is reflected up to or slightly beyond the level of the mucogingival junction, exposing the alveolar ridge of the implant surgical sites.
- The bone at the implant site must be thoroughly debrided all the granulation tissue
- A series of drills are used to prepare the osteotomy site precisely and incrementally for an Implant.

A Surgical guide or stent is inserted, checked for proper positioning and used throughout the procedure to direct the proper Implant placement.

- Round bur is used to mark the implant site. The surgical guide is removed.

- A Depth of 1 to 2mm with a round drill making through the cortical bone and creating a starting point for the 2mm twist drill.

- Final step in preparing the osteotomy site in dense cortical bone, tapping procedure may be necessary.

- dense cortical bone often placing longer Implant with naturally dense bone, it is prudent to tap the bone before Implant placement to facilitate Implant insertion

- pilot drill is placed
- final drill used in the 3mm twist drill to finish preparation of the osteotomy site.
- countersink drill is used to enter the entrance of the recipient site and allow for the subcrestal placement of the Implant collar and Cover screw.
- Cover screw is placed and soft tissues are closed and sutured

post operative care.

- Simple implant surgery in a healthy patient usually does not require antibiotic therapy.
- Can be premedicated with antibiotics. 1 hour before the surgery and continuing for 1 week post operatively if the surgery is extensive. If it require bone augmentation or if the patient is medically compromised.

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that VIJAY.M has actively participated in the Value Added Course on IMPLANTS held during JAN 2020 – MARCH 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. BALAJI SUBRAMANIYAN
RESOURCE PERSON

Dr. BALAGURUNATHAN
COORDINATOR

Student Feedback Form

Course Name: IMPLANTS

Subject Code: DI - 12

Name of Student: VIJAY. M Roll No.: U16 MB 797

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

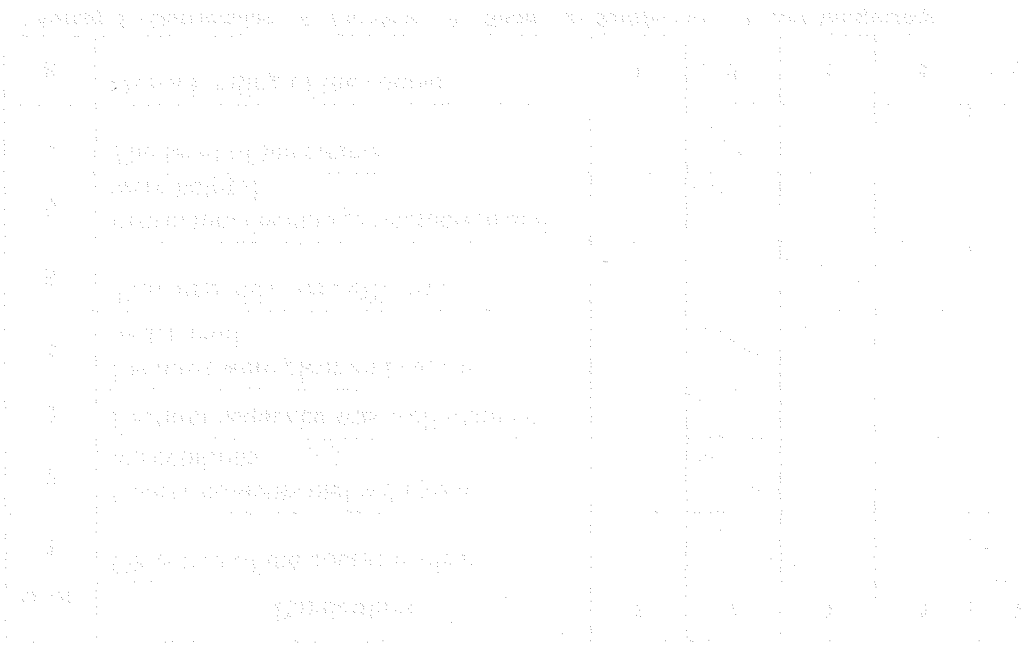
Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear		✓			
2	Course contents met with your expectations		✓			
3	Lecturer sequence was well planned		✓			
4	Lectures were clear and easy to understand		✓			
5	Teaching aids were effective			✓		
6	Instructors encourage interaction and were helpful		✓			
7	The level of the course		✓			
8	Overall rating of the course	1	✓2	3	4	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

Date: 28.12.15

Signature



COURSE COMPLETION

Date13.3.2020

From
DR.BALAJI SUBRAMANIYAN.R,
DENTISTRY,
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES,
BHARATH INSTITUTE OF HIGHER EDUCATION AND RESEARCH,
CHENNAI.

Through Proper Channel

To
The Dean,
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES,
BHARATH INSTITUTE OF HIGHER EDUCATION AND RESEARCH,
CHENNAI.

Sub: Completion of value-added course: IMPLANTS

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: **IMPLANTS** on10.3.2020. We solicit your kind action to send certificates for the participants,that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

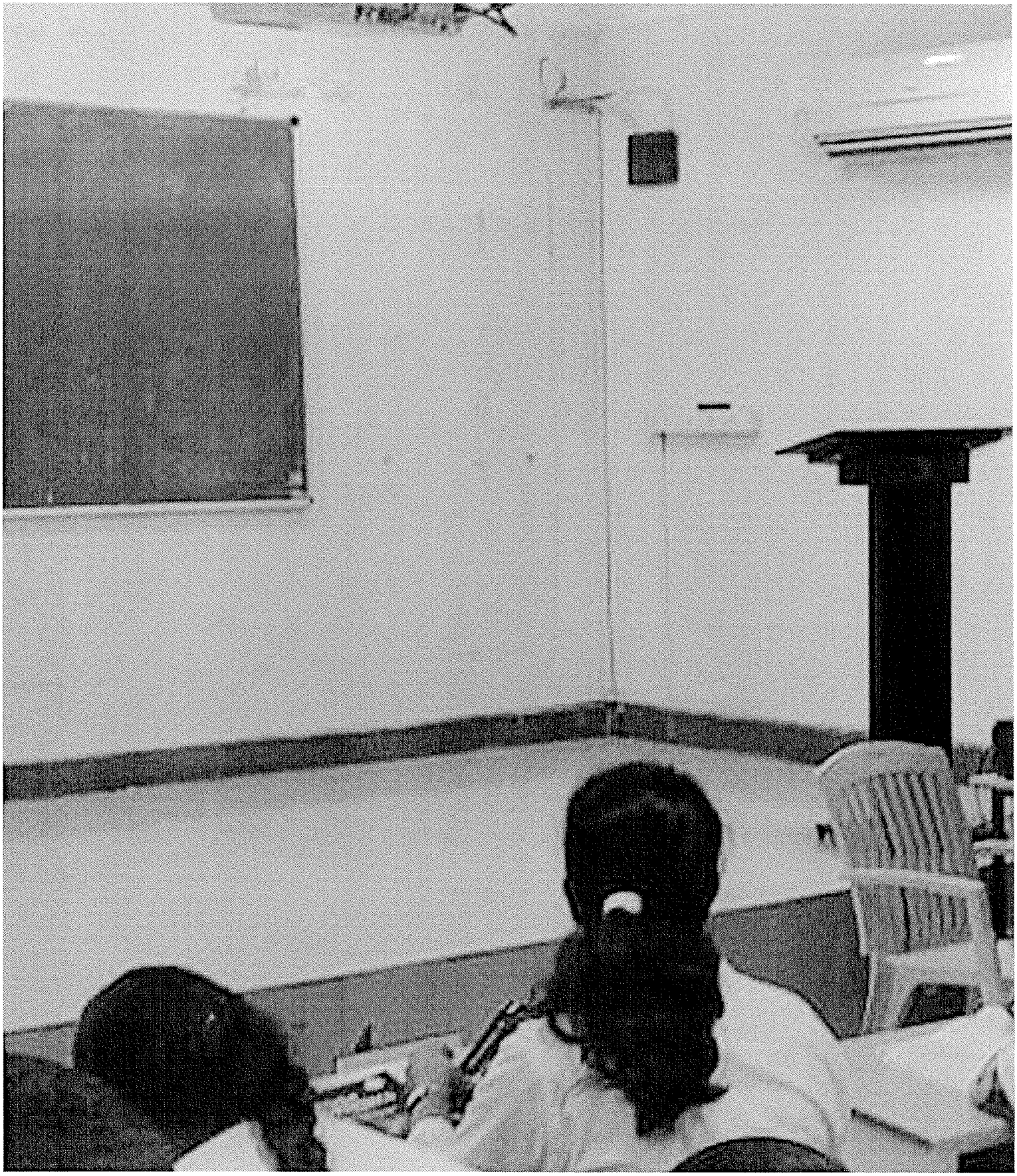
Kind Regards

DR.BALAJI SUBRAMANIYAN.R

Dr. BALAJI SUBRAMANIYAN. MDS
Reg. No. 45645
Professor HOD Dental
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kadaperi, Puducherry 605 502.

Encl: Certificates

Photographs



SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
Osudu, Agaram Village, Koodapakkam post, Puducherry - 605502

Date: 12.03.2015

From
Dr.G.Somasundaram
Professor and Head,
Department of Pharmacology
Sri Lakshmi Narayana Institute of Medical sciences
Pondicherry

To
The Dean,
Sri Lakshmi Narayana Institute of Medical sciences
Pondicherry

Sub: Permission to conduct value-added course: ADR monitoring

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **ADR monitoring** on **February 2020 August- 2020**. We solicit your kind permission for the same.

Kind Regards

Dr.G.Somasundaram

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

Dean: Dr.Balagurunathan HOD: Dr.G.Somasundaram Expert: Dr.Jaikumar

The committee has discussed about the course and is approved.

Dean | Subject Expert | HOD

DEAN
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
OSUDU, AGARAM VILLAGE,
KOODAPAKKAM POST,
PUDUCHERRY - 605 502

PROFESSOR & HOD
DEPARTMENT OF PHARMACOLOGY
Sri Lakshmi Narayana Institute Of Medical Sciences
PONDICHERRY - 605 502.

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affiliated to Bharath University, Chennai - TN]

Circular **Date: 12.03.2015**

Sub: Organising Value-added Course: ADR Monitoring

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical sciences is organizing **"ADR Monitoring"**. The course content is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before **February 2020 August- 2020**
Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

DEAN
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
OSUDU, AGARAM VILLAGE,
KUDAPAKKAM POST,
PUDUCHERRY - 605 502

Encl: Copy of Course content

OFFICE OF THE DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affiliated to Bharath University, Chennai - TN]

- Course Proposal

Course Title: ADR Monitoring

Course Objective:

1.Introduction to Adverse drug reaction

2. Importance of Pharmacovigilance

3. Post marketing surveillance

4.Adverse drug reaction Forms (ADR)

5.Reporting ADR Forms

6.What need to be collected from ADR from

7.How to collect data from ADR

8.Significance of reporting ADR

9.ADR reporting procedure

10. ADR reporting from patients, Hands on training

Course Outcome: On successful completion of the course the students will have skill in reporting ADR

Course Audience: 2nd Year MBBS Students

Course Coordinator: Dr.G.Somasundaram,

Course Faculties with Qualification and Designation:

1. Dr.Jaikumar Associate Prof Pharmacology

Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Time	Hours	Faculty
1	11.02.2020	Introduction to Pharmacovigilance	4-7 PM	3	Dr.Jaikumar
2	11.02.2020	Need for Pharmacovigilance	4-7 PM	3	
3	18.02.2020	Post marketing surveillance	4-7 PM	3	
4	10.03.2020	ADR Forms	4-7 PM	3	
5	17.03.2020	Reporting ADR Forms	4-7 PM	3	
6	02.06.2020	What need to be collected from ADR from	4-7 PM	3	
7	16.06.2020	How to collect data from ADR	4-7 PM	3	
8	07.07.2020	Significance of reporting ADR	4-7 PM	3	
9	14.07.2020	ADR reporting procedure	4-7 PM	3	
10	04.08.2020	ADR reporting from patients, Hands on training	4-7 PM	3	
			Total Hours	30	

REFERENCE BOOKS: (Minimum 2)

1. "Stephens' detection and evaluation of adverse drug reactions: principles and practice 6th ed.: Chichester, West Sussex, UK: John Wiley & Sons, 2012".

2. Mann's Pharmacovigilance, 3rd Edition ISBN: 978-0-470-67104-7 May 2014 Wiley-Blackwell 866 Pages

VALUE ADDED COURSE

1. **Name of the programme& Code**

   ADR Monitoring PH10

2. Duration& Period

30 hrs &- **February 2020 August- 2020**

3. Information Brochure and Course Content of Value-Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Multiple choice questions- *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7.No. of times offered during the same year:

February 2020 August- 2020

8. Year of discontinuation: 2020

9. Summary report of each program year-wise

Value Added Course- February 2020 August- 2020					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength& Year**
1	PH10	**ADR Monitoring**	Dr.S.Jaikumar	II MBBS	**20&February 2020 August- 2020**

10. Course Feed Back

Enclosed as Annexure- V

RESOURCE PERSON

COORDINATOR

PROFESSOR & HOD
DEPARTMENT OF PHARMACOLOGY
Sri Lakshmi Narayana Institute of Medical Sciences
PONDICHERRY - 605 502

ADR MONITORING

PARTICIPANT HAND BOOK

BIHER

SLIMS

COURSE DETAILS

Particulars	Description
Course Title	**ADR MONITORING**
Course Code	PH10
Objective	**1.Introduction to Adverse drug reaction** **2. Importance of Pharmacovigilance** **3.Preclinical research phases** **4.Post marketing surveillance** **5.Adverse drug reaction Forms (ADR)** **6.Reporting ADR Forms** **7.What need to be collected from ADR from** **8.How to collect data from ADR** **9.Significance of reporting ADR** **10.ADR reporting procedure**
Key Competencies	On successful completion of the course the students will have skill in reporting ADR
Target Student	II MBBS Students
Duration	30hrs February 2020 August- 2020
Theory Session	10hrs
Practical Session	20hrs
Assessment Procedure	Multiple choice questions

INTRODUCTION: "ANYTHING YOU CAN THINK OF, ANYTHING YOU CAN SEE AND SOME THINGS YOU DON"T EVEN THINK OF CAN BE DUE TO A DRUG" Every occasion when a patient is exposed to a medical product, is a unique situation and we can never be certain about what might happen. A good example for this is thalidomide tragedy in late 1950s and 1960s.Thalidomide prescribed as a safe hypnotic to many thousands of pregnant women caused severe form of limb abnormality known as phocomelia in many of the babies born to those women. It was a seminal event that led to the development of modern drug regulations aimed to identify, confirm and quantify ADRs. An adverse drug reaction (ADR) is any undesirable effect of a drug beyond anticipated therapeutic effects occurring during clinical use (pirmohamed etal1998). Hence every health care professional who give advice to patients need to know the frequency and magnitude of the risks involved in medical treatment along with its beneficial effects. Recent epidemiological studies estimated that ADRs are fourth to sixth leading cause of death1 . It has been estimated that approximately 2.9-5% of all hospital admission are caused by ADRs and as many as 35% of hospitalised patients experience an ADR during their hospital stay2 . An incidence of fatal ADRs is 0.23%- 0.4%3 . Although many of the ADRs are relatively mild and disappear when drug is stopped or dose is reduced, others are more serious and last longer. Therefore there is a little doubt that ADRs increase not only morbidity and mortality but also add to the overall health care cost4-6 . Pharmacovigilance is the science and activities relating to detection, assessment, understanding and prevention of adverse effects or any other drug related problems7 . Pharmacovigilance should however not be limited to the reporting of classical adverse effects. It should also be concerned with identification of product defects, unexpected insufficient therapeutic effects, intoxications and

misuse – abuse situations8 . According to WHO guidelines (2000), functions of pharmacovigilance are the detection and study of ADR"s, measurement of risk and effectiveness of drug use, dissemination of this information and education. Adverse drug reaction (ADR) monitoring involves following steps: I. Identifying adverse drug reaction (ADR) II. Assessing causality between drug and suspected reaction III. Documentation of ADR in patient"s medical records IV. Reporting serious ADRs to pharmacovigilance centres /ADR regulating authorities I. Identifying adverse drug reaction (ADR) Several definitions of ADRs exists, including those of WHO, FDA, Karch and Lasanga.The WHO definition is internationally accepted and most widely used. WHO technical report no 498(1972) defines ADR as "A response to a drug which is noxious and unintended, and which occurs at doses normally used in man for the prophylaxis, diagnosis or therapy of disease or for the modification of physiological function9 . This definition excludes therapeutic failures, intentional and accidental poisonings and drug abuse. Also this does not include adverse events due to errors in drug administration or noncompliance (taking more or less of a drug than prescribed amount) 3. ADRs are mainly identified in the pre-marketing studies and in the post-marketing surveillance studies. Disadvantages of the pre-marketing studies are that they lack sufficient knowledge to extrapolate information collected from animal studies directly into risks in humans and very few number of subjects (not more than 4000) are exposed to the new drug prior to the general release of product into market. Another major disadvantage is that clinical trials can not be done in rare group of subjects like children, elderly and pregnant JPRHC Review Article JPRHC January 2010 Volume 2 Issue 1 127-134 women. For cost reasons clinical trials often have short duration which means they can not generate information about long term adverse effects. As a consequence of the above reasons,

only type A adverse reactions are known at the time of general marketing of a new drug. So, all other types of ADRs can only be identified in post marketing surveillance. Post marketing surveillance can be done by different methods: 1. Anecdotal reporting10: The majority of the first reports of ADR come through anecdotal reports from individual doctors when a patient has suffered some peculiar effect. Such anecdotal reports need to be verified by further studies and these sometimes fail to confirm problem. 2. Intensive monitoring studies11,20: These studies provide systematic and detailed collection of data from well defined groups of inpatients .The surveillance was done by specially trained health care professionals who devote their full time efforts towards recording all the drugs administered and all the events, which might conceivably be drug induced. Subsequently, statistical screening for drugevent association may lead to special studies. Popular example for this methodology is Boston collaborative drug surveillance program Strengths: a. Derives incidence rates b. Analyses factors which may contribute to reactions c. Identifies drug interactions d. Generates and tests hypothesis F. Under reporting can be minimised Weakness: a. They need great expense of resources b. The relatively short period of observation resulting in non identification of delayed reaction c. Relatively small proportion of population size resulting in non identification of rare reactions d. The lack of follow up and outcome information 3. Spontaneous reporting system (SRS)12: It is the principal method used for monitoring the safety of marketed drugs. In UK, USA, India and Australia, the ADR monitoring programs in use are based on spontaneous reporting systems. In this system, clinicians are encouraged to report any or all reactions that believe may be associated with drug use. Usually, attention is focused on new drugs and serious ADRs. The rationale for SRS is to generate signals of potential drug problems, to identify

rare ADRs and theoretically to monitor continuously all drug used in a variety of real conditions from the time they are first marketed.15 Strengths: a. Simple, effective, inexpensive and continuous b. The entire population comprising extremes of age, people in hospital and community may be included c. ADRs that are too rare to be demonstrated by other methods may be detected d. Drugs that are uncommonly used may be monitored Weakness: a. Under reporting is almost universal b. Absence of reliable numerator or denominator precludes the provision of quantitative information c. Numerous other reporting biases include the novelty factor of new drug and the effect of publicity d. Reporting rates for each agent or group of agents may vary with time. e. Clinical information supplied is often limited. 4. Cohort studies (Prospective studies) 11: In these studies, patients taking a particular drug are identified and events are then recorded. The weakness of this method is relatively small number patients likely to be studied, and the lack of suitable control group to assess the background incidence of any adverse events. Such studies are expensive and it JPRHC Review Article JPRHC January 2010 Volume 2 Issue 1 127-134 would be difficult to justify and organize such a study for every newly marketed drug. 5. Case control studies (retrospective studies) 10: In these studies, patients who present with symptoms or an illness that could be due to an adverse drug reaction are screened to see if they have taken the drug. The prevalence of drug taking in this group is then compared with the prevalence in a reference population who do not have the symptoms or illness. The case control study is thus suitable for determining whether the drug causes a given adverse event once there is some initial indication that it might. However, it is not a method for detecting completely new adverse reactions. 6. Case cohort studies10: The case cohort study is a hybrid of prospective cohort study and retrospective case control study, Patients who present with

symptoms or an illness that could be due to an adverse drug reaction are screened to see if they have taken the drug. The results are then compared with the incidence of the symptoms or illness in a prospective cohort of patients who are taking the drug. 7. Record linkage10: The idea here is to bring together a variety of patient records like general practice records of illness events and general records of prescriptions. In this way it may be possible to match illness events with drugs prescribed. A specific example of the use of record linkage is the so called prescription event monitoring scheme in which all the prescriptions issued by selected parishioners for a particular drug are obtained from the prescription pricing authority. The prescribers are then asked to inform those running scheme of any events in the patients taking the drugs. This scheme is less expensive and time consuming than other surveillance methods 8. Meta analysis13: Meta analysis is a quantitative analysis of 2 or more independent studies for the purpose of determining an overall effect and of describing reasons for variation in study results, is another potential tool for identifying ADRs and assessing drug safety. 9. Use of population statistics14: Birth defect registers and cancer registers can be used If drug induced event is highly remarkable or very frequent. If suspicions are aroused then case control and observational cohort studies will be initiated. II. Assessing causality between drug and suspected reaction15: Causality assessment is the method by which the extent of relation ship between a drug and a suspected reaction is established. There are three approaches to asses" causality. These include a) Opinion of an individual expert b) Opinion of a panel of experts c) Formal algorithms In the first approach, an individual who is an expert in the area of ADRs would evaluate the case. In the process of evaluation, he or she may consider and critically evaluate all the data obtained to assess whether the drug has caused the particular reaction. A panel of experts adopts a similar procedure

to arrive at a collective opinion. Using formal algorithms, collected data is subjected and critically assessed by using one or more standard algorithms. Some of the important algorithms used are Naranjo, WHO, European ABO system, Kramer, Bayesian, Karch and lasanga and French imputation method. There is no gold standard for causality assessment. The categorisation of causal relationship between a drug and suspected adverse reactions varies with the scale adopted. WHO scale categorises the causality relationship into certain, probable, possible, unassessible/unclassifiable, unlikely, conditional /unclassifiable. The Naranjo"s scale JPRHC Review Article JPRHC January 2010 Volume 2 Issue 1 127-134 categorises the reaction as definite, probable, possible or unlikely. In general the following four different basic points can be considered in attributing a clinical adverse event to the drug. 1. Temporal time relationship between suspected reaction and drug. 2. Dechallenge (cessation of drug) 3. Rechallenge (re introducing drugs) 4. Likelihood of other possible causes Table 1: Causality assessment strengths and limitations What causality assessment can do What causality assessment can not do Decreases disagreement between assessors Classify relationship likelihood Mark individual case reports Education /improvement of scientific assessment Exact quantification measurement of relationship likelihood Distinguish valid from invalid cases Prove the connection between drug and event Quantify the contribution of a drug to the development of an adverse event Change uncertainty into certainty III. Documentation of ADRs in patient's medical records This aids as reference for alerting clinicians and other health care professionals to the possibility of a particular drug causing suspected reaction. IV. Reporting serious ADRs to pharmacovigilance centers / ADR regulating authorities According to FDA, a serious reaction is classified as one which is fatal, life threatening, prolonging hospitalisation, causing a significant

persistent disability, resulting in a congenital anomaly and requiring intervention to prevent permanent damage or resulting in death16 . Hatwig SC, Seigel J and Schneider PJ categorised ADRs into seven levels as per their severity. Level 1&2 fall under mild category whereas level 3& 4 under moderate and level 5, 6&7 fall under severe category. Karch and Lasanga classify severity into minor, moderate, severe and lethal. In minor severity, there is no need of antidote, therapy or prolongation of hospitalisation. To classify as moderate severity, a change in drug therapy, specific treatment or an increase in hospitalization by at least one day is required. Severe class includes all potentially life threatening reactions causing permanent damage or requiring intensive medical care. Lethal reactions are the one which directly or indirectly contributes to death of the patient. Different ADR regulatory authorities are - Committee on safety of medicine (CSM), Adverse drug reaction advisory committee (ADRAC)17, MEDWATCH, JPRHC Review Article JPRHC January 2010 Volume 2 Issue 1 127-134 Vaccine Adverse Event Reporting System18. WHO-UMC international database maintains all the data of ADRs. In India, national pharmacovigilance programme19 was officially inaugurated on 23rd November 2004. It has one national pharmacovigilance center located at CDSCO in Delhi, two zonal, five regional and twenty four peripheral centers. National pharmcovigillance center communicates all the reported ADR data to WHO – UMC international database. CONCLUSION: India has more than half a million qualified doctors and 15,000 hospitals having bed strength of 6, 24,000. It is the fourth largest producer of pharmaceuticals in the world. It is emerging as important clinical trial hub in the world. Many new drugs are being introduced every year and so every health care professional must have knowledge about importance of ADR monitoring and pharmacovigilance.

Every health care professional should see it as a part of his/her professional duty keeping in mind about Hippocrates admonition" at least do no harm".

Annexure- II
VALUE ADDED COURSE
ADR MONITORING
List of Students Enrolled

Sl. No	Name of the Student	Register No	Signature
1	NIRMAL KUMAR B	U19MB331	
2	NISHANTHI V	U19MB332	
3	NITIN NARAYAN M	U19MB333	
4	NIVASINY P S	U19MB334	
5	NUKUVOLU NIENU	U19MB335	
6	PADMAJA T	U19MB336	
7	PAVAN KALYAN POTLURI	U19MB337	
8	PAVITHRA T	U19MB338	
9	PRABHU MANIKANDAN V S	U19MB339	
10	PRADHEEP K	U19MB340	
11	PRAKHAR GAUTAM	U19MB341	
12	PRIYADHARSHINI A	U19MB342	
13	PRIYADHARSHINI M	U19MB343	
14	PRIYANSHU KESHARI	U19MB344	
15	PULAK ACHARYA	U19MB345	
16	RAAJ SETHU VINAYACK R	U19MB346	
17	RABYA TABASUM	U19MB347	
18	RAHUL MAHESHVAR M G	U19MB348	
19	RAHUL RAJ	U19MB349	
20	RAJAGOPAL R	U19MB350	

RESOURCE PERSON

COORDINATOR

PROFESSOR & HOD
DEPARTMENT OF PHARMACOLOGY
Sri Lakshmi Narayana Institute Of Medical Sciences
PONDICHERRY - 605 502.

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - II

ADR MONITORING

MULTIPLE CHOICE QUESTIONS

Course Code: PH10

1) What is Pharmacovigilance?

a) Adverse drug reaction (ADR) monitoring

b) Therapeutic drug monitoring

c) Vigilance over the pharma company for drug production

d) All

2) Pharmacovigilance includes

a) Drug related problems

b) Herbal products

c) Medical devices and vaccines

d) All

3) Which of the following methods is commonly employed by the pharmaceutical companies to monitor adverse drug reactions of new drugs once they are launched in the market?

a) Meta analysis

b) Post Marketing Surveillance (PMS) studies.

c) Population studies

d) Regression analysis

4) Aim of the Pharmacovigilance is to assess

a) Safety over efficacy

b) Efficacy over safety

5) National Pharmacovigilance programme (NPP) was officially inaugurated at New Delhi in the year

a) 2002 b) 2004 c) 2006 d) 2008

6) The international center for adverse drug reaction monitoring is located in

a) USA b) Australia c) France d) Sweden

7) In India which Regulatory body is responsible for monitoring of ADR's?

a) Central Drugs Standard Control Organization

b) Indian Institute of sciences

c) Indian pharmacopoeia commission

d) Medical Council of India

8) Which of the following scales is most commonly used to establish the causality of an ADR?

a) Hartwig scale

b) Naranjo algorithm

c) Schumock &Thornton scale

d) Karch & Lasagna scale

9) Which one of the following is the 'WHO online database' for reporting ADRs?

a) ADR advisory committtee b) Medsafe c) Vigibase d) Med watch

10) One of the following is a major risk factor for the occurrence of maximum adverse drug reactions

a) Arthritis b) Renal failure c) Visual impairment d) Vacuities

11) Rare ADRs can be identified in the following phase of a clinical trial

a) During phase-1 clinical trials

b) During phase-2 clinical trials

c) During phase-3 clinical trials

d) During phase-4 clinical trials

12) National pharmacovigilance programme co-ordinating center located in

a) Ghaziabad,UP

b) JIPMER, Pondicherry

c) AIIMS, Delhi.

d) CMC, Vellore

13) Do you think reporting of adverse drug reaction is necessary ?

a) Yes b) No

14) Do you think Pharmacovigilance should be taught in detail to healthcare professionals?

a) Yes b) No

15) Have you anytime read any article on prevention of adverse drug reactions?

a) Yes b) No

16) Have you ever come across with an ADR?

a) Yes b) No

17) Have you ever been trained on how to report Adverse Drug Reaction (ADR)?

a) Yes b) No

18) Do you think reporting is a professional obligation for you?

a) Yes b) No c) Don't know d) Perhaps

19) What is your opinion about establishing ADR monitoring centre in every hospital?

a) Should be in every hospital

b) Not necessary in every hospital

c) One in a city is sufficient

d) Depends on number of bed size in the hospitals.

20) Which among the following factors discourage you from reporting Adverse Drug Reactions? (Any one only)

a) Non-remuneration for reporting

b) Lack of time to report ADR

c) A single unreported case may not affect ADR database

d) Difficult to decide whether ADR has occurred or not.

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(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that NIRMAL KUMAR B has actively participated in the Value Added Course on "ADR MONITORING" held during February 2020 – August 2020.Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. S.JAIKUMAR
RESOURCE PERSON

Dr.G.Somasundaram
Co-ordinator

Student Feedback Form

Course Name: ADR MONITORING

Subject Code: PH10

Name of Student: Nirmal kumar.V Roll No.: U19MB321

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear					✓
2	Course contents met with your expectations				✓	
3	Lecturer sequence was well planned				✓	
4	Lectures were clear and easy to understand			✓		
5	Teaching aids were effective				✓	
6	Instructors encourage interaction and were helpful			✓	✓	
7	The level of the course				✓	
8	Overall rating of the course	1	2	3	4	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

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Date: 06.08.2020

From
Dr.G.Somasundaram
Professor and Head,
Department of Pharmacology
Sri Lakshmi Narayana Institute of Medical sciences
Pondicherry

To
The Dean,
Sri Lakshmi Narayana Institute of Medical sciences
Pondicherry.

Sub: Completion of value-added course: ADR MONITORING

Dear Sir,

With reference to the subject mentioned above, the department has conducted thevalue-added course titled: **ADR MONITORING** on **Feb 2020–Aug2020**. We solicit your kind action to send certificates for the participants, which is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards

Dr.G.Somasundaram
PROFESSOR & HOD
DEPARTMENT OF PHARMACOLOGY
Sri Lakshmi Narayana Institute of Medical Sciences
PONDICHERRY - 605 502

Encl: Certificates

Photographs



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Date:10/1/20

From
DR.shankarlal,
Professor and Head,
orthopaedics,
Slims,
Pondicherry.

To
The Dean,
Slims
pondicherry.

Sub: Permission to conduct value-added course: pediatric conditions in orthopaedics

Respected Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: pediatric conditions in orthopaedics_ on 8/2/20_. We solicit your kind permission for the same.

Kind Regards



Dr.shankarlal

PROFESSOR & HOD
Department of Orthopaedics
Sri Lakshmi Narayana Institute of Medical Sciences
Pondicherry - 605 502.

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean:Dr.balagurunathan

The HOD:Dr.shankarlal

The Expert:Dr.Vijayaragavan

The committee has discussed about the course and is approved.

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[Affliated to Bharath University, Chennai - TN]

Dean

DEAN
Prof.K.BALAGURUNATHAN,M.S
(General surgeon)
SRI LAKSHMI NARAYANA
INSTITUTE OF MEDICAL SCIENCES
OSUDU, PONDICHERRY

Subject Expert

Department of Orthopaedics
Sri Lakshmi Narayana Institute of Medical Sciences
Pondicherry - 605 502.

HOD

PROFESSOR & HOD
Department of Orthopaedics
Sri Lakshmi Narayana Institute of Medical Sciences
Pondicherry - 605 502.

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Circular

07.06.2020

Sub: Organising Value-added Course: PAEDIATRICS CONDITIONS IN ORTHOPAEDICS.

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research** is organizing **PAEDIATRIC CONDITIONS IN ORTHOPAEDICS.** *30 hrs &* FEB 2020 – JUNE 2020

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before FEB2020-JUNE2020. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

DEAN
Prof.K.BALAGURUNATHAN,M.S
(General surgeon)
SRI LAKSHMI NARAYANA
INSTITUTE OF MEDICAL SCIENCES
OSUDU PONDICHERRY

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Sri Lakshmi Narayana Institute of Medical Sciences
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Course Proposal

Course Title: pediatric condition in orthopaedics

CourseObjective: conditions.etiology,treatment

CourseOutcome: management of various pediatric conditions

Course Audience:25

Course Coordinator:dr.BALAGURUNATHAN

Course Faculties with Qualification and Designation:

1.Dr.shankarlal MS ORTHO MCH Neurosurgery

Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Time	Hours
1	8/2/20	CONDITIONS	4.30 to6.30	2
2	15/2/20	ETIOLOGY	5.30 to 7	1 1/2
3	4/3/20	CLINICAL FEATURES	4.30 to 5	1/2
4	12/3/20	LATE FEATURES	5 to7	2
5	19/3/20	TREATMENT	4.30 to 6:30	2
6	26/3/20	COMPLICATIONS	5 to 7	2
7	16/4/20	PRACTICAL SESSION	4 to 7	3
8	23/4/20	PRACTICAL SESSION	4 to 7	3
9	14/5/20	PRACTICAL SESSION	4 to 7	3
10	22/5/20	PRACTICAL SESSION	5 to7	2
11	30/5/20	PRACTICAL SESSION	4 to6	2
12	11/6/20	PRACTICAL SESSION	4 to7	3
13	18/6/20	PRACTICAL SESSION	4 to 8	4
			Total Hours	30

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REFERENCE BOOKS:

1)TACHDJIAN PAEDIATRIC ORTHOPAEDICS

2)FUNDAMENTAL OF PAEDIATRIC ORTHOPAEICS LYNN.T.STAHELI

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VALUE ADDED COURSE

1. **Name of the programme & Code :**

Paediatric conditions in orthopaedics – OR12

2. Duration & Period

30 hrs & FEB 2020 – JUNE 2020

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Short notes- *Enclosed as Annexure- III*

6. Certificate model

Value Added Course- FEB – JUNE 2020					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	OR12	PAEDIATRIC CONDITION IN ORTHOPAEDICS	Dr. Vincent	THIRD YEAR MBBS	25 (FEB 2020 – JUNE 2020)

Enclosed as Annexure- IV

7. No. of times offered during the same year:

1 FEB 2020 – JUNE 2020

8. Year of discontinuation: 2021

9. Summary report of each program year-wise

10. Course Feed Back *Enclosed as Annexure- v*

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Dr.VINCENT
RESOURCE PERSON

Department of Orthopaedics
Sri Lakshmi Narayana Institute of Medical Sciences
Pondicherry - 605 502.

DR.BALAGURUNATHAN
COORDINATOR

DEAN
Prof.K.BALAGURUNATHAN,M.S
(General surgeon)
SRI LAKSHMI NARAYANA
INSTITUTE OF MEDICAL SCIENCES
OSUDU PONDICHERRY

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8/2/20

PAEDIATRIC CONDITIONS IN ORTHOPAEDICS

Particulars	Description
Course Title	**PAEDIATRIC CONDITION IN ORTHOPAEDICS**
Course Code	OR12
Objective	1. CONDITIONS 2. AETIOLOGY 3. CLINICAL FEATURES 4. LATE FEATURES 5. TREATMENT 6. COMPLICATIONS
Further learning opportunities	**Rare cases of paediatric conditions in orthopaedics**
Key Competencies	On successful completion of the course the students will have the skill to evaluate and manage the paediatric conditions in orthopaedics
Target Student	PRE FINAL YEAR Students
Duration	30hrs FEB 2020 – JUNE 2020
Theory Session	10hrs
Practical Session	20hrs
Assessment Procedure	SHORT NOTES

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DEVELOPMENTAL DYSPLASIA OF THE HIP

Formerly known as congenital dislocation of the hip

- Comprise a spectrum of disorder:

1. Dislocation during neonatal period
2. Subluxation or partial displacement
3. Shallow acetabulum without actual displacement

- 5-20 per 1000 live births
- Re-examination 3 weeks after birth , the incidence : 1-2 per 1000 infants
- Girls>boys, 7:1
- Left hip> right hip
- 1:5 cases - bilateral

Genetic	• Generalized joint laxity • Shallow acetabula
Hormonal changes	• High level of maternal estrogen, progesterone and relaxin in the last few weeks of pregnancy aggravate ligamentous laxity in infant
Intrauterine malposition	• esp. breech position with extended legs -> dislocation
Postnatal factors	• Who swaddle their babies & carry them with fully extended hips n knees > compare to person who carry babies astride their backs with hips abducted

Clinical features:

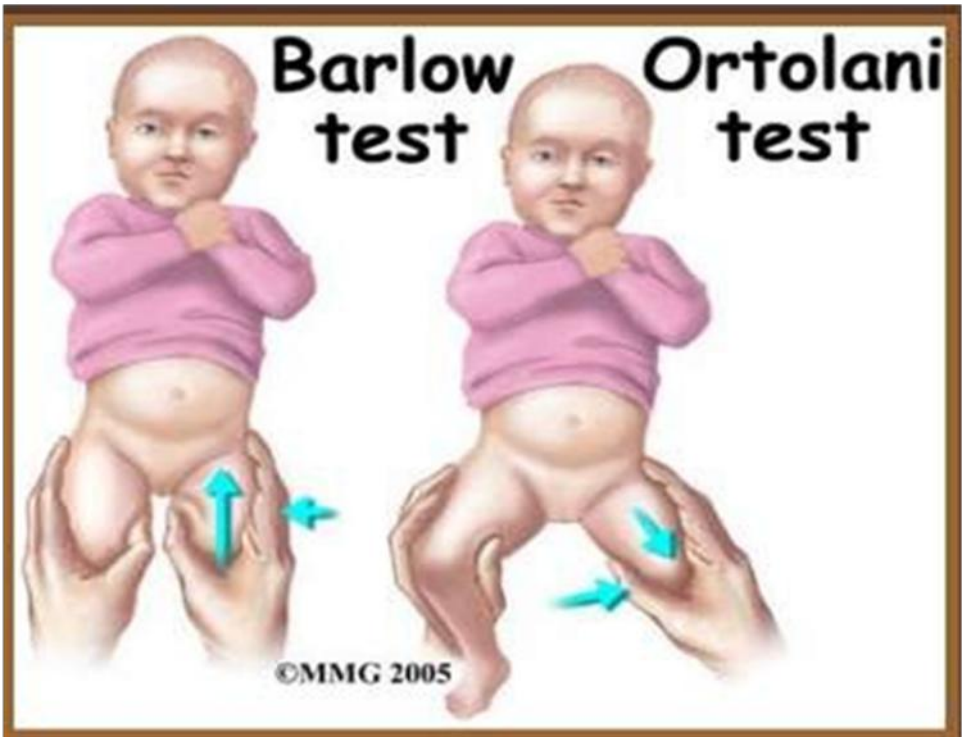
In the neonate:

- Every newborn child should be examine for sign of hip instability esp:

- FHx of congenital hip instability, breech presentation

Special tests:

- Ortolani's test
- Barlow's test



Late features:

- Asymmetry, a clicking hip or difficulty in applying napkin
- Unilateral dislocation- skin creases look asymmetrical, short leg, internally rotated
- Bilateral dislocation- wide perineal gap, abduction is limited
- Walking is delayed
- Gait: limp or Trendelanburg gait

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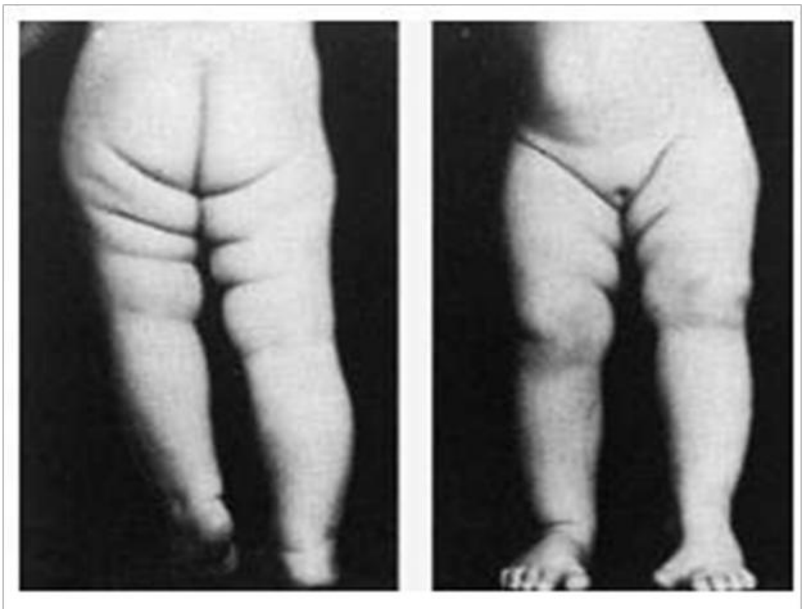
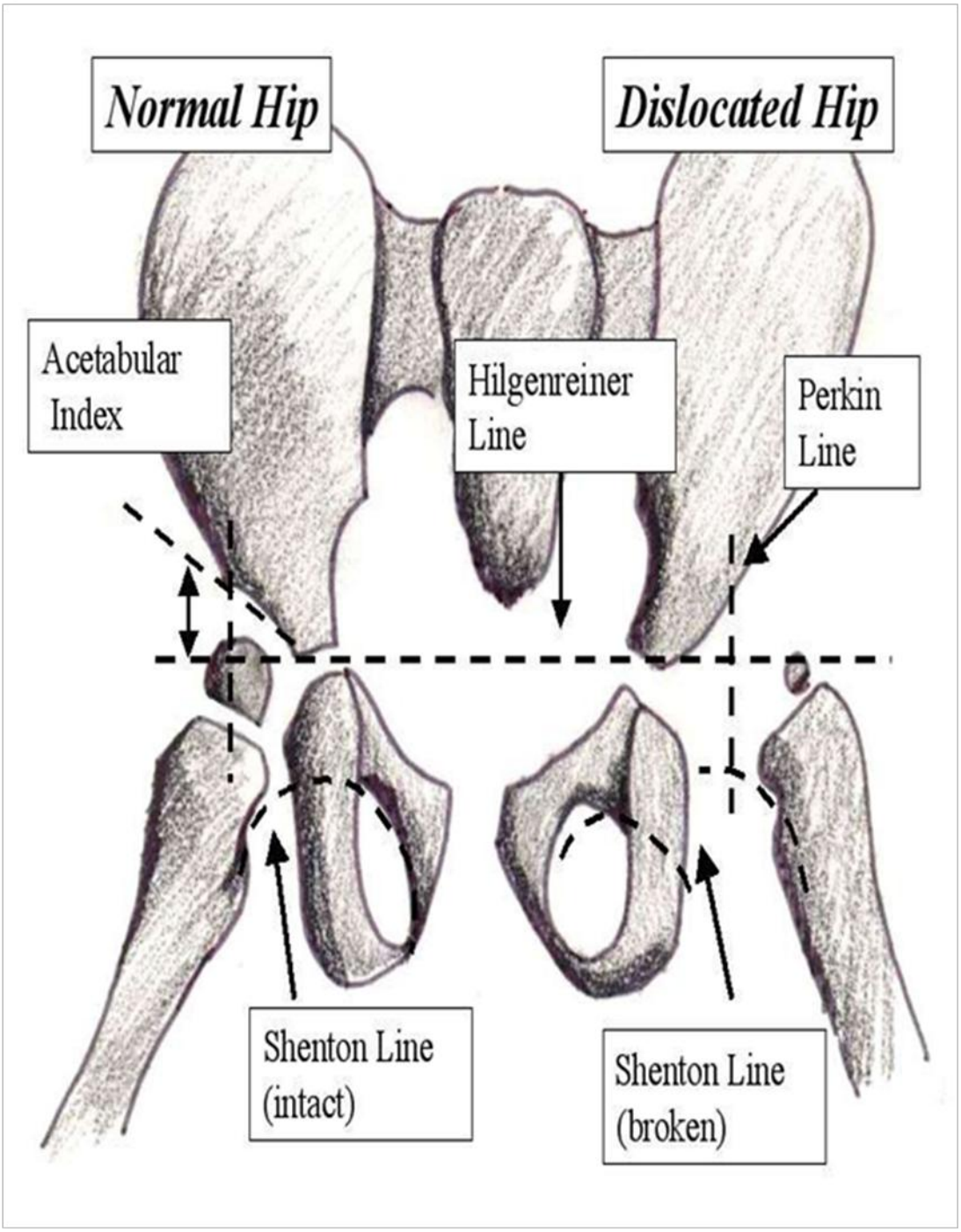
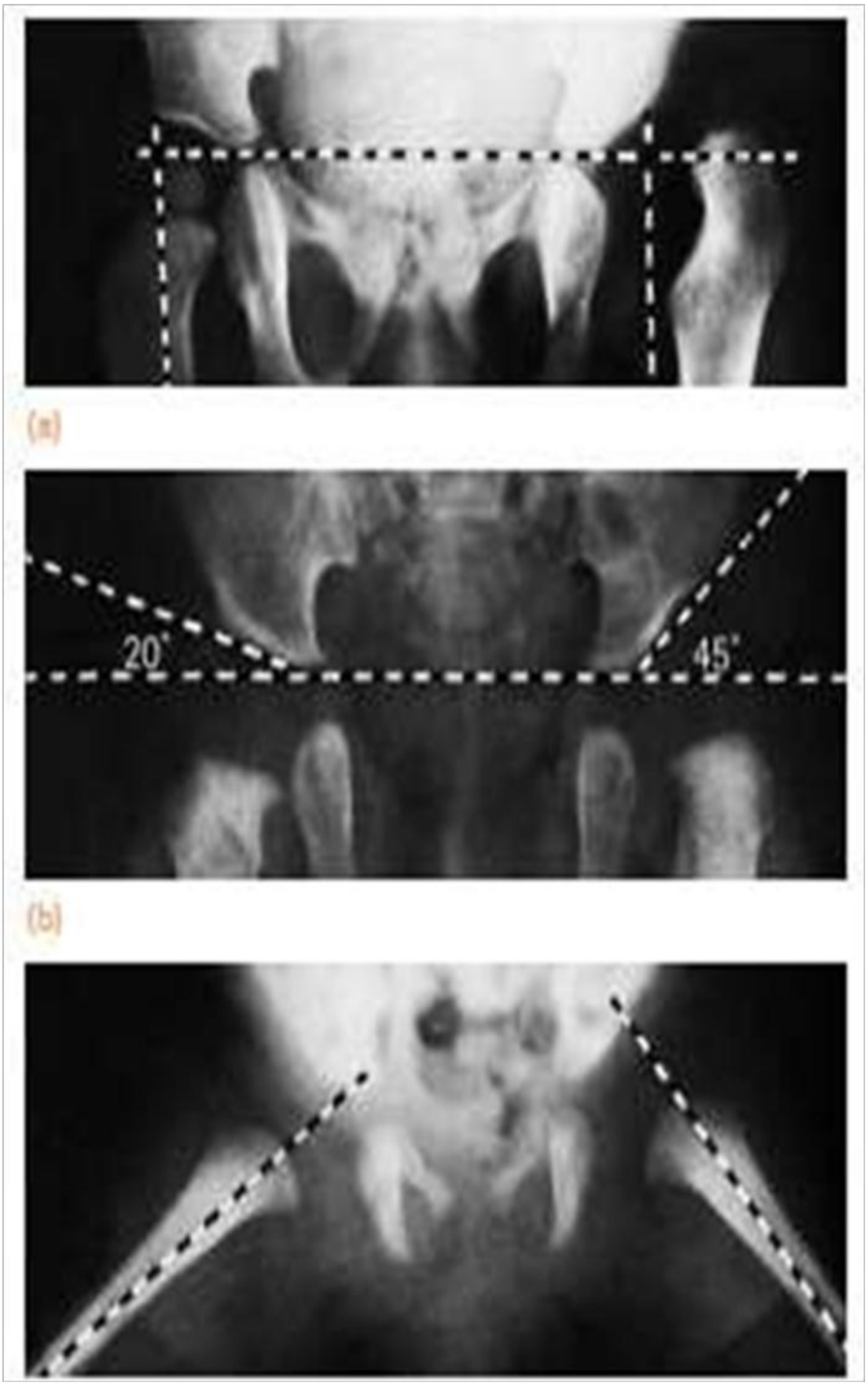





Normal Hip
Dislocated Hip
Acetabular Index
Hilgenreiner Line
Perkin Line
Shenton Line (intact)
Shenton Line (broken)



¨ hip dyplasia

¡ acetabular index - angle formed by a line drawn from point on triradiate cartilage to point on lateral margin of

acetabulum (normal is < 30 deg.)

Von Rosen's lines- the hip abducted 45degree.The femoral shaft should pointed into acetabula

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Treatment:

The first 3-6 month of age

- ¡ Double napkin or an abduction pillow for 1st 6weeks
- ¡ Re-examined
- ¡ Persistent instability à abduction splintage until hip is stable
- ¡ Follow up- until the child walking

¨ Splintage:

- hold the hip 100 degree flexed and abducted
- allow some movement in the splint

Persistent dislocation: 6month to 6 years

¨ **Closed reduction**

¨ **Splintage**

¨ **Open reduction**

After the age 6 years

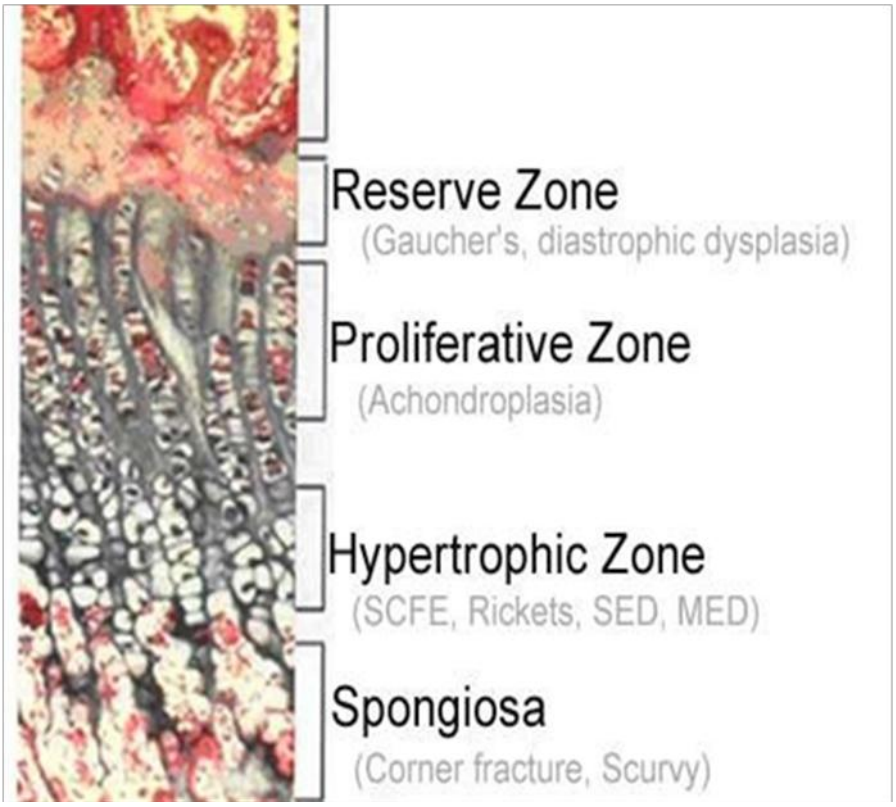
Unilateral dislocation- operative reduction Bilateral dislocation- Symmetrical, less notifiable

- Greater risk for surgical intervention
- avoid operation unless pain and deformity is unusually severe

slipped upper femoral epiphysis :

Displacement of the proximal femoral epiphysis

- aka epiphysiolysis
- Most common hip pain in adolescence
- M > F->3:2
- M: 12 - 16 y/o, F: 10 - 15 y/o
- Bilateral: 17 – 50% of cases



Epidemology:

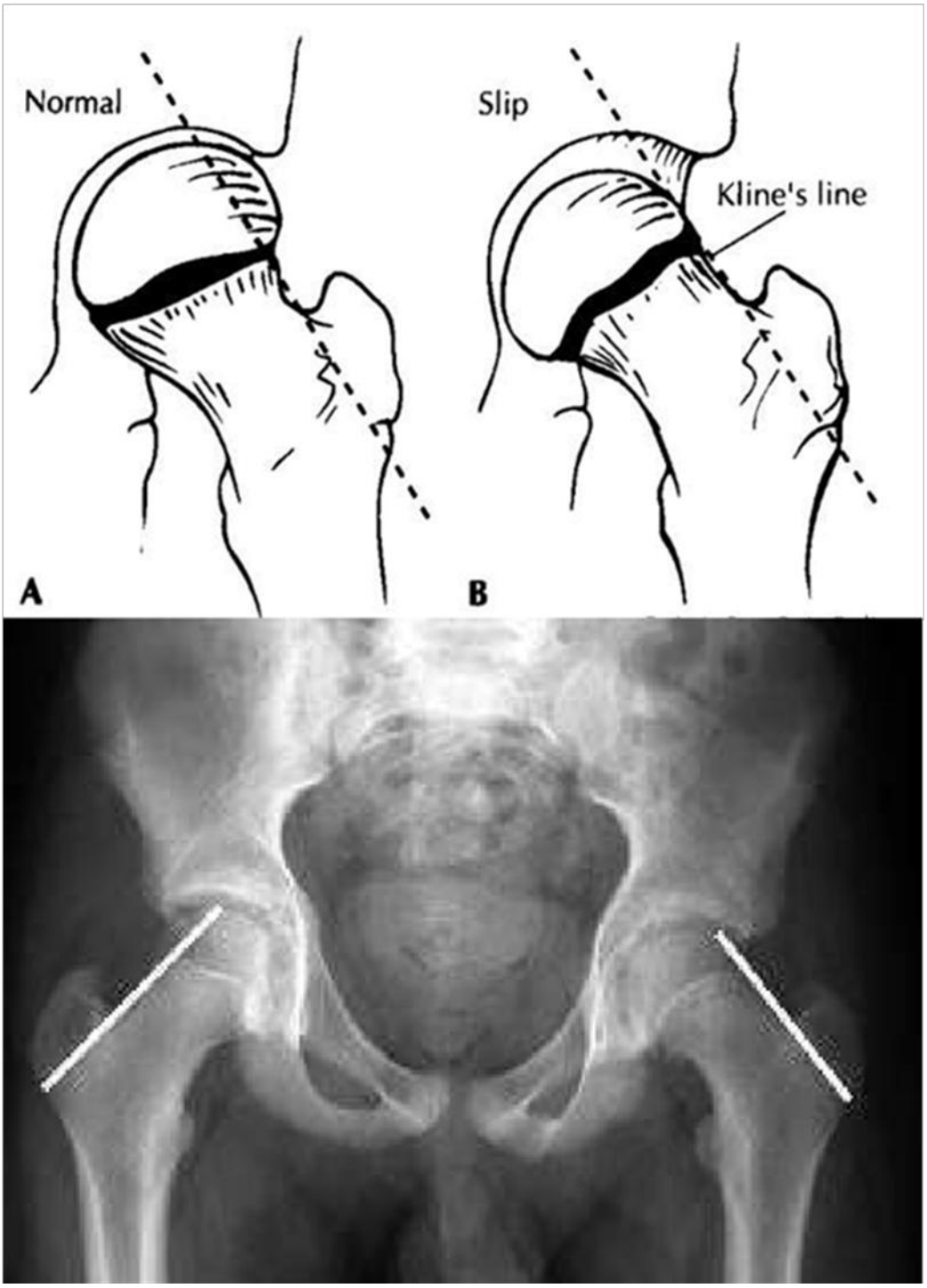
Risk factors include:

- Obesity
- Hx of radiation therapy to femoral head region

- Endocrine disorders (e.g. hypothyroidism and osteodystrophy of chronic renal failure)
- Positive family history of SUFE/SCFE (autosomal dominant)
- African American

Clinical presentation:

- HiHip or groin pain (most common)
- Reffered pain: ant part of thigh and knee
- 2. Physical examination
- Trendelenburg gait
- Leg is externally rotated
- 1-2cm short
- Limitation of abduction and internal rotation



SUFE Grading

Management:

Non weight bearing and rest

Surgical: Percutaneous in-situ stabilization/fixation

Complications

- Avascular necrosis of femoral head (10-15%)
- Acute cartilage necrosis/chondrolysis (7-10%)
- Deformity
- Secondary osteoarthritis (~90%)
- Slip progression (1-2% of single screw fixation)
- Hip stiffness



Perthes disease

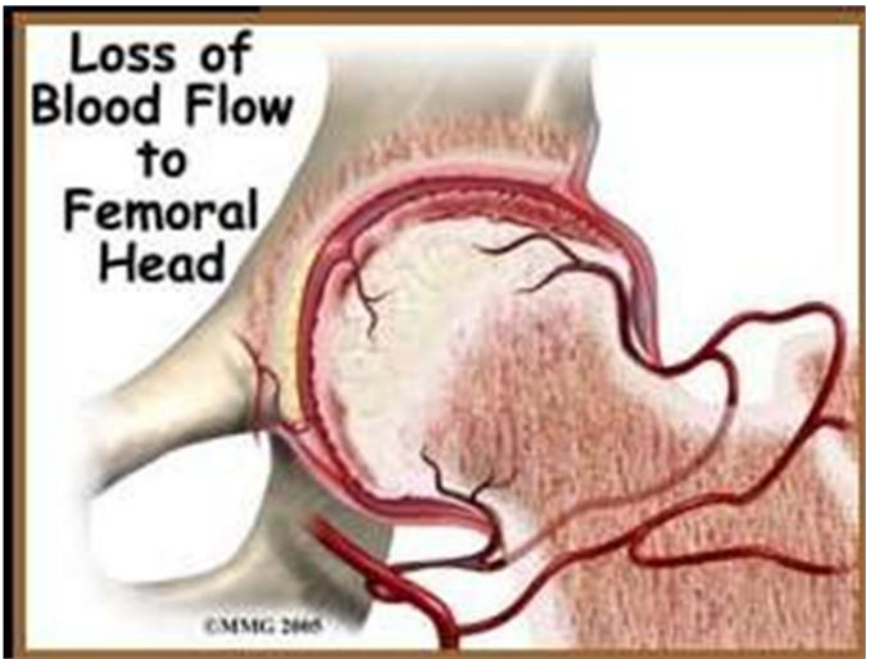
- Painful hip disorder of childhood characterized by necrosis of the femoral head
- Incidence: 1 in 10 000
- Boys>girls , 4x as often as girls
- Usually 4-8 years old

Femoral head supplied by:

- Mataphyseal vessels
- Lateral epiphyseal

vessels

- Scanty vessels



Pathology:

- Stage 1 : **Bone death**
- Part of the bony femoral head dies, stop enlarge
- Stage 2 : **Revascularization and repair**
- New blood vessel enter the necrotic area and new bone is laid down on the dead trabeculae
- Stage 3: **Distortion and remodelling**
- Epiphysis is damaged and the growth at the head and neck will be distorted
- Epiphysis ends up flattened ('coxa plana') but enlarged ('coxa magna')
- The femoral head is incompletely covered by the acetabulum.

Clinical features :

- Complaint of pain and start to limp
- Little wasting of muscles in the upper thigh
- Joint is irritable

✓ All movements are diminished

✓ Extremely painful

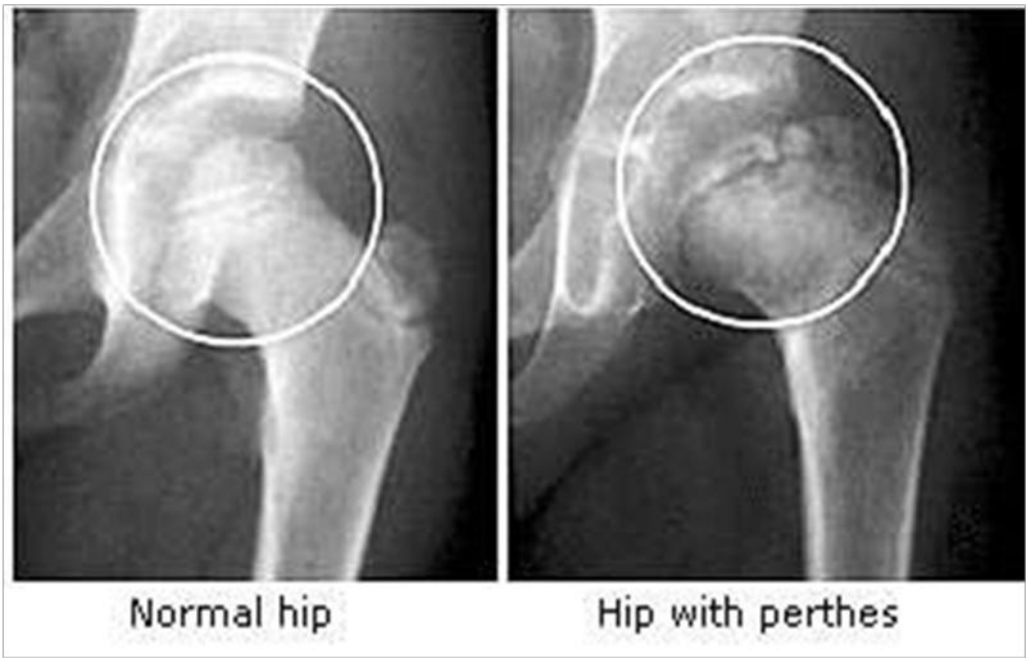
- The child is not seen till later

✓ Limited abduction and internal rotation

Investigation:

Xray:

- Earliest changes – increased density of the bony epiphysis and apparent widening of the joint space
- Followed by - flattening, fragmentation and lateral displacement of the epiphysis, with rarefaction and broadening of the metaphysis.



Treatment :

Symptomatic treatment :

- Pain control
- Gentle exercise to maintain movement
  - Containment
  - Operative reconstruction

Irritable hip :

Transient synovitis is the most common cause of acute hip pain

aged 3-10 years. Boys >> Girls

The disease causes arthralgia and arthritis secondary to a transient inflammation of the synovium of the hip.

Usually it is a diagnoses of exclusion, once trauma and infection are ruled out

Symptoms:

- Most commonly: Unilateral hip or groin pain
- Limp.
- 50% patient has recent history of an URTI
- Usually afebrile or have a mildly elevated temperature.
- Very young children -> crying at night.
- -Hold the hip in flexion with slight abduction and external rotation.
- mild restriction of abduction and internal rotation, but 1/3 demonstrate no limitation of motion.
- The hip may be tender and painful even with passive movement.
- The most sensitive test
- :**the log roll**

\

Investigations:

- ¨ Usually to rule out other diagnoses.
- ¨ WBC, ESR and CRP are usually elevated in septic arthritis.
- ¨ XRay: can exclude bony lesions.
- ¨ Ultrasound- may show a joint effusion
- Management
- ¨ Apply heat and massage
- ¨ .Non-steroidal anti-inflammatory drugs (NSAIDs).
- ¨ Advise bedrest until pain dissapear and the effusion
- resolves

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VALUE ADDED COURSE

PAEDIATRIC CONDITIONS IN ORTHOPAEDICS

OR12

4. List of Students Enrolled FEB 2020 – JUNE 2020

Pre final Year MBBS Student			
Sl. No	**Name of the Student**	**Roll No**	**sign**
1	ALLARI KARTHIK ABHIROOP	U16MB258	
2	AMAL ASHOK	U16MB259	
3	AMIRTHAVARSHNI .R	U16MB260	
4	ANANYA SHARMA	U16MB261	
5	ANGALAKUDURU DEEPCHAND	U16MB262	
6	ANJAN BANERJEE	U16MB263	
7	ANWESHA CHATTERJEE	U16MB264	
8	ARCHANA .A	U16MB265	
9	ARCHITHA.A	U16MB266	
10	ARIVUMATHI .R	U16MB267	
11	ARJUN.S	U16MB268	
12	ASHVANTH KUMAR .A	U16MB269	
13	ASMITHA S.V	U16MB270	
14	AVIDI VENKATA SAISUSHMA	U16MB271	
15	AVIRAL PATPATIA	U16MB272	
16	BALACHANDRAN .A	U16MB273	
17	BALAJI .S	U16MB274	
18	BHASKARAN .K.C	U16MB275	
19	BHAVANI . K.M	U16MB276	
20	BLESSY AMALA RISHA .J	U16MB277	
21	CAREENA DANIEL	U16MB278	
22	CHANDRA PRAKASH.M	U16MB279	
23	CHINJU S.R	U16MB280	

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[Affliated to Bharath University, Chennai - TN]

Dr.VINCENT
RESOURCE PERSON

Department of Orthopaedics
Sri Lakshmi Narayana Institute of Medical Sciences
Pondicherry - 605 502.

DR.BALAGURUNATHAN
COORDINATOR

DEAN
Prof.K.BALAGURUNATHAN,M.S
(General surgeon)
SRI LAKSHMI NARAYANA
INSTITUTE OF MEDICAL SCIENCES
OSUDU PONDICHERRY

OFFICE OF THE DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
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PUDUCHERRY - 605 502.
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Annexure 4

Course/Training Feedback Form

Course: PAEDIATRIC ORTHOPAEDICS
Date: 18/6/20
Name:amal ashok
Reg NO.
Department:ORTHO

Q 1: Please rate your overall satisfaction with the format of the course:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 2: Please rate course notes:

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 3: The lecture sequence was well planned

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 4: The lectures were clear and easy to understand

a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 5:Please rate the quality of pre-course administration and information:

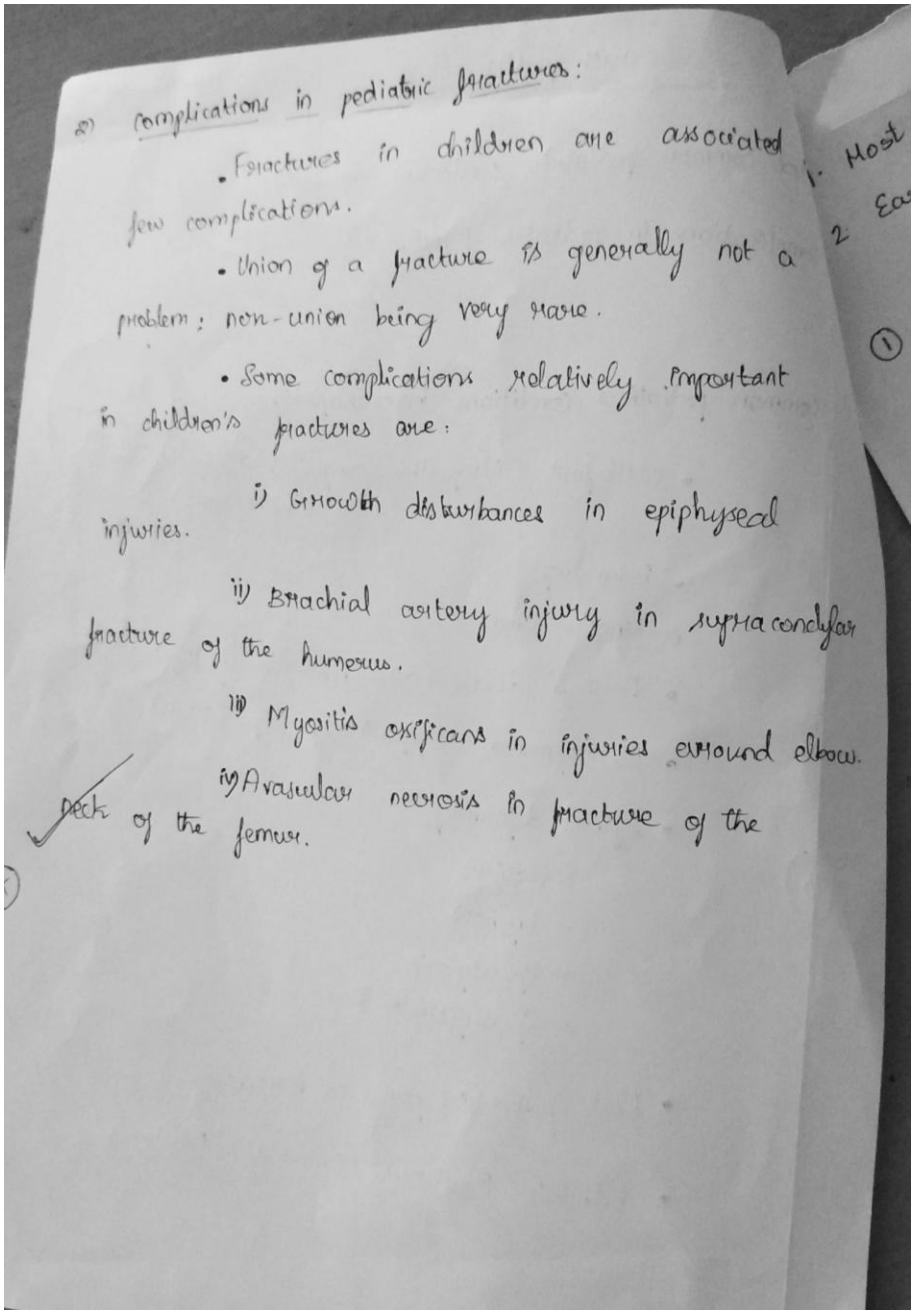
a. Excellent b. Very Good c. Satisfactory d. unsatisfactory

Q 6: Any other suggestions:

Comments:

Thank you for taking the time to complete this survey, your comments are much appreciated.

OPTIONAL Section: Name _____
Signature _____ Date _____



20) Complications in pediatric fractures:

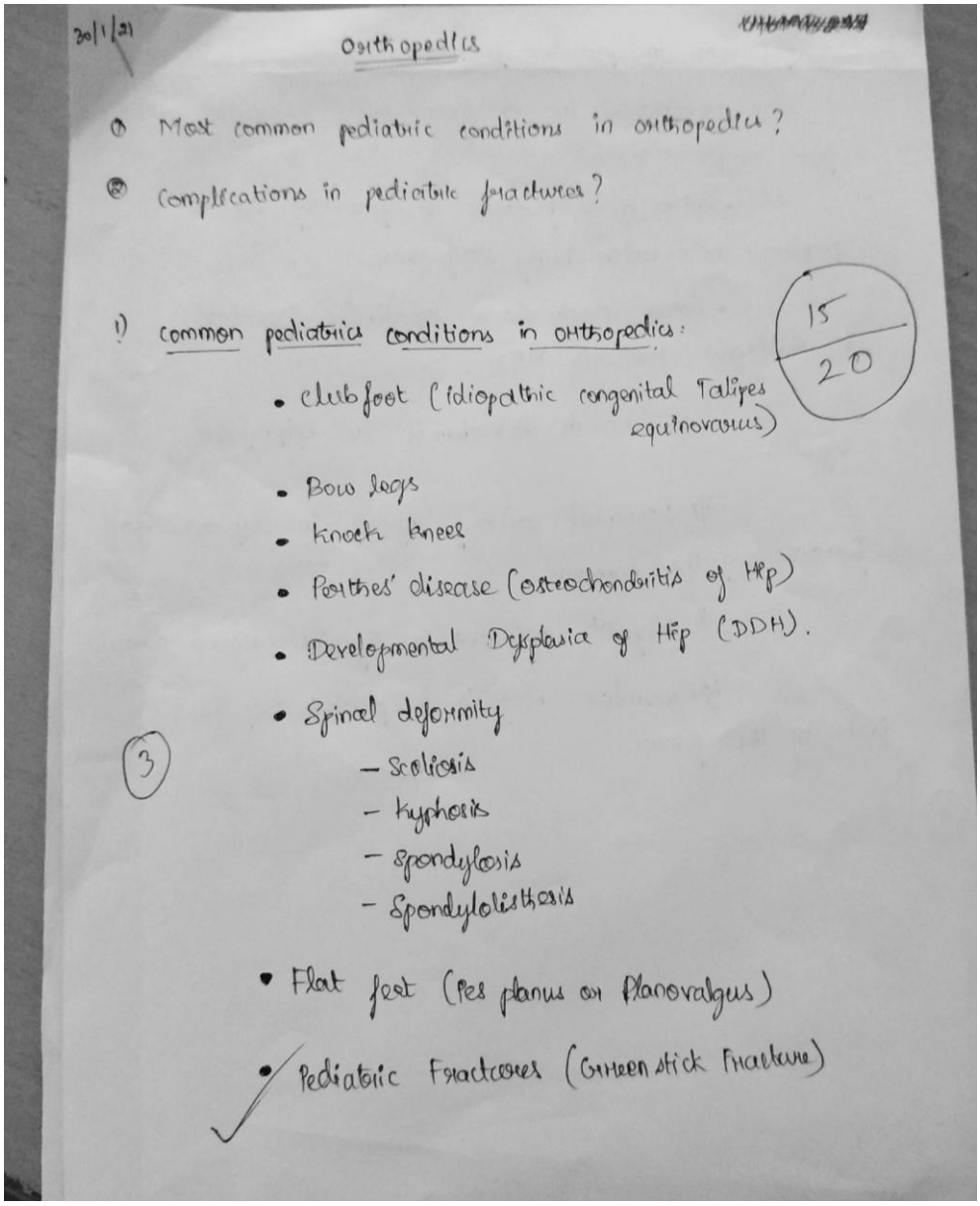
- Fractures in children are associated few complications.
- Union of a fracture is generally not a problem; non-union being very rare.
- Some complications relatively important in children's fractures are:

i) Growth disturbances in epiphyseal injuries.

ii) Brachial artery injury in supracondylar fracture of the humerus.

iii) Myositis ossificans in injuries around elbow.

iv) Avascular necrosis in fracture of the neck of the femur.



30/1/21

Orthopedics

1. Most common pediatric conditions in orthopedics?
2. Complications in pediatric fractures?

15/20

1) common pediatrics conditions in orthopedics:

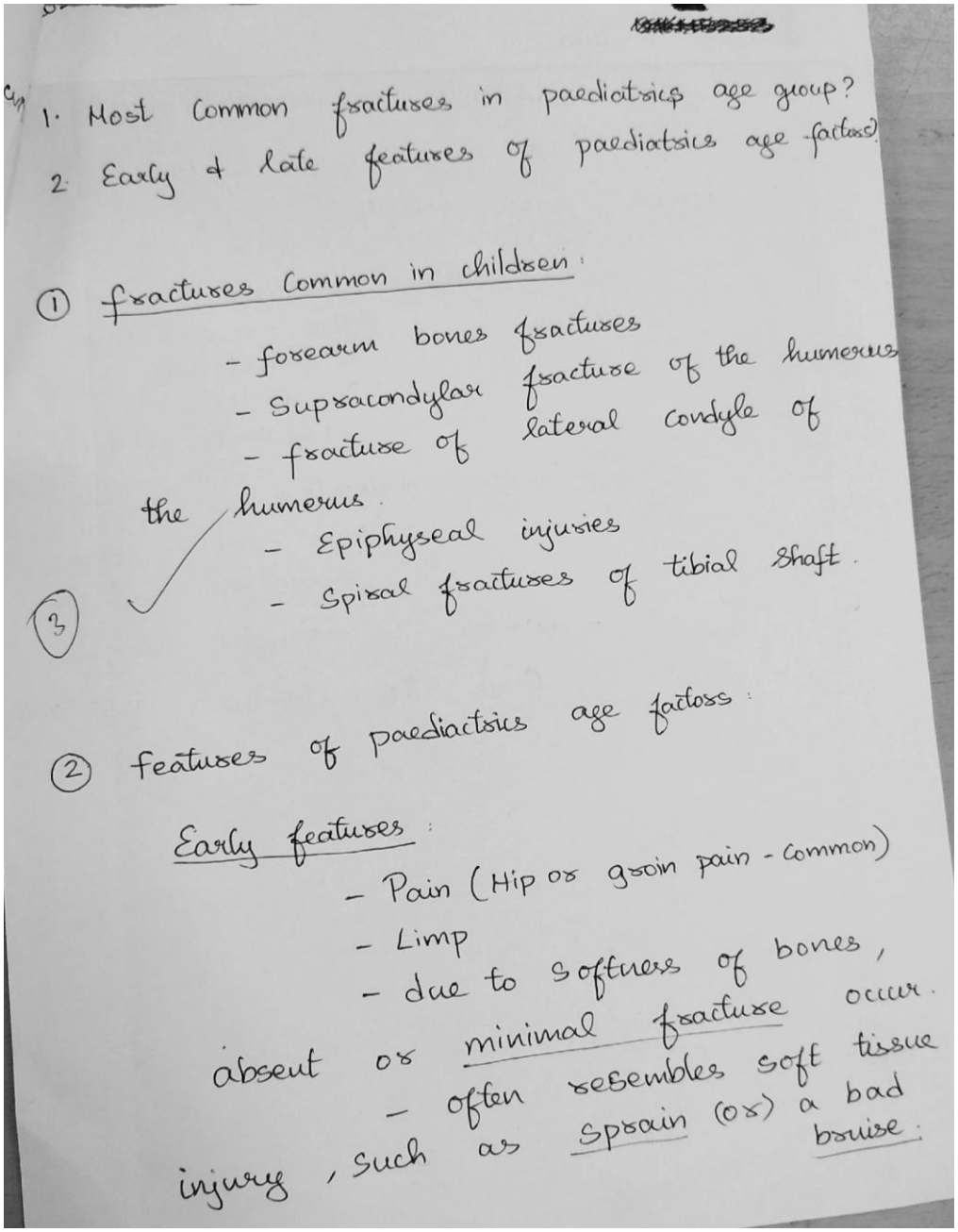
- clubfoot (idiopathic congenital Talipes equinovarus)
- Bow legs
- Knock knees
- Perthes' disease (osteochondritis of Hip)
- Developmental Dysplasia of Hip (DDH).
- Spinal deformity
  - Scoliosis
  - Kyphosis
  - spondylosis
  - Spondylolisthesis

(3)

- Flat feet (Pes planus or Planovalgus)
- Pediatric Fractures (Green stick Fracture)

late features :

- difficulty in wearing clothes
- X-rays reveals the lower bone density.
- Unilateral dislocation
  (Skin creases look, asymmetrical, short leg, internally rotated)
- Bilateral dislocation
  (wide perineal gap, abduction is limited)
- walking is delayed
- Gait : Trendelanburg gait may occur.



1. Most common fractures in paediatrics age group?
2. Early & late features of paediatrics age factors?

① Fractures common in children:

- forearm bones fractures
- Supracondylar fracture of the humerus
- fracture of lateral condyle of the humerus.
- Epiphyseal injuries
- Spiral fractures of tibial shaft.

③

② Features of paediatrics age factors:

Early features:

- Pain (Hip or groin pain - common)
- Limp
- due to softness of bones, minimal fracture occur.
- often resembles soft tissue injury, such as sprain (or) a bad bruise.

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(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that __AMAL ASHOK__ has actively participated in the Value Added Course on PAEDIATRIC CONDITIONS IN ORTHOPAEDICS held during FEB 2020 – JUNE 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. Vincent
RESOURCE PERSON

Dr. BALAGURUNATHAN
COORDINATOR

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Student Feedback Form

Course Name: **PAEDIATRIC CONDITIONS IN ORTHOPAEDICS**

Subject Code: OR12

Name of Student: EDA SAI VENKATA TEJA Roll No.: U16MB289

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear					✓
2	Course contents met with your expectations					✓
3	Lecturer sequence was well planned					✓
4	Lectures were clear and easy to understand					✓
5	Teaching aids were effective					✓
6	Instructors encourage interaction and were helpful					✓
7	The level of the course					✓
8	Overall rating of the course	1	2	3	4	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

Tejа
Signature

Date: 18/06/20

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Date:18/6/20

From
Dr.shankarlal,
orthopedics,
Slims,
pondicherry

Through Proper Channel

To
The Dean,
Slims,
Pondicherry.

Sub: Completion of value-added course: pediatric conditions in orthopedics

Respected Sir,

With reference to the subject mentioned above, the department has conducted thevalue-added course titled: **_pediatric conditions in orthopedics____** on __18/6/20_. We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards

Dr.shankarlal



PROFESSOR & HOD
Department of Orthopaedics
Sri Lakshmi Narayana Institute of Medical Sciences
Pondicherry - 605 502.

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Sri Lakshmi Narayana Institute of Medical Sciences

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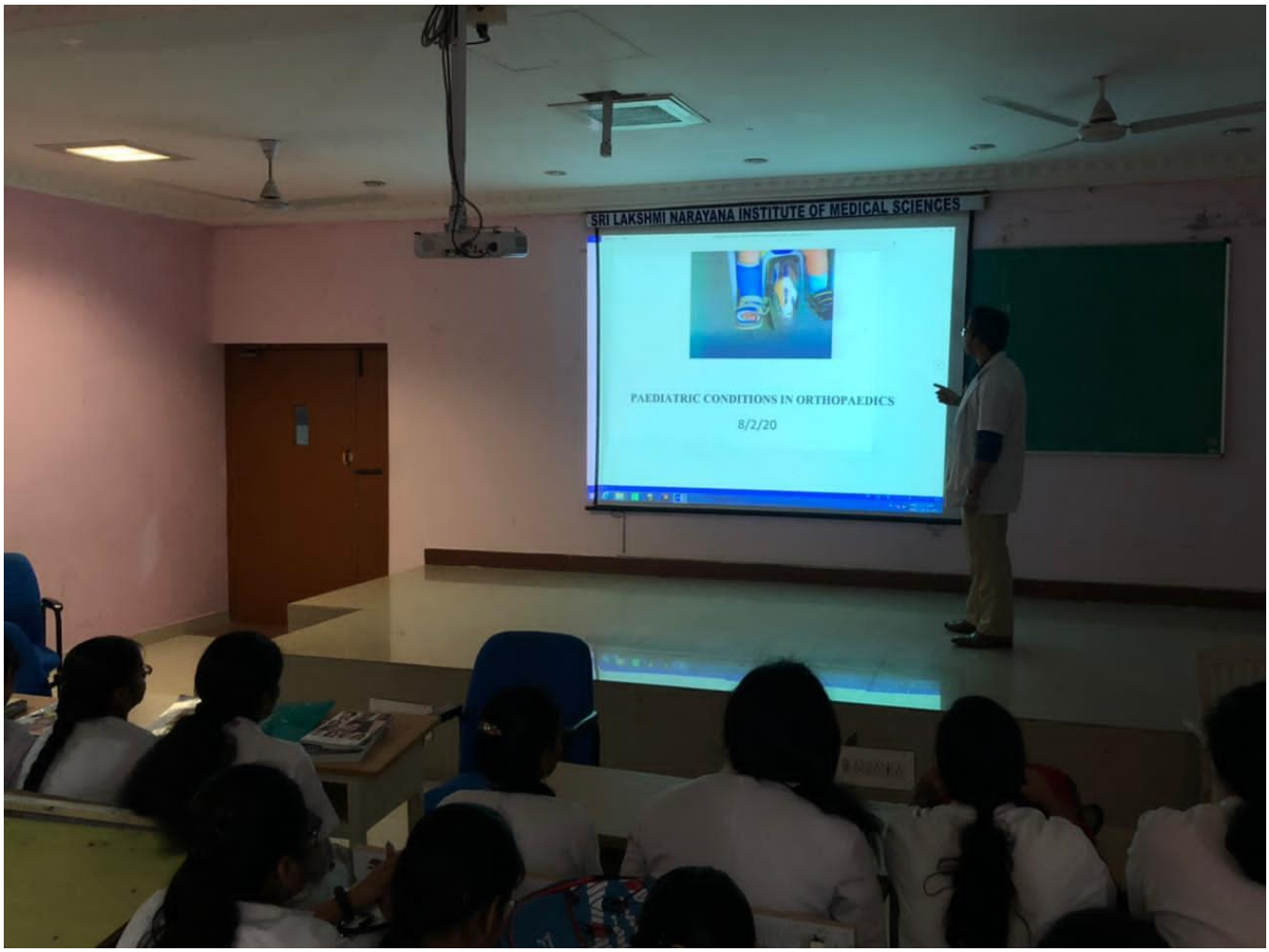

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

Date: 06/02/2020

From
Dr. Aravind. C
Professor and Head,
Department of General Medicine
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research
Chennai

To
The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research
Chennai

Sub: Permission to conduct value-added course: EUTHANASIA – An Indian Perspective

Respected Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **EUTHANASIA – An Indian Perspective** on 26/03/2020. We solicit your kind permission for the same.

Kind Regards

Dr. Aravind. C

Dr. C. ARAVIND, MD.,
Reg.No:68432
Professor & HOD, General Medicine
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

FOR THE USE OF DEAN'S OFFICE

Names of Committee members for evaluating the course:

The Dean: Dr. Balagurunathan

The HOD: Dr. Aravind. C

The Expert: Dr. Muthukumarasamy. B

The committee has discussed about the course and is approved.

Dean

Subject Expert

Dr. B. MUTHUKUMARASAMY, MD.,
Reg. No: 33723
Professor, General Medicine
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

HOD

Dr. C. ARAVIND, MD.,
Reg.No:68432
Professor & HOD, General Medicine
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

DEAN
Prof.K.BALAGURUNATHAN,M.S
(General surgeon)
SRI LAKSHMI NARAYANA
INSTITUTE OF MEDICAL SCIENCES
OSUDU PONDICHERRY

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Circular

10/02/2020

Sub: Organising Value-added Course: EUTHANASIA – An Indian Perspective reg

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research**, is organising a Value added course, titled, "EUTHANASIA – An Indian Perspective reg" between March 2020 and May 2020. The course content is enclosed below.

The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before 21/03/2020. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

DEAN
PRINCIPAL
SRI LAKSHMI NARAYANA
INSTITUTE OF MEDICAL SCIENCES
OSUDU, PUDUCHERRY

Encl: Copy of Course content and Registration form.

COURSE PROPOSAL

Course Title: **EUTHANASIA- An Indian Perspective**

Course Objective: To create an awareness among CRRIs about Physician Assisted Death / Euthanasia – its current standing in the Indian population

Course Outcome: Awareness was created among the interns who attended the course about Euthanasia – its moral and ethical implications and its standing in the Indian and global population

Course Audience: A batch of 25 CRRIs

Course Coordinator: Dr. C. Aravind

Course Faculties with Qualification and Designation:

1. Dr. Muthukumarasamy. B
   Professor
   Department of Medicine
2. Dr. Chellapandian
   Professor
   Department of Medicine

Course Curriculum/Topics with schedule

SlNo	Date	Topic	Time	Hours	Name of the faculty
1.	26/03/2020	What is euthanasia?	5 pm to 7 pm	2 hours	Dr. Muthukumarasamy. B
2.	30/03/2020	Physician assisted death	4: 30 pm to 6: 30 pm	2 hours	Dr. Muthukumarasamy. B
3.	02/04/2020	Arguments favouring Euthanasia/ PAS	5 pm to 7 pm	2 hours	Dr. Chellapandian
4.	03/04/2020	Arguments opposing Euthanasia/ PAS	5 pm to 7 pm	2 hours	Dr. Chellapandian

5.	06/04/2020	The global stand on PAS	5 pm to 7 pm	2 hours	Dr. Chellapandian
6.	08/04/2020	Legalization of Euthanasia/ PAS	4: 30 pm to 6: 30 pm	2 hours	Dr. Muthukumarasamy. B
7.	13/04/2020	Psychological implications on the patient and relatives	5 pm to 7 pm	2 hours	Dr. Chellapandian
8.	15/04/2020	Euthanasia/ PAS in clinical practice	5 pm to 7 pm	2 hours	Dr. Muthukumarasamy. B
9.	16/04/2020	Reasons for PAS/ Euthanasia	4 pm to 7 pm	3 hours	Dr. Chellapandian
10.	20/04/2020	Religious outlook on PAS/ Euthanasia	4 pm to 6 pm	2 hours	Dr. Chellapandian
11.	22/04/2020	Moral and ethical implications	4 pm to 7 pm	3 hours	Dr. Chellapandian
12.	27/04/2020	The physician's challenge	4 pm to 7 pm	3 hours	Dr. Muthukumarasamy. B
13.	08/05/2020	The Indian society and PAS/ Euthanasia	4 pm to 7 pm	3 hours	Dr. Chellapandian
			Total Hours	30	

REFERENCE BOOKS:

1. **HARRISON'S PRINCIPLES OF INTERNAL MEDICINE; 20th EDITION**
2. **Euthanasia: An Indian perspective; Vinod K. Sinha, S. Basu,1 and S. Sarkhel2; Indian J Psychiatry. 2012 Apr-Jun; 54(2): 177–183**

VALUE ADDED COURSE

1. Name of the programme and code

   Euthanasia – an Indian perspective; IM12

2. Duration & period

   30 hrs; March 2020 – May 2020

3. Information Brochure and course content of value-added courses

   Enclosed as Annexure – I

4. List of students enrolled

   Enclosed as Annexure – II

5. Assessment procedures:

   Short notes – Enclosed as Annexure – III

6. Certificate model

   Enclosed as Annexure – IV

7. No. of times offered during the same year

   1; March 2020- May 2020

8. Year of discontinuation

   2021

9. Summary report of each program year wise:

VALUE ADDED COURSE: January 2020 – April 2020					
Sl. No.	Course code	Course name	Resource persons	Target Students	Strength and year
1	IM12	Euthanasia – an Indian perspective	Dr. Muthukumarasamy. B Dr. Chellapandian	CRRI	25 (March 2020-May 2020)

10. Course feedback

    Enclosed as Annexure - V

RESOURCE PERSON – Dr. Muthukumarasamy. B

COORDINATOR – Dr. C. Aravind

Dr. B. MUTHUKUMARASAMY, MD.,
Professor & HOD, General Medicine
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

Dr. C. ARAVIND, MD.,
Reg.No:68432
Professor & HOD, General Medicine
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502

ANNEXURE – I

EUTHANASIA – An Indian Perspective





"Marte hain aarzoo mein marne ki
Maut aati hai par nahin aati"

- Mirza Ghalib

PARTICIPANT HAND BOOK

VALUE ADDED COURSE

COURSE DETAILS

PARTICULARS	DESCRIPTION
Course title	EUTHANASIA – AN INDIAN PERSPECTIVE
Course code	IM12
Objective	1. What is Euthanasia? 2. Physician assisted death 3. Arguments favouring Euthanasia/ PAS 4. Arguments opposing Euthanasia/ PAS 5. The global stand on PAS 6. Legalization of Euthanasia/ PAS 7. Psychological implications on the patient and relatives 8. Euthanasia/ PAS in clinical practice 9. Reasons for PAS/ Euthanasia 10. Religious outlook on PAS/ Euthanasia 11. Moral and ethical implications 12. Indian society PAS/ Euthanasia
Key competencies	On successful completion of the course, the students will have a better knowledge about PAS/ Euthanasia in the Indian health care setting
Target students	CRRIs
Duration	30 hours; between March 2020 and May 2020
Assessment procedure	SHORT NOTES

EUTHANASIA – AN INDIAN PERSPECTIVE

The phenomenal advances in medical science and technology have not been without a significant impact on society. They have brought into forefront issues that are altering the pattern of human living and societal values. *Pari passu* with these changes is the upsurge of affirmation of human rights, autonomy, and freedom of choice. These issues compel us to re-evaluate our concepts of societal and medical ethics and value systems.

Amongst these issues, the palliative care and quality of life issues in patients with terminal illnesses like advanced cancer and acquired immune deficiency syndrome (AIDS) have become an important area of clinical care and investigation. Significant progress has been made in extending a palliative care/quality of life research agenda to the clinical problems of patients with cancer, including efforts that focus on mental health related issues such as neuropsychiatric syndromes and psychological symptoms in patients with terminal medical illness. However, perhaps the most compelling and clinically relevant mental health issues in palliative care today concern the desire for death and physician-assisted suicide (PAS) and their relationship to depression.

Desire for death has been postulated as a construct that is central to a number of related issues or phenomena, including suicide and suicidal ideation, interest in PAS/euthanasia, and request for PAS/euthanasia. This construct, which was initially proposed by Brown and colleagues and further developed by Chochinov *et al.* focuses on the degree to which an individual wishes his or her life could end sooner. It ranges from suicidal intent (i.e., a desire to end one's life immediately) to a complete absence of any desire to die.

Advocates demanding autonomy for patients regarding how and when they die have been increasingly vocal during recent years, sparked by the highly publicized cases of Drs Jack Kevorkian, Timothy Quill, and Aruna Shanbaug. These cases have centered on the plight of dying patients with terminal illnesses.

What has often been overlooked, however, in the political and legal machinations, is the importance of medical, social, and psychological factors (e.g., depression) that may contribute to suicidal ideation, desire for hastened death, or requests for PAS by terminally ill patients.

DEFINITION OF EUTHANASIA AND PAS

The English philosopher Sir Francis Bacon coined the phrase "euthanasia" early in the 17th century. Euthanasia is derived from the Greek word eu, meaning "good" and thanatos meaning "death," and early on signified a "good" or "easy" death. Euthanasia is defined as the administration of a lethal agent by another person to a patient for the purpose of relieving the patient's intolerable and incurable suffering. Typically, the physician's motive is merciful and intended to end suffering. Euthanasia is performed by physicians and has been further defined as "active" or "passive." Active euthanasia refers to a physician deliberately acting in a way to end a patient's life. Passive euthanasia pertains to withholding or withdrawing treatment necessary to maintain life. There are three types of active euthanasia. Voluntary euthanasia is one form of active euthanasia which is performed at the request of the patient. Involuntary euthanasia, also known as "mercy killing," involves taking the life of a patient who has not requested for it, with the intent of relieving his pain and suffering. In nonvoluntary euthanasia, the process is carried out even though the patient is not in a position to give consent.

PAS, on the other hand, involves a physician providing medications or advice to enable the patient to end his or her own life. While theoretical and/or ethical distinctions between euthanasia and PAS may be subtle to some, the practical distinctions may be significant. Many terminally ill patients have access to potentially lethal medications, at times even upon request from their physicians, yet do not use these medications to end their own lives.

Both euthanasia and PAS have been distinguished, legally and ethically, from the administration of high-dose pain medication meant to relieve a patient's pain that may hasten death (often referred to as the rule of double effect) or even the withdrawal of life support. The distinction between euthanasia/PAS and the administration of high-dose pain medications that may hasten death is premised on the intent behind the act. In

euthanasia/PAS, the intent is to end the patient's life, while in the administration of pain medications that may also hasten death; the intent is to relieve suffering.

Distinctions between withdrawal of life support and euthanasia/PAS are, in many ways, considerably clearer. Long-standing civil case law has supported the rights of patients to refuse any unwanted treatment, even though such treatment refusals may cause death. On the other hand, patients have not had the converse right to demand treatments or interventions that they desire. This distinction has had the effect of allowing a patient on life support the ability to end his or her life on request, yet a patient who is not dependent on life support does not have such a right.

LEGALIZATION OF PAS AND EUTHANASIA

Arguments supporting legalization of PAS/euthanasia

The arguments supporting legalization of euthanasia/PAS are substantial. Proponents perceive PAS as an act of humanity toward the terminally ill patient. They believe the patient and family should not be forced to suffer through a long and painful death, even if the only way to alleviate the suffering is through suicide. According to the proponents of PAS, it becomes ethical and justified when the quality of life of the terminally ill patient becomes so low that death remains the only justifiable means to relieve suffering. Lack of any justifiable means of recovery and the dying patient himself making the choice to end his life are conditions which make euthanasia more justifiable. To the advocate for PAS, legalization of PAS is a natural extension of patient's autonomy and the right to determine what treatments are accepted or refused. Arguments in favor of legalization of PAS are typically premised on the assumption that requests for PAS are "rational" decision, given the circumstances of terminal illness, pain, increased disability, and fears of becoming (or continuing to be) a burden to family and friends. Given the possibility that these symptoms and circumstances may not be relieved, even with aggressive palliative care and social services, the decision to hasten one's death may seem rational. Proponents of euthanasia also criticize the "artificial and impractical" demarcation drawn by the court and the religious organizations between active and passive euthanasia. Withdrawal of life support, the classical form of "passive" euthanasia, actually involves taking an "active" step to hasten the death of a terminally ill patient and it is the patient's consent which lends legitimacy to the act. If, following consent

of a similar nature, a physician administers a lethal dose of injection, there is no reason why this act should be considered as illegal or immoral. Moreover, the desire to include one's physician in carrying out a decision to end one's life can be viewed as an extension of the natural reliance of terminally ill patients on their physicians for help with most aspects of their illness, as well as reasonable mechanism to ensure that they do not become more disabled and burdensome to their family or friends by attempting suicide unsuccessfully (causing a persistent vegetative state or increased disability).

Another argument raised by proponents of legalization is that merely knowing that one can control the timing and manner of death serves as a form of "psychologic insurance" for dying patients. In other words, knowing there can be an escape from the suffering of illness may alleviate some of the stress associated with the dying processes. It may be (as argued by some proponents of PAS) that many individuals with a terminal illness desire the option to end their lives if certain possible conditions arise, even though the likelihood that they will utilize this option is small.

Arguments opposing legalization of PAS/euthanasia

Opposition to legalization of PAS and/or euthanasia has come from numerous different perspectives. As frequently noted in the editorial pages of various medical journals, the medical profession is guided by a desire to heal and extend life. This guideline is best exemplified in the Hippocratic Oath which states, "I will prescribe regimen for the good of my patients according to my ability and my judgment and never do harm to anyone. To please no one will I prescribe a deadly drug, nor give advice that may cause his death." Thus, the possibility that a physician may directly hasten the death of a patient – one whom the physician has been presumably treating in an effort to extend and improve life – contradicts the central tenet of the medical profession.

From a mental health perspective, professional psychiatric and psychological training reinforces the view that suicide should be prevented at all costs. Several studies have supported this connection between mental disorder (e.g., depression) and interest in PAS, suggesting that suicidal ideation in terminally ill patients is a manifestation of undiagnosed, untreated mental illness. Consequently, physician compliance with a suffering patient's stated wish for PAS may circumvent the provision of appropriate psychiatric care. Similar arguments have been made regarding pain and physical symptoms, suggesting that requests for PAS may be evidence of inadequate palliative care. In spite of the fact that improperly

managed physical and/or psychiatric symptoms may underlie a patient's wish for hastened death, physicians may unknowingly participate in PAS designed to alleviate precisely these symptoms that possibly could be managed with better palliative care, as opposed to providing proper medical management, if PAS is legalized.

Opponents of PAS additionally posit that individuals of lower socioeconomic classes or other disenfranchised groups will be "coerced," either directly or indirectly, into requesting PAS as a means of resolving the difficulties posed by their illness. Family members may subtly suggest that death, since inevitable, would be preferable if it occurred sooner rather than later because of the social and financial burdens involved in caring for terminally ill family members. Physicians may view PAS, perhaps because of their own unrecognized feelings (countertransference), as the appropriate and preferable response to a terminal illness and resulting disability. Thus, physicians may be particularly poor at recognizing "irrational" requests for PAS because of their belief that they would not want to live in a condition similar to that of their patients. An even more frightening possibility is that physicians or other health care providers might recommend PAS as an option because the alternative – providing adequate palliative care – is too expensive or difficult to obtain. Thus, patients with poor health insurance or limited financial resources may be "coerced" into requesting PAS by poorly managed or untreated physical and psychological symptoms, perceiving their only options to be either continued suffering or death. Several studies have demonstrated inadequate recognition and treatment of both psychological and physical symptoms, with symptoms such as depression and anxiety going largely unrecognized in many medically ill patients. According to a recent review of palliative care in Canada, only 5% of dying patients in Canada receive adequate palliative care. These and related studies are often cited by opponents of legalization for PAS/euthanasia as evidence that legalization is premature until all dying patients and their families have access to skilled and effective palliative care service.

In response to these concerns, legislators proposing guidelines for PAS have incorporated several mechanisms to minimize the risk that PAS, if legalized, will be misused. These guidelines include (1) a voluntarily request for assistance in dying on the part of the patient, (2) evidence of a terminal illness, and (3) documentation by the primary physician of the reason for the request and efforts made to optimize the patient's care. Opponents, however, suggest that these limitations are more arbitrary than scientific, and they argue that the legal and medical communities will eventually end up on a "slippery slope," where euthanasia is

ultimately legalized as an acceptable practice for a wider patient population, including non-terminal, nonvoluntary patients. Opponents point to a similar evolution of euthanasia use in The Netherlands where regulations regarding PAS have gradually weakened over the 13 years since this practice was decriminalized. For example, in 1994, the Dutch Supreme Court accepted the argument that a chronic disease is an acceptable basis for euthanasia, even if not terminal, and more recent cases have extended this "right" even to patients without a physical illness.

ATTITUDES TOWARD HASTENED DEATH AND PAS: IMPORTANCE OF PSYCHIATRIC ISSUES

Public interest has been spurred by media attention devoted to Drs. Kevorkian, Quill, Aruna Shanbaug, and others, as well as legal decision, state referenda, and the growing availability of life-extending medical treatments. As a result, both the public and the medical community have openly debated ethical issues relating to end-of-life options. While the US Supreme Court upheld the rights of individual states to prohibit PAS, its decision simultaneously opened the door for professionals to "experiment" with legalization of PAS, as has recently occurred in the state of Oregon. In part spurred by this increased attention, a number of researchers have surveyed attitudes toward euthanasia and PAS among the lay public, medical professionals, and medically ill patients. These surveys have demonstrated high rates of public support for legalization of PAS, as well as relatively significant rates of endorsement and even performance of PAS among medical professionals. The proposed guidelines offered to date have all suggested that psychiatric evaluation must comprise critical components of any assessment of a patient's request for PAS. Clearly, if PAS is legalized, mental health professionals must play an important role in the evaluation of patients at the end of life who request PAS. Despite the apparent importance of a mental professional's evaluation in assessing requests for PAS, little research has been conducted that has focused on the basis for patients' interest in hastened death. In their study of physician response to request for PAS/euthanasia, Meier *et al.* found that physicians sought mental health consultation for only 2% of their patients who requested PAS or euthanasia. Furthermore, a study by Ganzini *et al.* indicated that only 6% of Oregon psychiatrists felt "confident" in their ability to assess whether a psychiatric disorder was impairing the

judgment of a patient requesting PAS, despite overwhelming support from psychiatrists for legalization.

EUTHANASIA AND PAS IN CLINICAL PRACTICE

A number of surveys have been published documenting the practice of euthanasia and PAS among health care professionals. For example, an anonymous survey of Washington physicians conducted in 1995 found that 26% of responding physicians had received at least one request for PAS and two-thirds of those physicians had granted such requests. These statistics suggest that PAS is not a rare event, despite the illegal status (it is also possible that despite the anonymous nature of the survey, some physicians who had in fact carried out these requests were unwilling to acknowledge their actions for fear of repercussions). Even more striking results were reported in a survey of San Francisco area physicians looking after AIDS patients. Slome *et al.* found that 98% of respondents had received requests for PAS and that more than half of all responding physicians reported having granted requests for PAS, with some physicians fulfilling dozens of such requests. Moreover, in response to a hypothetical vignette, nearly half of the sample (48%) indicated that they would be likely to grant a hypothetical patient's initial request for PAS.

Perhaps the most striking research to date regarding the use of PAS and euthanasia was a study of critical care nurses conducted by Asch. This study, based on the results of an anonymous survey, found that 17% of respondents reported having received at least one request for PAS and 11% had granted such a request. Approximately 5% responding nurses acknowledged having hastened a patient's death at the request of the physician, but without the request of the patient or the family (termed "nonvoluntary euthanasia" by some writers). Moreover, 4.7% of the sample indicated that they had hastened a patient's death without the knowledge of or request by the physician. Respondents described having stopped oxygen therapy or increased pain medication in order to hasten death. Asch suggested that based on the reports of respondent nurses, these actions were done in order to ease the suffering of the patients. The traditional role of nursing in palliative care was cited as the basis for these results. It should also be noted that Asch's controversial study generated considerable response, including many suggestions that methodological issues such as vague wording of questions may make these data unreliable. Nevertheless, while these data may not accurately indicate the true prevalence of PAS or euthanasia, requests for assistance in dying are clearly

not rare events and physicians occasionally grant such requests despite legal prohibitions. Furthermore, because legal restrictions limit the ability of physicians to consult with colleagues regarding how to react to a request for PAS, the appropriateness of patient requests and physician responses is unknown.

In The Netherlands, however, where PAS and euthanasia have been practiced regularly for more than 20 years, data are available regarding the frequency of requests for assistance in dying and the proportion of terminally ill patients whose lives end in this manner. Euthanasia was granted its current status in 1984 after a Dutch Supreme Court decision authorized this practice, provided a number of conditions were met. Specifically, the patient's request for PAS must be considered free, conscious, explicit, and persistent. Both the physician and patient must agree that the patient's suffering is intolerable, and other measures for relief must have been exhausted. A second physician must be consulted and must concur with the decision to assist in ending the patient's life. Finally, all of these conditions must be adequately documented and reported to the governmental body supervising the practice of euthanasia. Because of the availability of such records, several studies have documented the proportion of deaths in The Netherlands in which euthanasia and PAS are implicated (these estimates were adjusted to account for underreporting of euthanasia acknowledged by many Dutch physicians). While reporting on euthanasia and PAS practices in The Netherlands from 1990 to 1995, van der Maas *et al.* incorporated both official reports of euthanasia as well as responses to anonymous surveys to estimate the rates of euthanasia and PAS. They concluded that euthanasia and PAS were involved in roughly 4.7% of all deaths in The Netherlands during 1995, a substantial increase over the 2.7% of deaths involving medical assistance reported in a 1991 study.

Supporters of PAS point to data from The Netherlands as evidence that legalization has not led to widespread abuse or overuse of euthanasia or PAS. However, critics suggest that the 75% increase in deaths involving euthanasia or PAS (from 2.7 to 4.7%) demonstrates a growing tendency toward their more frequent use and thus a greater number of potentially inappropriate cases of euthanasia. Such concerns are clearly reflected in a 1994 Dutch Supreme Court decision in which the right to euthanasia/PAS was extended to include patients' suffering from chronic illnesses that are not terminal, including mental disorders such as depression, provided the illness is refractory to treatment and causes intolerable suffering. Although the vast majority of requests for PAS from mentally ill individuals have been denied, isolated cases have occurred in which mentally ill Dutch adults have been

allowed to receive PAS or euthanasia as a result of this court ruling. This experience has been identified as evidence of the "slippery slope" argument, in which legalization of PAS is presumed to lead to a gradual widening of the group of patients eligible for this "intervention," many of whom may not be appropriate candidates (e.g., physically healthy but clinically depressed individuals).

REASONS FOR SEEKING HASTENED DEATH/PAS

A growing body of literature has emerged indicating the types of physical and psychological concerns that may give rise to a desire for hastened death and requests for PAS. Although this literature has not always been consistent, a growing consensus has supported many of the assumptions put forth by the initial advocates and opponents of legalization. Specifically, the issues that have received the broadest empirical support are pain, depression, social support, and cognitive dysfunction.

SUICIDE AMONG THE MEDICALLY ILL

Not all patients who seek a hastened death request assistance from their physicians. Rates of suicide among medically ill populations have been a topic of clinical concern and empirical research for many years prior to the emergence of the PAS debate. This research has generally concluded that depression and suicide among patients with medical illnesses are not particularly common but rather occur more often than in physically healthy populations. These suicide vulnerability factors in cancer and AIDS patients include poor prognosis and advanced disease, depression, hopelessness, loss of control, a sense of helplessness, delirium, fatigue and exhaustion of resources, pre-existing psychopathology, and previous suicide attempts. The role of psychiatric and psychosocial assessment and intervention has been well accepted as a critically important aspect of the care of patients with advanced cancer or AIDS.

HINDUISM – SUICIDE, EUTHANASIA, AND PAS

It has been pointed out that in Hinduism, the word for suicide, atma-gatha, has also the elements of intentionality.

The intention to voluntarily kill oneself for selfish motives was condemned in Hinduism. Subjectively, the evil sprang from a product of ignorance and passion; objectively, the evil encompassed the karmic consequences which impeded the progress of liberation. It was in this context that the Dharmasutras vehemently prohibited suicide.

Nevertheless, Hinduism venerated enlightened people who voluntarily decided their mode of death. Thus, the Pandavas eulogized "Mahaparasthana" or the great journey through their Himalayan sojourn when they walked in pilgrimage, thriving on air and water till they left their bodies one after another. Crawford lists fasting, self-immolation, and drowning at holy places as other examples of such venerated deaths. Such deaths by enlightened persons have never been equated with the popular notion of suicide in the Indian tradition. It has been always considered that suicide increases the difficulties in subsequent lives.

Can the Hindu stance as mentioned above be extended to the question of euthanasia? Here, the Indian attitude toward life and death needs special mention.

In the Hindu tradition, death acts as a prefiguration and model, through which the ties that bind man's self or soul to cosmic impermanence can be completely broken and through which ultimate goals of immortality and freedom can be finally and definitely attained. Crawford considers "spiritual death" in the Indian context to be synonymous with a "good death," i.e., the individual must be in a state of calm and equipoise. Crawford surmises that to ensure such a noble death, the concept of active euthanasia would not be unacceptable to the Indian psyche. However, this view has been criticized by authors who claim that "spiritual death" or "iccha mrtu" can only be possible when the evolved soul chooses to abandon the body at will. It is also claimed that the evolving soul cannot be equated with mental tranquility as it is at a higher level of consciousness. Thus, though less dogmatic than other religions, Hindus would traditionally remain skeptic in their view about euthanasia. It has been proposed that a strong objection to euthanasia might arise from the Indian concept of Ahimsa. However, even in the Gandhian framework of Ahimsa, violence that is inevitable is not considered as sin. This emphasizes flexibility of the Indian mind. Hence, though a little skeptic, the Indian mind would not consider the thought of euthanasia and PAS as a sacrilege.

A major concern that has been expressed is that the wish of the terminally ill patient requesting PAS may be colored by depression. Hence, psychiatrist's role becomes important for assessing depression in these patients. It is in fact a legal requirement in some places that psychiatric assessment should be mandatory before a patient is granted the permission to undergo PAS. It is claimed that after being allotted this crucial role, the psychiatrists would act as a gatekeeper in this highly controversial issue. It has also been proposed that since very few psychiatrists would feel confident in detecting depression in the terminally ill, their attitude might color their judgment.

Though legalization of PAS is still not a very important prerogative for the Indian legislature, we designed a study at the Central Institute of Psychiatry, Ranchi, to see the attitude of Indian psychiatrists about euthanasia, as they might have to act as gatekeepers in PAS issues in the future. Certain interesting findings emerged in this study. Out of the 165 psychiatrists who participated in the study, 99 completed the questionnaire. More than 55% of the subjects favored PAS and believed that it should be legalized, whereas only 28% opposed the idea. The major factors that determined the attitude included deeply held moral values like role of physician is to preserve life, PAS would pressurize for improved palliative care, religious beliefs, and diversion of resources from palliative care. 60% believed that they would consider PAS on themselves in case of terminal suffering. The factors determining their decision to consider PAS would be pain in 70% cases, no hope of recovery in 50% cases, loss of mental faculties in 49% cases, inability to take care of self and poor quality of life in 35% cases each. 60% of the respondents believed that they would not be confident in diagnosing depression in the terminally ill patients during a single interview with the patients if they were called for giving an expert opinion. This is a surprising finding as it implies that more than expert knowledge, the moral principles and previous attitude regarding PAS may influence the judgments of the psychiatrists if they were act as a gatekeeper in the future.

Another sample survey of 200 doctors carried out by the Society for the Right to Die with Dignity in Bombay also gave a glimpse of what views health professionals in our country held regarding euthanasia and PAS: Ninety percent stated they had the topic in mind and were concerned, while 78% argued that patients should have the right to choose in case of terminal illness; 74% believed that artificial life supports should not be extended when death

is imminent, but only 65% stated that they would withdraw life supports; 41% argued that Living Will should be respected, and 31% had reservations about the issue.

THE INDIAN REALITY

It can be argued that in a country where the basic human rights of individuals are often left unaddressed, illiteracy is rampant, more than half the population is not having access to potable water, people die every day due to infections, and where medical assistance and care is less, for the few people, issues related to euthanasia and PAS are irrelevant. However, India is a country of diversities across religious groups, educational status, and cultures. In this background, the debate on euthanasia in India is more confusing as there is also a law in this land that punishes individuals who even try to commit suicide.

The Medical Council of India, in a meeting of its ethics committee in February 2008 in relation to euthanasia opined: Practicing euthanasia shall constitute unethical conduct. However, on specific occasions, the question of withdrawing supporting devices to sustain cardio-pulmonary function even after brain death shall be decided only by a team of doctors and not merely by the treating physician alone. A team of doctors shall declare withdrawal of support system. Such team shall consist of the doctor in-charge of the patient, Chief Medical Officer / Medical Officer in-charge of the hospital, and a doctor nominated by the in-charge of the hospital from the hospital staff or in accordance with the provisions of the Transplantation of Human Organ Act, 1994.

In India, euthanasia is a crime. Section 309 of the Indian Penal Code (IPC) deals with the attempt to commit suicide and Section 306 of the IPC deals with abetment of suicide – both actions are punishable. Only those who are brain dead can be taken off life support with the help of family members. Likewise, the Honorable Supreme Court is also of the view that that the right to life guaranteed by Article 21 of the constitution does not include the right to die. The court held that Article 21 is a provision guaranteeing protection of life and personal liberty and by no stretch of imagination can extinction of life be read into it. However, various pro-euthanasia organizations, the most prominent among them being the Death with Dignity Foundation, keep on fighting for legalization of an individual's right to choose his own death.

A major development took place in this field on 7 March 2011. The Supreme Court, in a landmark judgment, allowed passive euthanasia. Refusing mercy killing of Aruna Shaunbag, lying in a vegetative state in a Mumbai Hospital for 37 years, a two-judge bench laid down a set of tough guidelines under which passive euthanasia can be legalized through a high-court monitored mechanism. The court further stated that parents, spouses, or close relatives of the patient can make such a plea to the high court. The chief justices of the high courts, on receipt of such a plea, would constitute a bench to decide it. The bench in turn would appoint a committee of at least three renowned doctors to advise them on the matter.

ANNEXURE – II

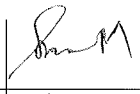
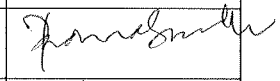
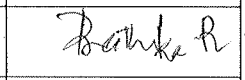
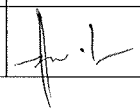
Bharath Institute of Higher Education and Research

Sri Lakshmi Narayana Institute of Medical Sciences

Participant list with signatures

Value-added course: **EUTHANASIA – An Indian Perspective (dated 26/03/2020)**

Sl.No	Reg.No	Name of the candidate	Signature
1.	U15MB250	AARTHI .H	
2.	U15MB251	ABARNA. M	
3.	U15MB252	ABINAYA.J	
4.	U15MB274	DEEPIKA PRIYADHARSHINI. B	
5.	U15MB275	DEVANAND .M	
6.	U15MB276	DEVANATHAN. R	
7.	U15MB277	DHANA PRIYA.P	
8.	U15MB278	DHANALAKSHMI. M	
9.	U15MB279	DHANUSH .R	
10.	U15MB285	EZHILARASI. R	
11.	U15MB286	FATHIMA BANU. A	
12.	U15MB287	GAYATHRI .M	
13.	U15MB288	GOGUL SUGAN. K	
14.	U15MB289	GOKULA KRISHNAN. E	
15.	U15MB268	ASWIN. B	
16.	U15MB262	ARUL NIVETHINI V.A	
17.	U15MB265	ARUN PRASAD. K	
18.	U15MB311	KISHORE. K	
19.	U15MB333	NIVETHITHA. A. N	
20.	U15MB335	NIVETHITHA. R. N	

21.	U15MB337	PIRAI NILA. M	
22.	U15MB336	PADMA SUNDARI	
23.	U15MB342	PREETHIKA. R	
24.	U15MB320	MALAISENAN. E	
25.	U15MB294	HARINI. L	

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

Annexure - III

EUTHANASIA – An Indian Perspective

SHORT NOTES

Student Name:

ATHUL SUBHASH

Course Code: IM12

WRITE SHORT NOTES ON THE FOLLOWING:

1. What is Physician Assisted Death?
2. What are the psychological implications of Euthanasia?
3. Suggest arguments in favour of PAS
4. What are the moral and ethical issues against PAS?
5. Euthanasia in the Indian setting

10
10
Dr. MKS

1) A deliberate intervention undertaken with the express intention of ending a life, to relieve intractable suffering.
2

2) psychological implications of euthanasia → patient's drive for assisted suicide, having a sense of powerlessness, and feeling isolated.
2

3) Some of the most compelling arguments made in favor of PAS came from patients such as Maynard, who suffer from life-threatening illnesses.
2

4) A physician facilitates a patient's death by providing the necessary means and/or information to enable the patient to perform the life-ending act.
2 those who favor PAS view the process as a peaceful and painless death, those who oppose it believe that the consequence of any form of suicide is illegal and ethical ramifications.

5) Euthanasia is legal in India under strict guidelines patients must consent through a living will, and must be either terminally ill or in a vegetative state
2

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

Annexure - III

EUTHANASIA – An Indian Perspective

SHORT NOTES

Student Name:
ASHISH RANJAN

Course Code: IM12

WRITE SHORT NOTES ON THE FOLLOWING:

1. What is Physician Assisted Death?
2. What are the psychological implications of Euthanasia?
3. Suggest arguments in favour of PAS
4. What are the moral and ethical issues against PAS?
5. Euthanasia in the Indian setting

(Dr. L. Aravind)

1) A deliberate intervention undertaken with the intention of ending a life, to relieve intractable suffering 1

2) Psychological implications of euthanasia - patient is denied assisted suicide, having a sense of powerlessness and feeling isolated 2

3) Some of the most compelling arguments, made in favor of PAS come from patients such as terminal, who suffer from life-threatening illness 2

4) patient death by providing a necessary means or formulae to enable the patient to perform the life ending act 2

5) Is legal in India under strict guidelines, patient must consent through a living will, and must be either terminal by ill or in a vegetative State 2

ANNEXURE IV

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that AKSSHAYA .M.R has actively participated in the Value Added Course on "Euthanasia an Indian Perspective" between March 2020 - May 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. Muthukumarasamy. B
RESOURCE PERSON

Dr. C. Aravind
COORDINATOR

ANNEXURE - IV

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that AARTHI .H has actively participated in the Value Added Course on Euthanasia – An Indian Perspective between March 2020 - May 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. Muthukumarasamy. B
RESOURCE PERSON

Dr. C. Aravind
COORDINATOR

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ANNEXURE - V

Student Feedback Form

Course Name: EUTHANASIA : AN INDIAN PERSPECTIVE

Subject Code: **IM12**

Name of Student: Anusuya. N Roll No.: 17-HB 272

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear				✓	
2	Course contents met with your expectations				✓	
3	Lecturer sequence was well planned				✓	
4	Lectures were clear and easy to understand					✓
5	Teaching aids were effective					✓
6	Instructors encourage interaction and were helpful					✓
7	The level of the course				✓	
8	Overall rating of the course	1	2	3	4	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

-

Signature

Date: 01/05/2020

ANNEXURE - V

Student Feedback Form

Course Name: EUTHANASIA - AN INDIAN PERSPECTIVE

Subject Code: **IM12**

Name of Student: Anil Sinha Roll No.: 017MB267

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear				✓	
2	Course contents met with your expectations				✓	
3	Lecturer sequence was well planned				✓	
4	Lectures were clear and easy to understand				✓	
5	Teaching aids were effective				✓	
6	Instructors encourage interaction and were helpful				✓	
7	The level of the course				✓	
8	Overall rating of the course	1	2	3	4 ✓	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

Signature

Date: 08/05/2020

COURSE COMPLETION LETTER

From,

Dr. C. Aravind

Department of Internal Medicine

Sri Lakshmi Narayana Institute of Medical Sciences

Bharath Institute of Higher Education and Research,

Chennai.

To,

The Dean,

Sri Lakshmi Narayana Institute of Medical Sciences

Bharath Institute of Higher Education and Research,

Chennai.

Sub: Completion of value-added course: EUTHANASIA – An Indian Perspective

Respected Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: **"EUTHANASIA – An Indian Perspective"**. We solicit your kind action to send certificates for the participants. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards

Dr. C. Aravind

Dr. C. ARAVIND, MD.,
Reg.No:68432
Professor & HOD, General Medicine
Sri Lakshmi Narayana Institute of Medical Sciences
Pondu, Kudapakkam, Puducherry-605 502.

Encl: Photographs

ANNEXURE - III

SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES

EXPLAINING PROGNOSIS FOR A PATIENT WITH TERMINAL ILLNESS

SHORT NOTES

Course Code: IM10

WRITE SHORT NOTES ON THE FOLLOWING:

1. How to prepare oneself before breaking the news to the patient and family?
2. How to help the family take in the news
3. Pain relief in terminal illness
4. Providing options to the patient and family

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affiliated to Bharath University, Chennai - TN]

Circular

15/12/2015

Sub: Organising Value-added Course: Stress management among medical students reg

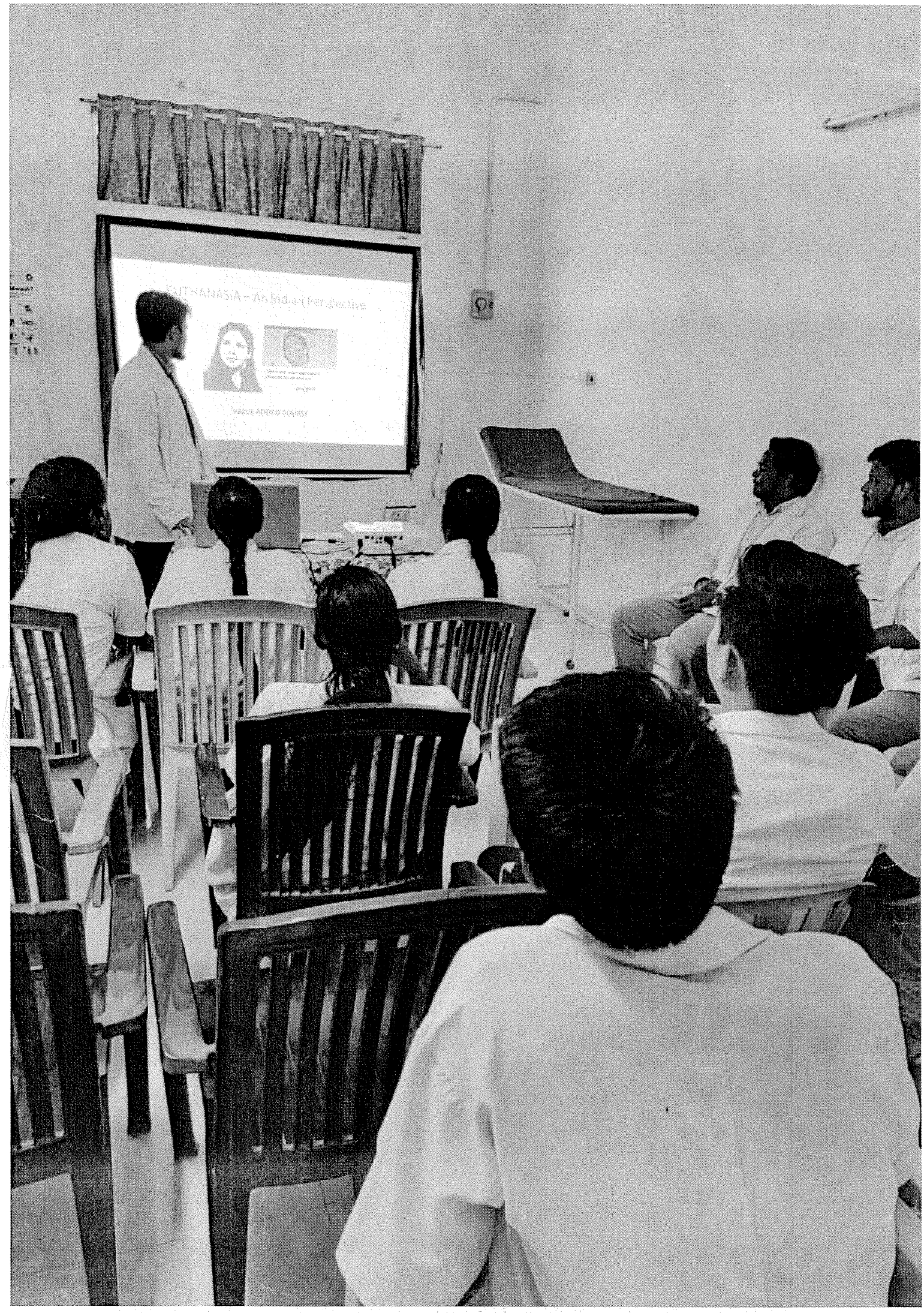
With reference to the above- mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research**, is organisinga Value added course, titled, "**Stress management among medical students**" between January 2016 and April 2016. The course content is enclosed below.

The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before 24/12/2015. Applications received after the mentioned date shall not be entertained under any circumstances.

Encl: Copy of Course content.

COURSE PROPOSAL

Course Title: Stress management among medical students


EUTHANASIA – An Indian Perspective

Sri Lakshmi Narayana Institute of Medical Sciences

Date: 02.2.2019

From
DR.V.R Sridhar
Professor and Head,
Department of Psychiatry,
Sri Lakshmi Narayana Institute Of Medical Sciences,
Bharath Institute of Higher Education and Research,
Chennai.

To
The Dean,
Sri Lakshmi Narayana Institute Of Medical Sciences,
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Brain stimulation techniques – A detailed review

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **Brain stimulation techniques – A detailed review** on 01/04/2020. We solicit your kind permission for the same.

Kind Regards

Dr.V.R. Sridhar

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: **Dr. Balagurunathan. K**

The HOD: **Dr. V.R Sridhar**

The Expert: **Dr. Arun Seetharaman**

The committee has discussed about the course and is approved.

Dean	Subject Expert	HOD
(Sign & Seal)	(Sign & Seal)	(Sign & Seal)

DEAN
Prof.K.BALAGURUNATHAN M.S
(General surgeon)
SRI LAKSHMI NARAYANA
INSTITUTE OF MEDICAL SCIENCES
OSUDU PONDICHERRY

Dr. ARUN SEETHARAMAN, MD.,
Reg. No: 91440
Associate Professor, Psychiatry
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

Dr. V. R. SRIDHAR, MD.,D.P.M.,
Reg. No: 30995
Professor & HOD, Psychiatry
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,
PUDUCHERRY - 605 502.
[Recognised by Medical Council of India, Ministry of Health letter No. U/12012/249/2005-ME (P -II) dt. 11/07/2011]
[Affliated to Bharath University, Chennai - TN]

Circular

14.02.2020

Sub: Brain stimulation techniques – A detailed review

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research** is organizing **"Brain stimulation techniques – A detailed review"**. The course content and registration form is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before 31, feb 2020. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

DEAN
Prof.K.BALAGURUNATHAN M.S
(General surgeon)
SRI LAKSHMI NARAYANA
INSTITUTE OF MEDICAL SCIENCES
OSUDU PONDICHERRY

Encl: Copy of Course content

Course Proposal

Course Title: **Brain stimulation techniques – A detailed review**

Course Objective:

Electroconvulsive therapy
ECT – Indication
Pre-treatment evaluation for ECT
Trans-cranial Magnetic Stimulation
TMS – Indication
TMS – S/E, interactions with medications & other risks
Patient selection
Trans-cranial Direct Current Stimulation
TDCS – S/E
TDCS – Mechanism of Action
TDCS – clinical studies
Cranial Electric Stimulation
Magnetic seizure Therapy
Vagus nerve stimulation
Deep brain Stimulation

Course Outcome:

Course Audience: CRRI STUDENTS of 2020
Course Coordinator: Dr.V.R. Sridhar
Course Faculties with Qualification and Designation:
1.Dr.V.R.SHIDHAR, Professor & HOD
2.Dr.Arun, Associate Professor
3.Dr. Agila, Assistant Professor
Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Resource person	Time	Hours
1.	01.04.2020	INTRODUCTION TO BST Introduction	Dr.Arun	4-5p.m	1
2.	03.04.2020	ELECTRO-CONVULSIVE THERAPY	Dr.Arun	2-3p.m	1
3.	06.04.2020	ECT – Indication	Dr.Agila	4-6p.m	2
4.	08.04.2020	Pre-treatment evaluation for ECT	Dr.Arun	4-6p.m	2
5.	10.04.2020	Trans-cranial Magnetic Stimulation	Dr.Arun	4-6p.m	2
6.	13.04.2020	• TMS – Indication • TMS – S/E, interactions with medications & other risks • Patient selection	Dr.Arun	4-5p.m	2

7.	15.04.2020	• Trans-cranial Direct Current Stimulation • TDCS – S/E • TDCS – Mechanism of Action	Dr.Agila	4-5P.M	1
8.	17.04.2020	TDCS – clinical studies	Dr.Arun	4-5p.m	1
9.	20.04.2020	Cranial Electric Stimulation	Dr. Agila	4-6p.m	1
10.	22.04.2020	Magnetic seizure Therapy	Dr.Agila	4-6p.m	2
11.	24.04.2020	Vagus nerve stimulation	Dr.Agila	4-6p.m	1
12.	27.04.2020	Deep brain Stimulation	Dr.Agila	4-6p.m	2
13.	29.04.2020	Pre course and Post Course evaluation, Feedback analysis from Likert scale	Dr.Arun	2-5p.m	3
		Practical Class I	Dr. Shridhar		
13.	02.05.2020	ECT MACHINE DEMO	Dr. Shridhar	2-3 PM	1
14.	04.05.2020	ECT ON PATIENT DEMO	Dr. Shridhar	2-3 PM	1
15.	06.05.2020	CASE PRESENTATION	Dr. Shridhar	2-4 PM	2
16.	08.05.2020	DIRECT CURRENT DEMO	Dr. Shridhar	2-4 PM	2
17.	11.05.2020	CASE PRESENTATION	Dr. Shridhar	2-4p.m	2
		Total			30 hrs

REFERENCE BOOKS:

- **Comprehensive textbook of psychiatry – Kaplan & Saddock**
- **Oxford Textbook Of Psychiatry**
- **Synopsis - Kaplan & Saddock**
- **Stahl's essential psychopharmacology**

VALUE ADDED COURSE

1. Name of the programme & Code

Brain stimulation techniques – A detailed review

2. Duration & Period

April – June 2020

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Assessment Evolution by MCQ method - *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

1 TIME -April – June 2020

8. Year of discontinuation: 2020

9. Summary report of each program year-wise

Value Added Course: April – June 2020					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	**PSYC12**	Brain stimulation techniques – A detailed review	Dr. V.R. Sridhar Dr.Agila.c	CRRI Interns	10 students APRIL- JUNE 2020

10. Course Feed Back

Enclosed as Annexure- V

RESOURCE PERSON

1. **Dr.V.R. Sridhar**
2. **Dr. Arun Seetharaman**

COORDINATOR

Dr. .V.R. Sridhar

BRAIN STIMULATION THERAPIES



PARTICIPANT HAND BOOK

BIHER SLIMS

COURSE DETAILS

Particulars	**Description**
Course Title	Brain stimulation therapies
Course Code	PSYC12
Objective	1. Introduction **2.** Electroconvulsive therapy **3.** ECT – Indication 4. Pre-treatment evaluation for ECT 5. Trans-cranial Magnetic Stimulation 6. TMS – Indication 7. TMS – S/E, interactions with medications & other risks 8. Patient selection 9. Trans-cranial Direct Current Stimulation 10. TDCS – S/E 11. TDCS – Mechanism of Action 12. TDCS – clinical studies 13. Cranial Electric Stimulation 14. Magnetic seizure Therapy 15. Vagus nerve stimulation 16. Deep brain Stimulation
Further learning opportunities	Brain stimulation therapies & its application
Key Competencies	On successful completion of the course the students will have skill in handling and knows the application of brain stimulation therapies.
Target Student	CRRI
Duration	30hrs Every APRIL 2020– JUNE 2020
Theory Session	20hrs
Practical Session	10hrs
Assessment Procedure	Multiple choice questions

Introduction: Brain stimulation uses electrical currents or magnetic fields to alter neuronal firing. There is a growing list of tools capable of eliciting such neuromodulation, each with a different spectrum of action (trans-cranially or surgical implantation of electrodes). Trans-cranial techniques include cranial electrical stimulation (CES), electroconvulsive therapy (ECT), trans-cranial direct current stimulation (tDCS, also called direct current polarization), trans-cranial magnetic stimulation (TMS), and magnetic seizure therapy (MST). The surgical techniques include cortical brain stimulation (CBS), deep brain stimulation (DBS), and vagus nerve stimulation (VNS).

I. Electroconvulsive Therapy:

In 1938, the first electroconvulsive treatment (ECT) course was administered to a delusional and incoherent patient, who improved with 1 treatment and remitted after 11 treatments and in 1940, the first use of ECT occurred in the United States. There is a dose–response relationship with right unilateral ECT and that bilateral ECT is likely to be ineffective with ultra-brief pulse widths. ECT remains the most effective treatment for major depression and a rapidly effective treatment for life-threatening psychiatric conditions. The induction of a bilateral generalized seizure is necessary for both the beneficial and the adverse effects of ECT. ECT affects the cellular mechanisms of memory and mood regulation and raises the seizure threshold. The latter effect may be blocked by the opiate antagonist naloxone (Narcan). Electroconvulsive therapy

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From Wikipedia, the free encyclopedia
Jump to navigationJump to search
"Electroshock" redirects here. For other uses, see Electroshock (disambiguation).

Electroconvulsive therapy



MECTA spECTrum 5000Q with electroencephalography (EEG) in a modern ECT suite

Other names	Electroshock therapy
ICD-10-PCS	GZB
ICD-9-CM	94.27
MeSH	D004565
OPS-301 code	8-630
MedlinePlus	007474

[edit on Wikidata]

Electroconvulsive therapy (**ECT**), formerly known as **electroshock therapy**, is a psychiatric treatment in which seizures in the brain (without muscular convulsions) are electrically induced in patients to provide relief from mental disorders.[1] Typically, 70 to 120 volts are applied externally to the patient's head resulting in approximately 800 milliamperes of direct current passed through the brain, for 100 milliseconds to 6 seconds duration, either from temple to temple (bilateral ECT) or from front to back of one side of the head (unilateral ECT).

The ECT procedure was first conducted in 1938 by Italian psychiatrist Ugo Cerletti[2] and rapidly replaced less safe and effective forms of biological treatments in use at the time. ECT is often used with informed consent[3] as a

safe and effective intervention for major depressive disorder, mania, and catatonia.[4] ECT machines were originally placed in the Class III category by the United States Food and Drug Administration (FDA) in 1976.[5] They were re-classified as Class II devices, for treatment of catatonia, major depressive disorder, and bipolar disorder, in 2018.[6]

ECT is the most effective treatment that currently exists for depression. A course of ECT is effective for about 80–90% of people with treatment-resistant unipolar or bipolar depression.[7][8][9] Aside from effects on the brain, the general physical risks of ECT are similar to those of brief general anesthesia.[10]:259 Immediately following treatment, the most common adverse effects are confusion and transient memory loss.[4][11] Among treatments for severely depressed pregnant women, ECT is one of the least harmful to the fetus.[12]

A usual course of ECT involves multiple administrations, typically given two or three times per week until the patient is no longer suffering symptoms. ECT is administered under anesthesia with a muscle relaxant.[13] ECT can differ in its application in three ways: electrode placement, treatment frequency, and the electrical waveform of the stimulus. These treatment parameters can pose significant differences in both adverse side effects and symptom remission in the treated patient.

Placement can be bilateral, where the electric current is passed from one side of the brain to the other, or unilateral, in which the current is solely passed across one hemisphere of the brain. High-dose unilateral ECT has some cognitive advantages compared to moderate-dose bitlateral ECT while showing no difference in antidepressant efficacy.[14]

ECT appears to work in the short term via an anticonvulsant effect primarily in the frontal lobes and longer term via neurotrophic effects primarily in the medial temporal lobe.[15]

Contents

- 1Medical use
  - 1.1Major depressive disorder
    - 1.1.1Efficacy
  - 1.2Catatonia
  - 1.3Mania
  - 1.4Schizophrenia
- 2Effects
  - 2.1Cognitive impairment
  - 2.2Effects on brain structure

- 2.3Effects in pregnancy
- 2.4Effects on the heart
- 3Technique
  - 3.1Devices
- 4Mechanism of action
- 5Use
  - 5.1United States
  - 5.2United Kingdom
  - 5.3China
- 6History
- 7Society and culture
  - 7.1Controversy
  - 7.2Legal status
    - 7.2.1Informed consent
    - 7.2.2Involuntary ECT
      - 7.2.2.1United States
      - 7.2.2.2United Kingdom
    - 7.2.3Regulation
  - 7.3Public perception
  - 7.4Famous cases
  - 7.5Fictional examples
- 8Special populations
  - 8.1Sex difference
- 9See also
- 10References
- 11External links

Medical use[edit]

ECT is used with informed consent[3] in treatment-resistant major depressive disorder, treatment-resistant catatonia, prolonged or severe mania, and in conditions where "there is a need for rapid, definitive response because of the severity of a psychiatric or medical condition (e.g., when illness is characterized by stupor, marked psychomotor retardation, depressive delusions or hallucinations, or life-threatening physical exhaustion associated with mania)."[4][16] It has also been used to treat autism in adults with an intellectual disability, yet findings from a systematic review found this an unestablished intervention.[17]

Major depressive disorder[edit]

For major depressive disorder, ECT is generally used only when other treatments have failed, or in emergencies, such as imminent

suicide.[4][18][19][20] ECT has also been used in selected cases of depression occurring in the setting of multiple sclerosis, Parkinson's disease, Huntington's chorea, developmental delay, brain arteriovenous malformations, and hydrocephalus.[21]

Efficacy[edit]

A meta-analysis on the effectiveness of ECT in unipolar and bipolar depression was conducted in 2012. Results indicated that although patients with unipolar depression and bipolar depression responded to other medical treatments very differently, both groups responded equally well to ECT. Overall remission rate for patients given a round of ECT treatment was 50.9% for those with unipolar depression and 53.2% for those with bipolar depression. The severity of each patient's depression was assessed at the same baseline in each group.[7]

There is little agreement on the most appropriate follow-up to ECT for people with major depressive disorder.[22] When ECT is followed by treatment with antidepressants, about 50% of people relapsed by 12 months following successful initial treatment with ECT, with about 37% relapsing within the first 6 months. About twice as many relapsed with no antidepressants. Most of the evidence for continuation therapy is with tricyclic antidepressants; evidence for relapse prevention with newer antidepressants is lacking.[22]

In 2004, a meta-analytic review paper found in terms of efficacy, "a significant superiority of ECT in all comparisons: ECT versus simulated ECT, ECT versus placebo, ECT versus antidepressants in general, ECT versus tricyclics and ECT versus monoamine oxidase inhibitors."[23]

In 2003, The UK ECT Review Group published a systematic review and meta-analysis comparing ECT to placebo and antidepressant drugs. This meta-analysis demonstrated a large effect size (high efficacy relative to the mean in terms of the standard deviation) for ECT versus placebo, and versus antidepressant drugs.[24]

Compared with repetitive transcranial magnetic stimulation (rTMS) for people with treatment-resistant major depressive disorder, ECT relieves depression as shown by reducing the score on the Hamilton Rating Scale for Depression by about 15 points, while rTMS reduced it by 9 points.[25]

Catatonia[edit]

ECT is generally a second-line treatment for people with catatonia who do not respond to other treatments, but is a first-line treatment for severe or life-threatening catatonia.[4][26][27] There is a plethora of evidence for its efficacy, notwithstanding a lack of randomised controlled trials, such that "the excellent efficacy of ECT in catatonia is generally acknowledged".[26] For people with autism spectrum disorders who have catatonia, there is little published

evidence about the efficacy of ECT; as of 2014 there were twelve case reports.[28]

Mania[edit]

ECT is used to treat people who have severe or prolonged mania;[4] NICE recommends it only in life-threatening situations or when other treatments have failed[29] and as a second-line treatment for bipolar mania.[30][31]

Schizophrenia[edit]

ECT is widely used worldwide in the treatment of schizophrenia, but in North America and Western Europe it is invariably used only in treatment resistant schizophrenia when symptoms show little response to antipsychotics; there is comprehensive research evidence for such practice.[32] It is useful in the case of severe exacerbations of catatonic schizophrenia, whether excited or stuporous.[4][29] There are also case reports of ECT improving persistent psychotic symptoms associated with Stimulant-induced psychosis.[33][34]

Effects[edit]

Aside from effects in the brain, the general physical risks of ECT are similar to those of brief general anesthesia; the U.S. Surgeon General's report says that there are "no absolute health contraindications" to its use.[10]:259 Immediately following treatment, the most common adverse effects are confusion and memory loss. Some patients experience muscle soreness after ECT. The death rate during ECT is around 4 per 100,000 procedures.[35] There is evidence and rationale to support giving low doses of benzodiazepines or otherwise low doses of general anesthetics, which induce sedation but not anesthesia, to patients to reduce adverse effects of ECT.[36]

While there are no absolute contraindications for ECT, there is increased risk for patients who have unstable or severe cardiovascular conditions or aneurysms; who have recently had a stroke; who have increased intracranial pressure (for instance, due to a solid brain tumor), or who have severe pulmonary conditions, or who are generally at high risk for receiving anesthesia.[11]:30

In adolescents, ECT is highly efficient for several psychiatric disorders, with few and relatively benign adverse effects.[37][38][39]

Cognitive impairment[edit]

Cognitive impairment is sometimes noticed after ECT.[40][41][42][43] It has been claimed by some non-medical authors that retrograde amnesia occurs to some extent in almost all patients receiving ECT.[44] However, most experts consider this adverse effect relatively uncommon.[45] The American Psychiatric Association (APA) report in 2001 acknowledges: “In some patients the recovery

from retrograde amnesia will be incomplete, and evidence has shown that ECT can result in persistent or permanent memory loss".[11] After treatment, drug therapy is usually continued and some patients will continue to receive maintenance ECT treatments.[4] It is the purported effects of ECT on long-term memory that give rise to much of the concern surrounding its use.[46] However, the methods used to measure memory loss are generally poor, and their application to people with depression, who have cognitive deficits including problems with memory, have been problematic.[45]

The acute effects of ECT can include amnesia, both retrograde (for events occurring before the treatment) and anterograde (for events occurring after the treatment).[47] Memory loss and confusion are more pronounced with bilateral electrode placement rather than unilateral, and with outdated sine-wave rather than brief-pulse currents. The use of either constant or pulsing electrical impulses also varied the memory loss results in patients. Patients who received pulsing electrical impulses, as opposed to a steady flow, seemed to incur less memory loss. The vast majority of modern treatment uses brief pulse currents.[47]

Retrograde amnesia is most marked for events occurring in the weeks or months before treatment, with one study showing that although some people lose memories from years prior to treatment, recovery of such memories was "virtually complete" by seven months post-treatment, with the only enduring loss being memories in the weeks and months prior to the treatment.[48][49] Anterograde memory loss is usually limited to the time of treatment itself or shortly afterwards. In the weeks and months following ECT these memory problems gradually improve, but some people have persistent losses, especially with bilateral ECT.[1][47] One published review summarizing the results of questionnaires about subjective memory loss found that between 29% and 55% of respondents believed they experienced long-lasting or permanent memory changes.[50] In 2000, American psychiatrist Sarah Lisanby and colleagues found that bilateral ECT left patients with more persistently impaired memory of public events as compared to right unilateral ECT.[46]

Effects on brain structure[edit]

Considerable controversy exists over the effects of ECT on brain tissue, although a number of mental health associations—including the APA—have concluded that there is no evidence that ECT causes structural brain damage.[11][19] A 1999 report by the U.S. Surgeon General states: "The fears that ECT causes gross structural brain pathology have not been supported by decades of methodologically sound research in both humans and animals."[51]

Many expert proponents of ECT maintain that the procedure is safe and does not cause brain damage. Dr. Charles Kellner, a prominent ECT researcher and

former chief editor of the *Journal of ECT*, stated in a 2007 interview that, "There are a number of well-designed studies that show ECT does not cause brain damage and numerous reports of patients who have received a large number of treatments over their lifetime and have suffered no significant problems due to ECT."[52] Dr. Kellner cites a study purporting to show an absence of cognitive impairment in eight subjects after more than 100 lifetime ECT treatments.[53] Dr. Kellner stated "Rather than cause brain damage, there is evidence that ECT may reverse some of the damaging effects of serious psychiatric illness."

Effects in pregnancy[edit]

If steps are taken to decrease potential risks, ECT is generally accepted to be relatively safe during all trimesters of pregnancy, particularly when compared to pharmacological treatments.[12][54] Suggested preparation for ECT during pregnancy includes a pelvic examination, discontinuation of nonessential anticholinergic medication, uterine tocodynamometry, intravenous hydration, and administration of a nonparticulate antacid. During ECT, elevation of the pregnant woman's right hip, external fetal cardiac monitoring, intubation, and avoidance of excessive hyperventilation are recommended.[12] In many instances of active mood disorder during pregnancy, the risks of untreated symptoms may outweigh the risks of ECT. Potential complications of ECT during pregnancy can be minimized by modifications in technique. The use of ECT during pregnancy requires thorough evaluation of the patient's capacity for informed consent.[55]

Effects on the heart[edit]

ECT can cause a lack of blood flow and oxygen to the heart, heart arrhythmia, and "persistent asystole". Deaths, however, are very rare after ECT: 6 per 100,000 treatments. If they do occur, cardiovascular complications are considered as causal in about 30%.[56]

Technique[edit]



Electroconvulsive therapy machine on display at Glenside Museum in Bristol, England



ECT device produced by Siemens and used for example at the Asyl psychiatric hospital in Kristiansand, Norway from the 1960s to the 1980s.

ECT requires the informed consent of the patient.[1]:1880[3][4]

Whether psychiatric medications are terminated prior to treatment or maintained, varies.[1]:1885[57] However, drugs that are known to cause toxicity in combination with ECT, such as lithium, are discontinued, and benzodiazepines, which increase the seizure threshold,[58] are either discontinued, a benzodiazepine antagonist is administered at each ECT session, or the ECT treatment is adjusted accordingly.[1]:1879:1875

In the US, the medical team performing the procedure typically consists of a psychiatrist, an anesthetist, an ECT treatment nurse or qualified assistant, and one or more recovery nurses.[11]:109 Medical trainees may assist, but only under the direct supervision of credentialed attending physicians and staff.[11]:110 The placement of electrodes, as well as the dose and duration of the stimulation is determined on a per-patient basis.[1]:1881

In unilateral ECT, both electrodes are placed on the same side of the patient's head. Unilateral ECT may be used first to minimize side effects such as memory loss.

In bilateral ECT, the two electrodes are placed on opposite sides of the head. Usually bitemporal placement is used, whereby the electrodes are placed on the temples. Uncommonly bifrontal placement is used; this involves positioning the electrodes on the patient's forehead, roughly above each eye.

Unilateral ECT is thought to cause fewer cognitive effects than bilateral treatment, but is less effective unless administered at higher doses.[1]:1881 Most patients in the US[59] and almost all in the UK[60][61][62] receive bilateral ECT.

The electrodes deliver an electrical stimulus. The stimulus levels recommended for ECT are in excess of an individual's seizure threshold: about one and a half times seizure threshold for bilateral ECT and up to 12 times for unilateral ECT.[1]:1881 Below these levels treatment may not be effective in spite of a seizure, while doses massively above threshold level, especially with bilateral ECT, expose patients to the risk of more severe cognitive impairment without additional therapeutic gains.[63] Seizure threshold is determined by trial and

error ("dose titration"). Some psychiatrists use dose titration, some still use "fixed dose" (that is, all patients are given the same dose) and others compromise by roughly estimating a patient's threshold according to age and sex.[59] Older men tend to have higher thresholds than younger women, but it is not a hard and fast rule, and other factors, for example drugs, affect seizure threshold.

Immediately prior to treatment, a patient is given a short-acting anesthetic such as methohexital, etomidate, or thiopental,[1] a muscle relaxant such as suxamethonium (succinylcholine), and occasionally atropine to inhibit salivation.[1]:1882 In a minority of countries such as Japan,[64] India,[65] and Nigeria,[66] ECT may be used without anesthesia. The Union Health Ministry of India recommended a ban on ECT without anesthesia in India's Mental Health Care Bill of 2010 and the Mental Health Care Bill of 2013.[67][68] The practice was abolished in Turkey's largest psychiatric hospital in 2008.[69]

The patient's EEG, ECG, and blood oxygen levels are monitored during treatment.[1]:1882

ECT is usually administered three times a week, on alternate days, over a course of two to four weeks.[1]:1882–1883



An illustration depicting electroconvulsive therapy.

Devices[edit]


ECT machine from before 1960.

Most modern ECT devices deliver a brief-pulse current, which is thought to cause fewer cognitive effects than the sine-wave currents which were originally used in ECT.[1] A small minority of psychiatrists in the US still use sine-wave stimuli.[59] Sine-wave is no longer used in the UK or Ireland.[62] Typically, the electrical stimulus used in ECT is about 800 milliamps and has up to several hundred watts, and the current flows for between one and six seconds.[63]

In the US, ECT devices are manufactured by two companies, Somatics, which is owned by psychiatrists Richard Abrams and Conrad Swartz, and Mecta.[70] In the UK, the market for ECT devices was long monopolized by Ectron Ltd, which was set up by psychiatrist Robert Russell.[71]

Mechanism of action[edit]

Despite decades of research, the exact mechanism of action of ECT remains elusive. Neuroimaging studies in people who have had ECT, investigating differences between responders and nonresponders, and people who relapse, find that responders have anticonvulsant effects mostly in the frontal lobes, which corresponds to immediate responses, and neurotrophic effects primarily in the medial temporal lobe. The anticonvulsant effects are decreased blood flow and decreased metabolism, while the neurotrophic effects are opposite - increased perfusion and metabolism, as well as increased volume of the hippocampus.[15]

A recently proposed mechanism of action is that the seizures induced by ECT cause a profound change in sleep architecture; it is this change in the state of the organism that drives the therapeutic effects of ECT and not any simple change in the release of neurotransmitters, neurotrophic factors and/or hormones.[72]

Use[edit]

As of 2001, it was estimated that about one million people received ECT annually.[73]

There is wide variation in ECT use between different countries, different hospitals, and different psychiatrists.[1][73] International practice varies considerably from widespread use of the therapy in many Western countries to a small minority of countries that do not use ECT at all, such as Slovenia.[74]

About 70 percent of ECT patients are women.[1] This may be due to the fact that women are more likely to be diagnosed with depression.[1][75] Older and more affluent patients are also more likely to receive ECT. The use of ECT is not as common in ethnic minorities.[75][76]

Sarah Hall reports, "ECT has been dogged by conflict between psychiatrists who swear by it, and some patients and families of patients who say that their lives have been ruined by it. It is controversial in some European countries such as the Netherlands and Italy, where its use is severely restricted".[77]

United States[edit]

ECT became popular in the US in the 1940s. At the time, psychiatric hospitals were overrun with patients whom doctors were desperate to treat and cure. Whereas lobotomies would reduce a patient to a more manageable submissive state, ECT helped to improve mood in those with severe depression. A survey

of psychiatric practice in the late 1980s found that an estimated 100,000 people received ECT annually, with wide variation between metropolitan statistical areas.[78] Accurate statistics about the frequency, context and circumstances of ECT in the US are difficult to obtain because only a few states have reporting laws that require the treating facility to supply state authorities with this information.[79] In 13 of the 50 states, the practice of ECT is regulated by law.[80] In the mid-1990s in Texas, ECT was used in about one third of psychiatric facilities and given to about 1,650 people annually.[75] Usage of ECT has since declined slightly; in 2000–01 ECT was given to about 1500 people aged from 16 to 97 (in Texas it is illegal to give ECT to anyone under sixteen).[81] ECT is more commonly used in private psychiatric hospitals than in public hospitals, and minority patients are underrepresented in the ECT statistics.[1] In the United States, ECT is usually given three times a week; in the United Kingdom, it is usually given twice a week.[1] Occasionally it is given on a daily basis.[1] A course usually consists of 6–12 treatments, but may be more or fewer. Following a course of ECT some patients may be given continuation or maintenance ECT with further treatments at weekly, fortnightly or monthly intervals.[1] A few psychiatrists in the US use multiple-monitored ECT (MMECT), where patients receive more than one treatment per anesthetic.[1] Electroconvulsive therapy is not a required subject in US medical schools and not a required skill in psychiatric residency training. Privileging for ECT practice at institutions is a local option: no national certification standards are established, and no ECT-specific continuing training experiences are required of ECT practitioners.[82]

United Kingdom[edit]

In the UK in 1980, an estimated 50,000 people received ECT annually, with use declining steadily since then[83] to about 12,000 per annum in 2002.[84] It is still used in nearly all psychiatric hospitals, with a survey of ECT use from 2002 finding that 71 percent of patients were women and 46 percent were over 65 years of age. Eighty-one percent had a diagnosis of mood disorder; schizophrenia was the next most common diagnosis. Sixteen percent were treated without their consent.[84] In 2003, the National Institute for Health and Care Excellence, a government body which was set up to standardize treatment throughout the National Health Service in England and Wales, issued guidance on the use of ECT. Its use was recommended "only to achieve rapid and short-term improvement of severe symptoms after an adequate trial of treatment options has proven ineffective and/or when the condition is considered to be potentially life-threatening in individuals with severe depressive illness, catatonia or a prolonged manic episode".[85]

The guidance received a mixed reception. It was welcomed by an editorial in the *British Medical Journal*[86] but the Royal College of Psychiatrists launched an unsuccessful appeal.[87] The NICE guidance, as the *British Medical*

Journal editorial points out, is only a policy statement and psychiatrists may deviate from it if they see fit. Adherence to standards has not been universal in the past. A survey of ECT use in 1980 found that more than half of ECT clinics failed to meet minimum standards set by the Royal College of Psychiatrists, with a later survey in 1998 finding that minimum standards were largely adhered to, but that two-thirds of clinics still fell short of current guidelines, particularly in the training and supervision of junior doctors involved in the procedure.[88] A voluntary accreditation scheme, ECTAS, was set up in 2004 by the Royal College, and as of 2017 the vast majority of ECT clinics in England, Wales, Northern Ireland and the Republic of Ireland have signed up.[89]

The Mental Health Act 2007 allows people to be treated against their will. This law has extra protections regarding ECT. A patient capable of making the decision can decline the treatment, and in that case treatment cannot be given unless it will save that patient's life or is immediately necessary to prevent deterioration of the patient's condition. A patient may not be capable of making the decision (they "lack capacity"), and in that situation ECT can be given if it is appropriate and also if there are no advance directives that prevent the use of ECT.[90]

China[edit]

ECT was introduced in China in the early 1950s and while it was originally practiced without anesthesia, as of 2012 almost all procedures were conducted with it. As of 2012, there are approximately 400 ECT machines in China, and 150,000 ECT treatments are performed each year.[91] Chinese national practice guidelines recommend ECT for the treatment of schizophrenia, depressive disorders, and bipolar disorder and in the Chinese literature, ECT is an effective treatment for schizophrenia and mood disorders.[91] Although the Chinese government stopped classifying homosexuality as an illness in 2001, electroconvulsive therapy is still used by some establishments as a form of "conversion therapy".[92][93]

History[edit]



A *Bergonic chair*, a device "for giving general electric treatment for psychological effect, in psycho-neurotic cases", according to original photo description. World War I era.

Further information: History of electroconvulsive therapy in the United Kingdom and History of electroconvulsive therapy in the United States

As early as the 16th century, agents to induce seizures were used to treat psychiatric conditions. In 1785, the therapeutic use of seizure induction was documented in the *London Medical and Surgical Journal*.[1][94][95] As to its earliest antecedents one doctor claims 1744 as the dawn of electricity's therapeutic use, as documented in the first issue of *Electricity and Medicine*. Treatment and cure of hysterical blindness was documented eleven years later. Benjamin Franklin wrote that an electrostatic machine cured "a woman of hysterical fits." In 1801, Giovanni Aldini used galvanism to treat patients suffering from various mental disorders.[96] G.B.C. Duchenne, the mid-19th century "Father of Electrotherapy", said its use was integral to a neurological practice.[97]

In the second half of the 19th century, such efforts were frequent enough in British asylums as to make it notable.[98]

Convulsive therapy was introduced in 1934 by Hungarian neuropsychiatrist Ladislas J. Meduna who, believing mistakenly that schizophrenia and epilepsy were antagonistic disorders, induced seizures first with camphor and then metrazol (cardiazol).[99][100] Meduna is thought to be the father of convulsive therapy.[101] In 1937, the first international meeting on schizophrenia and convulsive therapy was held in Switzerland by the Swiss psychiatrist Max Müller.[102] The proceedings were published in the *American Journal of Psychiatry* and, within three years, cardiazol convulsive therapy was being used worldwide.[100] Italian Professor of neuropsychiatry Ugo Cerletti, who had been using electric shocks to produce seizures in animal experiments, and his assistant Lucio Bini at Sapienza University of Rome developed the idea of using electricity as a substitute for metrazol in convulsive therapy and, in 1938, experimented for the first time on a person affected by delusions. It was believed early on that inducing convulsions aided in helping those with severe schizophrenia but later found to be most useful with affective disorders such as depression. Cerletti had noted a shock to the head produced convulsions in dogs. The idea to use electroshock on humans came to Cerletti when he saw how pigs were given an electric shock before being butchered to put them in an anesthetized state.[103] Cerletti and Bini practiced until they felt they had the right parameters needed to have a successful human trial. Once they started trials on patients, they found that after 10-20 treatments the results were significant. Patients had much improved. A positive side effect to the treatment was retrograde amnesia. It was because of this side effect that patients could not remember the treatments and had no ill feelings toward it.[103] ECT soon replaced metrazol therapy all over the world because it was cheaper, less frightening and more convenient.[104] Cerletti and Bini were nominated for a Nobel Prize but did not receive one. By 1940, the procedure was introduced to

both England and the US. In Germany and Austria, it was promoted by Friedrich Meggendorfer. Through the 1940s and 1950s, the use of ECT became widespread. At the time the ECT device was patented and commercialized abroad, the two Italian inventors had competitive tensions that damaged their relationship.[105] In the 1960s, despite a climate of condemnation, the original Cerletti-Bini ECT apparatus prototype was hotly contended by scientific museums between Italy and the USA[106] The ECT apparatus prototype is now owned and displayed by the Sapienza Museum of the History of Medicine in Rome.[107]

In the early 1940s, in an attempt to reduce the memory disturbance and confusion associated with treatment, two modifications were introduced: the use of unilateral electrode placement and the replacement of sinusoidal current with brief pulse. It took many years for brief-pulse equipment to be widely adopted.[108] In the 1940s and early 1950s ECT, was usually given in "unmodified" form, without muscle relaxants, and the seizure resulted in a full-scale convulsion. A rare but serious complication of unmodified ECT was fracture or dislocation of the long bones. In the 1940s, psychiatrists began to experiment with curare, the muscle-paralysing South American poison, in order to modify the convulsions. The introduction of suxamethonium (succinylcholine), a safer synthetic alternative to curare, in 1951 led to the more widespread use of "modified" ECT. A short-acting anesthetic was usually given in addition to the muscle relaxant in order to spare patients the terrifying feeling of suffocation that can be experienced with muscle relaxants.[108]

The steady growth of antidepressant use along with negative depictions of ECT in the mass media led to a marked decline in the use of ECT during the 1950s to the 1970s. The Surgeon General stated there were problems with electroshock therapy in the initial years before anesthesia was routinely given, and that "these now-antiquated practices contributed to the negative portrayal of ECT in the popular media."[109] *The New York Times* described the public's negative perception of ECT as being caused mainly by one movie: "For Big Nurse in *One Flew Over the Cuckoo's Nest,* it was a tool of terror, and, in the public mind, *shock therapy* has retained the tarnished image given it by Ken Kesey's novel: dangerous, inhumane and overused".[110]

In 1976, Dr. Blatchley demonstrated the effectiveness of his constant current, brief pulse device ECT. This device eventually largely replaced earlier devices because of the reduction in cognitive side effects, although as of 2012 some ECT clinics still were using sine-wave devices.[73] The 1970s saw the publication of the first American Psychiatric Association (APA) task force report on electroconvulsive therapy (to be followed by further reports in 1990 and 2001). The report endorsed the use of ECT in the treatment of depression. The decade also saw criticism of ECT.[111] Specifically, critics pointed to

shortcomings such as noted side effects, the procedure being used as a form of abuse, and uneven application of ECT. The use of ECT declined until the 1980s, "when use began to increase amid growing awareness of its benefits and cost-effectiveness for treating severe depression".[109] In 1985, the National Institute of Mental Health and National Institutes of Health convened a consensus development conference on ECT and concluded that, while ECT was the most controversial treatment in psychiatry and had significant side-effects, it had been shown to be effective for a narrow range of severe psychiatric disorders.[112]

Because of the backlash noted previously, national institutions reviewed past practices and set new standards. In 1978, the American Psychiatric Association released its first task force report in which new standards for consent were introduced and the use of unilateral electrode placement was recommended. The 1985 NIMH Consensus Conference confirmed the therapeutic role of ECT in certain circumstances. The American Psychiatric Association released its second task force report in 1990 where specific details on the delivery, education, and training of ECT were documented. Finally, in 2001 the American Psychiatric Association released its latest task force report.[11] This report emphasizes the importance of informed consent, and the expanded role that the procedure has in modern medicine. By 2017, ECT was routinely covered by insurance companies for providing the "biggest bang for the buck" for otherwise intractable cases of severe mental illness, was receiving favorable media coverage, and was being provided in regional medical centers.[113]

Though ECT use declined with the advent of modern antidepressants, there has been a resurgence of ECT with new modern technologies and techniques.[114] Modern shock voltage is given for a shorter duration of 0.5 milliseconds where conventional brief pulse is 1.5 milliseconds.[115]

Society and culture[edit]

Controversy[edit]

Surveys of public opinion, the testimony of former patients, legal restrictions on the use of ECT and disputes as to the efficacy, ethics and adverse effects of ECT within the psychiatric and wider medical community indicate that the use of ECT remains controversial.[116][117][118][119][120][121][122] This is reflected in the January 2011 vote by the FDA's Neurological Devices Advisory Panel to recommend that FDA maintain ECT devices in the Class III device category for high risk devices, except for patients suffering from catatonia, major depressive disorder, and bipolar disorder.[6] This may result in the manufacturers of such devices having to do controlled trials on their safety and efficacy for the first time.[4][123][124] In justifying their position, panelists referred to the memory loss associated with ECT and the lack of long-term data.[125]

Legal status[edit]

Informed consent[edit]

The World Health Organization (2005) advises that ECT should be used only with the informed consent of the patient (or their guardian if their incapacity to consent has been established).[16]

In the US, this doctrine places a legal obligation on a doctor to make a patient aware of the reason for treatment, the risks and benefits of a proposed treatment, the risks and benefits of alternative treatment, and the risks and benefits of receiving no treatment. The patient is then given the opportunity to accept or reject the treatment. The form states how many treatments are recommended and also makes the patient aware that consent may be revoked and treatment discontinued at any time during a course of ECT.[10] The US Surgeon General's Report on Mental Health states that patients should be warned that the benefits of ECT are short-lived without active continuation treatment in the form of drugs or further ECT, and that there may be some risk of permanent, severe memory loss after ECT.[10] The report advises psychiatrists to involve patients in discussion, possibly with the aid of leaflets or videos, both before and during a course of ECT.

To demonstrate what he believes should be required to fully satisfy the legal obligation for informed consent, one psychiatrist, working for an anti-psychiatry organisation, has formulated his own consent form[126] using the consent form developed and enacted by the Texas Legislature[127] as a model.

According to the US Surgeon General, involuntary treatment is uncommon in the US and is typically used only in cases of great extremity, and only when all other treatment options have been exhausted. The use of ECT is believed to be a potentially life-saving treatment.[51]

In one of the few jurisdictions where recent statistics on ECT usage are available, a national audit of ECT by the Scottish ECT Accreditation Network indicated that 77% of patients who received the treatment in 2008 were capable of giving informed consent.[128]

In the UK, in order for consent to be valid it requires an explanation in "broad terms" of the nature of the procedure and its likely effects.[129] One review from 2005 found that only about half of patients felt they were given sufficient information about ECT and its adverse effects[130] and another survey found that about fifty percent of psychiatrists and nurses agreed with them.[131]

A 2005 study published in the *British Journal of Psychiatry* described patients' perspectives on the adequacy of informed consent before ECT.[130] The study found that "About half (45–55%) of patients reported they were given an adequate explanation of ECT, implying a similar percentage felt they were not." The authors also stated:

Approximately a third did not feel they had freely consented to ECT even when they had signed a consent form. The proportion who feel they did not freely choose the treatment has actually increased over time. The same themes arise whether the patient had received treatment a year ago or 30 years ago. Neither current nor proposed safeguards for patients are sufficient to ensure informed consent with respect to ECT, at least in England and Wales.[130]

Involuntary ECT[edit]



This section **needs expansion**. You can help by adding to it. *(June 2017)*

Procedures for involuntary ECT vary from country to country depending on local mental health laws.

United States[edit]

In most states in the US, a judicial order following a formal hearing is needed before a patient can be forced to undergo involuntary ECT.[10] However, ECT can also be involuntarily administered in situations with less immediate danger. Suicidal intent is a common justification for its involuntary use, especially when other treatments are ineffective.[10]

United Kingdom[edit]

Until 2007 in England and Wales, the Mental Health Act 1983 allowed the use of ECT on detained patients whether or not they had capacity to consent to it. However, following amendments which took effect in 2007, ECT may not generally be given to a patient who has capacity and refuses it, irrespective of his or her detention under the Act.[132] In fact, even if a patient is deemed to lack capacity, if they made a valid advance decision refusing ECT then they should not be given it; and even if they do not have an advance decision, the psychiatrist must obtain an independent second opinion (which is also the case if the patient is under age of consent).[133] However, there is an exception regardless of consent and capacity; under Section 62 of the Act, if the treating psychiatrist says the need for treatment is urgent they may start a course of ECT without authorization.[134] From 2003 to 2005, about 2,000 people a year in England and Wales were treated without their consent under the Mental Health Act.[135] Concerns have been raised by the official regulator that psychiatrists are too readily assuming that patients have the capacity to consent to their treatments, and that there is a worrying lack of independent advocacy.[136] In Scotland, the Mental Health (Care and Treatment) (Scotland) Act 2003 also gives patients with capacity the right to refuse ECT.[137]

Regulation[edit]

In the US, ECT devices came into existence prior to medical devices being regulated by the Food and Drug Administration. In 1976, the Medical Device Regulation Act required the FDA to retrospectively review already existing devices, classify them, and determine whether clinical trials were needed to prove efficacy and safety. The FDA initially classified the devices used to administer ECT as Class III medical devices. In 2014, the American Psychiatric Association petitioned the FDA to reclassify ECT devices from Class III (high-risk) to Class II (medium-risk), which would significantly improve access to an effective and potentially lifesaving treatment. A similar reclassification proposal in 2010 met significant resistance from anti-psychiatry groups and did not pass.[138] In 2018, the FDA re-classified ECT devices as Class II devices when used to treat catatonia or a severe major depressive episode associated with major depressive disorder or bipolar disorder.[6]

Public perception[edit]

A questionnaire survey of 379 members of the general public in Australia indicated that more than 60% of respondents had some knowledge about the main aspects of ECT. Participants were generally opposed to the use of ECT on depressed individuals with psychosocial issues, on children, and on involuntary patients. Public perceptions of ECT were found to be mainly negative.[122] A sample of the general public, medical students, and psychiatry trainees in the United Kingdom found that the psychiatry trainees were more knowledgeable and had more favorable opinions of ECT than did the other groups.[139] More members of the general public believed that ECT was used for control or punishment purposes than medical students or psychiatry trainees.[139]

Famous cases[edit]

Main article: List of people who have undergone electroconvulsive therapy

Ernest Hemingway, an American author, died by suicide shortly after ECT at the Mayo Clinic in 1961.[140] He is reported to have said to his biographer, "Well, what is the sense of ruining my head and erasing my memory, which is my capital, and putting me out of business? It was a brilliant cure but we lost the patient."[141] Robert Pirsig suffered a nervous breakdown and spent time in and out of psychiatric hospitals between 1961 and 1963.[142] He was diagnosed with paranoid schizophrenia and clinical depression as a result of an evaluation conducted by psychoanalysts, and was treated with electroconvulsive therapy on numerous occasions,[143] a treatment he discusses in his novel, *Zen and the Art of Motorcycle Maintenance*.[144]

Thomas Eagleton, United States Senator from Missouri, was dropped from the Democratic ticket in the 1972 United States Presidential Election as the party's Vice Presidential candidate after it was revealed that he had received electroshock treatment in the past for depression. Presidential nominee George

McGovern replaced him with Sargent Shriver, and later went on to lose by a landslide to Richard Nixon.

American surgeon and award-winning author Sherwin B. Nuland is another notable person who has undergone ECT.[145] In his 40s, this successful surgeon's depression became so severe that he had to be institutionalized. After exhausting all treatment options, a young resident assigned to his case suggested ECT, which ended up being successful.[146] Author David Foster Wallace also received ECT for many years, beginning as a teenager, before his suicide at age 46.[147]

New Zealand author Janet Frame experienced both insulin coma therapy and ECT (but without the use of anesthesia or muscle relaxants).[148] She wrote about this in her autobiography, *An Angel at My Table* (1984),[148] which was later adapted into a film (1990).[149]

American actor Carrie Fisher wrote about her experience with memory loss after ECT treatments in her memoir *Wishful Drinking*.[150]

Fictional examples[edit]

Electroconvulsive therapy has been depicted in fiction, including fictional works partly based on true experiences. These include Sylvia Plath's autobiographical novel, *The Bell Jar*, Ken Loach's film Family Life, and Ken Kesey's novel *One Flew Over the Cuckoo's Nest*; Kesey's novel is a direct product of his time working the graveyard shift as an orderly at a mental health facility in Menlo Park, California.[151][152]

In the 2000 film *Requiem for a Dream*, Sarah Goldfarb receives "unmodified" electroconvulsive therapy after experiencing severe amphetamine psychosis following prolonged stimulant abuse. Unlike typical ECT treatment, she is given no anesthetic or medication before.

In the 2014 TV series *Constantine*, the protagonist John Constantine is institutionalized and specifically requests electroconvulsive therapy as an attempt to alleviate or resolve his mental problems.

The musical *Next to Normal* revolves around the family of a woman who undergoes the procedure.

In the HBO series *Six Feet Under* season 5, George undergoes an ECT treatment to deal with his increasing paranoia. The depiction is shown realistically, with an actual ECT machine.

In the WB/CW TV series *Smallville*, Lionel Luthor condemns his son Lex Luthor to electroshock therapy to remove Lex's short-term memory of a murder he discovered Lionel committed.

In the Netflix series *Stranger Things*, Eleven's mother is given electroshock therapy to silence her.

Electroshock therapy is used on various characters throughout season 2 of American Horror Story.

Special populations[edit]

Sex difference[edit]

Throughout the history of ECT, women have received it two to three times as often as men.[153] Currently, about 70 percent of ECT patients are women.[1] This may be due to the fact that women are more likely to be diagnosed with depression.[1][75] A 1974 study of ECT in Massachusetts reported that women made up 69 percent of those given ECT.[154] The Ministry of Health in Canada reported that from 1999 until 2000 in the province of Ontario, women were 71 percent of those given ECT in provincial psychiatric institutions, and 75 percent of the total ECT given was given to women.[155

II. Trans-cranial Magnetic Stimulation:

TMS induces electrical fields in the brain without an electrode through the application of alternating magnetic fields via a coil held on the scalp. It is a non-invasive stimulation of focal regions of the brain without the need for anaesthesia.

A. Indications. It is approved by the FDA for the treatment of MDD in adult patients who have failed to achieve satisfactory improvement from one prior antidepressant medication at or above the minimal effective dose and duration in the current episode.

B. Side effects, interactions with medications, and other risks. Administration of TMS is a non-invasive, relatively benign procedure but it is not entirely without risk, the most serious being an unintended seizure.

C. Patient selection. Patients who have failed a trial of one or more antidepressant medications or have untoward side effects to medications may be good candidates for TMS. However, given the lower effect size of TMS, for urgent or severely refractory cases, ECT would remain the ultimate gold standard treatment.

Transcranial magnetic stimulation (**TMS**) is a noninvasive form of brain stimulation in which a changing magnetic field is used to cause electric current at a specific area of the brain through electromagnetic induction. An electric pulse generator, or stimulator, is connected to a magnetic coil, which in turn is connected to the scalp. The stimulator generates a changing electric

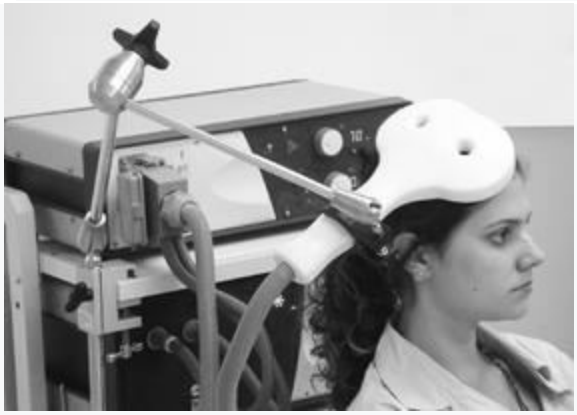
current within the coil which induces a magnetic field; this field then causes a second inductance of inverted electric charge within the brain itself.[1]:3[2]

TMS has shown diagnostic and therapeutic potential in the central nervous system with a wide variety of disease states in neurology and mental health, with research still evolving.[3][4][5][6][7][8][9][10]

Adverse effects of TMS are rare, and include fainting and seizure.[11] Other potential issues include discomfort, pain, hypomania, cognitive change, hearing loss, and inadvertent current induction in implanted devices such as pacemakers or defibrillators.[11]

Contents

- 1Medical uses
  - 1.1Diagnosis
  - 1.2Treatment
- 2Adverse effects
- 3Procedure
- 4Physics
  - 4.1Frequency and duration
  - 4.2Coil types
- 5History
- 6Research
  - 6.1Study blinding
  - 6.2Animal model limitations
- 7Society and culture
  - 7.1Regulatory approvals
  - 7.2Coverage
  - 7.3Costs
  - 7.4Providers



A magnetic coil is positioned at the head of the person[12]

TMS is non-invasive, and does not require surgery or electrode implantation. Its use can be divided into diagnostic and therapeutic applications. Effects vary based on frequency and intensity of the magnetic pulses as well as the length of the train, which affects the total number of pulses given.[*citation needed*] TMS treatments are now approved by the FDA in the USA and by NICE in the UK for the treatment of depression and are predominantly provided by private clinics.

Diagnosis[edit]

TMS can be used clinically to measure activity and function of specific brain circuits in humans, most commonly with single or paired magnetic pulses.[3] The most widely accepted use is in measuring the connection between the primary motor cortex of the central nervous system and the peripheral nervous system to evaluate damage related to past or progressive neurologic insult.[3][13][14][15]

Treatment[edit]

Repetitive high frequency TMS (rTMS) has shown diagnostic and therapeutic potential with the central nervous system in a variety of disease states, particularly in the fields of neurology and mental health.[3][4][5][7][8][9][10]

Adverse effects[edit]

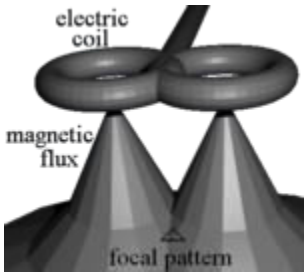
Although TMS is generally regarded as safe, risks are increased for therapeutic rTMS compared to single or paired diagnostic TMS.[16] Adverse effects generally increase with higher frequency stimulation.[11]

The greatest immediate risk from TMS is fainting, though this is uncommon. Seizures have been reported, but are rare.[11][17][18] Other adverse effects include short term discomfort, pain, brief episodes of hypomania, cognitive change, hearing loss, impaired working memory, and the induction of electrical currents in implanted devices such as cardiac pacemakers.[11]

Procedure[edit]

During the procedure, a magnetic coil is positioned at the head of the person receiving the treatment using anatomical landmarks on the skull, in particular the inion and nasion.[12] The coil is then connected to a pulse generator, or stimulator, that delivers electric current to the coil.[2]

Physics[edit]





TMS – Butterfly Coils

TMS uses electromagnetic induction to generate an electric current across the scalp and skull.[19][20] A plastic-enclosed coil of wire is held next to the skull and when activated, produces a magnetic field oriented orthogonal to the plane of the coil. The magnetic field can then be directed to induce an inverted electric current in the brain that activates nearby nerve cells in a manner similar to a current applied superficially at the cortical surface.[21]

The magnetic field is about the same strength as an MRI, and the pulse generally reaches no more than 5 centimeters into the brain, unless using a modified coil and technique for deeper stimulation.[20]

From the Biot–Savart law,

it has been shown that a current through a wire generates a magnetic field around that wire. Transcranial magnetic stimulation is achieved by quickly discharging current from a large capacitor into a coil to produce pulsed magnetic fields between 2 and 3 Tesla in strength.[22] Directing the magnetic field pulse at a targeted area in the brain causes a localized electrical current which can then either depolarize or hyperpolarize neurons at that site. The magnetic flux generated by the current causes its own electric field, as explained by the Maxwell-Faraday equation,

.

This electric field causes a change in transmembrane currents resulting in depolarization or hyperpolarization of neurons, causing them to be more or less excitable, respectively.[22]

Deep TMS can reach up to 6 cm into the brain to stimulate deeper layers of the motor cortex, such as that which controls leg motion. The path of this current can be difficult to model because the brain is irregularly shaped with variable internal density and water content, leading to a nonuniform magnetic field strength and conduction throughout its tissues.[23]

Frequency and duration[edit]

The effects of TMS can be divided based on frequency, duration and intensity (amplitude) of stimulation:[24]

- Single or paired pulse TMS causes neurons in the neocortex under the site of stimulation to depolarize and discharge an action potential. If used in the primary motor cortex, it produces muscle activity referred to as a motor evoked potential (MEP) which can be recorded on electromyography. If used on the occipital cortex, 'phosphenes' (flashes of light) might be perceived by the subject. In most other areas of the cortex, there is no conscious effect, but behaviour may be altered (e.g., slower reaction time on a cognitive task), or changes in brain activity may be detected using diagnostic equipment.[25]
- Repetitive TMS produces longer-lasting effects which persist past the period of stimulation. rTMS can increase or decrease the excitability of the corticospinal tract depending on the intensity of stimulation, coil orientation, and frequency. Low frequency rTMS with a stimulus frequency less than 1 Hz is believed to inhibit cortical firing while a stimulus frequency greater than 1 Hz, or high frequency, is believed to provoke it.[26] Though its mechanism is not clear, it has been suggested as being due to a change in synaptic efficacy related to long-term potentiation (LTP) and long-term depression (LTD).[27]

Coil types[edit]

Most devices use a coil shaped like a figure-eight to deliver a shallow magnetic field that affects more superficial neurons in the brain.[28] Differences in magnetic coil design should be considered when comparing results, with important elements including the type of material, geometry and specific characteristics of the associated magnetic pulse.

The core material may be either a magnetically inert substrate ('air core'), or a solid, ferromagnetically active material ('solid core'). Solid cores result in more efficient transfer of electrical energy to a magnetic field and reduce energy loss to heat, and so can be operated with the higher volume of therapy protocols without interruption due to overheating. Varying the geometric shape of the coil

itself can cause variations in focality, shape, and depth of penetration. Differences in coil material and its power supply also affect magnetic pulse width and duration.[29]

A number of different types of coils exist, each of which produce different magnetic fields. The round coil is the original used in TMS. Later, the figure-eight (butterfly) coil was developed to provide a more focal pattern of activation in the brain, and the four-leaf coil for focal stimulation of peripheral nerves. The double-cone coil conforms more to the shape of the head.[30] The Hesed (H-core), circular crown and double cone coils allow more widespread activation and a deeper magnetic penetration. They are supposed to impact deeper areas in the motor cortex and cerebellum controlling the legs and pelvic floor, for example, though the increased depth comes at the cost of a less focused magnetic pulse.[11]

History[edit]

Luigi Galvani (1737-1798) undertook research on the effects of electricity on the body in the late-eighteenth century and laid the foundations for the field of electrophysiology.[31] In the 1830s Michael Faraday (1791-1867) discovered that an electrical current had a corresponding magnetic field, and that changing one could induce its counterpart.[32]

Work to directly stimulate the human brain with electricity started in the late 1800s, and by the 1930s the Italian physicians Cerletti and Bini had developed electroconvulsive therapy (ECT).[31] ECT became widely used to treat mental illness, and ultimately overused, as it began to be seen as a panacea. This led to a backlash in the 1970s.[31]

In 1980 Merton and Morton successfully used transcranial electrical stimulation (TES) to stimulate the motor cortex. However, this process was very uncomfortable, and subsequently Anthony T. Barker began to search for an alternative to TES.[33] He began exploring the use of magnetic fields to alter electrical signaling within the brain, and the first stable TMS devices were developed in 1985.[31][32] They were originally intended[*by whom?*] as diagnostic and research devices, with evaluation of their therapeutic potential being a later development.[31][32] The United States' FDA first approved TMS devices in October 2008.[31]

Research[edit]

TMS has shown potential with neurologic conditions such as Alzheimer's disease,[4] amyotrophic lateral sclerosis,[4][34] persistent vegetative states,[4] epilepsy,[4][35] stroke related disability,[4][11][14][15][36][37] tinnitus,[4][38] multiple sclerosis,[4] schizophrenia,[4][10] and traumatic brain injury.[39]

With Parkinson's disease, early results suggest that low frequency stimulation may have an effect on medication associated dyskinesia, and that high frequency stimulation improves motor function.[40] The most effective treatment protocols appear to involve high frequency stimulation of the motor cortex, particularly on the dominant side,[41] but with more variable results for treatment of the dorsolateral prefrontal cortex.[42] It is less effective than electroconvulsive therapy for motor symptoms, though both appear to have utility.[43][44][45] Cerebellar stimulation has also shown potential for the treatment of levodopa associated dyskinesia.[46]

In psychiatry, it has shown potential with anxiety disorders, including panic disorder[47] and obsessive-compulsive disorder (OCD).[4] The most promising areas to target for OCD appear to be the orbitofrontal cortex and the supplementary motor area.[48] Older protocols that targeted the prefrontal dorsal cortex were less successful.[49] It has also been studied with autism,[50] substance abuse,[4] addiction,[4][51] and posttraumatic stress disorder (PTSD).[4] For treatment-resistant major depressive disorder, high-frequency (HF) rTMS of the left dorsolateral prefrontal cortex (DLPFC) appears effective and low-frequency (LF) rTMS of the right DLPFC has probable efficacy.[4][5][7][8][9]

TMS can also be used to map functional connectivity between the cerebellum and other areas of the brain.[52]

Study blinding[edit]

Mimicking the physical discomfort of rTMS with placebo to discern its true effect is a challenging issue in research.[4][11][53][54] It is difficult to establish a convincing placebo for TMS during controlled trials in conscious individuals due to the neck pain, headache and twitching in the scalp or upper face associated with the intervention.[4][11] In addition, placebo manipulations can affect brain sugar metabolism and MEPs, which may confound results.[55] This problem is exacerbated when using subjective measures of improvement.[11] Placebo responses in trials of rTMS in major depression are negatively associated with refractoriness to treatment.[56]

A 2011 review found that most studies did not report unblinding. In the minority that did, participants in real and sham rTMS groups were not significantly different in their ability to correctly guess their therapy, though there was a trend for participants in the real group to more often guess correctly.[57]

Animal model limitations[edit]

TMS research in animal studies is limited due to its early FDA approval for treatment-resistant depression, limiting development of animal specific magnetic coils.[58]

Society and culture[edit]

Regulatory approvals[edit]

Neurosurgery planning[edit]

Nexstim obtained 510(k) FDA clearance for the assessment of the primary motor cortex for pre-procedural planning in December 2009[59] and for neurosurgical planning in June 2011.[60]

Depression[edit]

In 2008, the US Food and Drug Administration authorized the use of rTMS as a treatment for depression that has not improved with other measures.[61][62] A number of deep TMS have received FDA 510k clearance to market for use in adults with treatment resistant major depressive disorders.[63][64][65][66][67] The Royal Australian and New Zealand College of Psychiatrists has endorsed rTMS for treatment resistant major depressive disorder (MDD).[68]

Migraine[edit]

The use of single-pulse TMS was approved by the FDA for treatment of migraines in December 2013.[69] It is approved as a Class II medical device under the "*de novo* pathway".[70][71]

Other areas[edit]

In the European Economic Area, various versions of Deep TMS H-coils have CE marking for Alzheimer's disease,[72] autism,[72] bipolar disorder,[73] epilepsy,[74] chronic pain,[73] major depressive disorder,[73] Parkinson's disease,[41][75] posttraumatic stress disorder (PTSD),[73] schizophrenia (negative symptoms)[73] and to aid smoking cessation.[72] One review found tentative benefit for cognitive enhancement in healthy people.[76]

In August 2018, the US Food and Drug Administration authorized the use of TMS in the treatment of obsessive-compulsive disorder (OCD).[77]

Coverage[edit]

United States[edit]

Commercial health insurance[edit]

In 2013, several commercial health insurance plans in the United States, including Anthem, Health Net, and Blue Cross Blue Shield of Nebraska and of Rhode Island, covered TMS for the treatment of depression for the first time.[78][79][80][81] In contrast, UnitedHealthcare issued a medical policy for TMS in 2013 that stated there is insufficient evidence that the procedure is beneficial for health outcomes in patients with depression. UnitedHealthcare noted that methodological concerns raised about the scientific evidence studying TMS for

depression include small sample size, lack of a validated sham comparison in randomized controlled studies, and variable uses of outcome measures.[82] Other commercial insurance plans whose 2013 medical coverage policies stated that the role of TMS in the treatment of depression and other disorders had not been clearly established or remained investigational included Aetna, Cigna and Regence.[83][84][85]

Medicare[edit]

Policies for Medicare coverage vary among local jurisdictions within the Medicare system,[86] and Medicare coverage for TMS has varied among jurisdictions and with time. For example:

- In early 2012 in New England, Medicare covered TMS for the first time in the United States.[87][88][89][90] However, that jurisdiction later decided to end coverage after October, 2013.[91]
- In August 2012, the jurisdiction covering Arkansas, Louisiana, Mississippi, Colorado, Texas, Oklahoma, and New Mexico determined that there was insufficient evidence to cover the treatment,[92] but the same jurisdiction subsequently determined that Medicare would cover TMS for the treatment of depression after December 2013.[93]

United Kingdom[edit]

The United Kingdom's National Institute for Health and Care Excellence (NICE) issues guidance to the National Health Service (NHS) in England, Wales, Scotland and Northern Ireland. NICE guidance does not cover whether or not the NHS should fund a procedure. Local NHS bodies (primary care trusts and hospital trusts) make decisions about funding after considering the clinical effectiveness of the procedure and whether the procedure represents value for money for the NHS.[94]

NICE evaluated TMS for severe depression (IPG 242) in 2007, and subsequently considered TMS for reassessment in January 2011 but did not change its evaluation.[95] The Institute found that TMS is safe, but there is insufficient evidence for its efficacy.[95]

In January 2014, NICE reported the results of an evaluation of TMS for treating and preventing migraine (IPG 477). NICE found that short-term TMS is safe but there is insufficient evidence to evaluate safety for long-term and frequent uses. It found that evidence on the efficacy of TMS for the treatment of migraine is limited in quantity, that evidence for the prevention of migraine is limited in both quality and quantity.[96]

Subsequently, in 2015, NICE approved the use of TMS for the treatment of depression in the UK and IPG542 replaced IPG242.[97] NICE said "The evidence on repetitive transcranial magnetic stimulation for depression shows

no major safety concerns. The evidence on its efficacy in the short-term is adequate, although the clinical response is variable. Repetitive transcranial magnetic stimulation for depression may be used with normal arrangements for clinical governance and audit."

Costs[edit]

A single TMS session for depressive disorders averages US$350. A full course of treatment could cost between US$6,000 and US$12,000, depending on the number of treatments.[98][26]

Providers[edit]

Manufacturers of the devices include Brainsway, Deymed, MagVenture, Mag&More, Magstim, Nexstim, Neuronetics, Neurosoft.[*citation needed*] Current UK providers include a few NHS Trusts and a private operator, Smart TMS. In Cyprus FDA approved treatments for depression and OCD are provided by Cyprus rTMS [99].Also the Cyprus Technological University uses rTMS in research [100]

III. Trans-cranial Direct Current Stimulation

It is a non-invasive form of treatment that uses very weak (1 to 3 mA) direct electrical current applied to the scalp. The small device is very portable and usually operated by readily available DC batteries.

A. Side effects. There are no known serious adverse effects of tDCS. It is well tolerated, with reported common side effects in the literature listing mostly minimal tingling at the site of stimulation, with a few reported cases of skin irritation.

B. Mechanism of action. Direct current polarizes current, and tDCS is believed to act via the alteration of neuronal membrane polarization, but little is known about the actual mechanism of action of tDCS.

C. Clinical studies. Preliminary research suggests that tDCS may enhance certain brain functions independent of mood; however, tDCS technology and its use in psychiatry are in the early stages of exploration.

IV. Cranial Electrical Stimulation

A. Definition. CES, like tDCS, uses a weak (1 to 4 mA) current. It is traditionally applied via saline-soaked, felt-covered electrodes clipped onto the earlobes.

B. Mechanism of action. The exact mechanism of action has not been elicited, and there is no agreement among researchers on the predominant mode of action.

C. Side effects. It is believed that the CES stimulation is not harmful, primarily due to its low voltage power supply (9-V battery) and lack of any reported adverse event by the FDA. Local skin effects, as well as a general feeling of dizziness, have been reported.

D. Clinical studies. In a meta-analysis by the Harvard School of Public Health the overall pooled result showed CES to be better than sham treatment for anxiety at a statistically significant level.

V. Magnetic Seizure Therapy

A. Definition. MST is a novel form of a convulsive treatment, given using a modified TMS device that is under development in several research institutions. The aim is to produce a seizure whose focus and patterns of spread may be controlled. MST is a convulsive treatment, in many ways similar to ECT and requires approximately the same preparation and infrastructure as ECT. It is not FDA approved.

B. Mechanism of action. Induction of a seizure is hypothesized to be the underlying event responsible for the likely multiple specific mechanisms of action of MST treatment.

C. Side effects. Adverse effects are like those of ECT, are largely connected to the risks associated with anaesthesia and generalized seizure. Studies show MST results in less retrograde and anterograde amnesia than ECT.

D. Current status in treatment algorithms. It is still an investigational protocol and treatments outside of research are not FDA approved.

VI. Vagus Nerve Stimulation

A. Definition. VNS is the direct, intermittent electrical stimulation of the left cervical vagus nerve via an implanted pulse generator, usually in the left chest wall. The electrode is wrapped around the left vagus nerve in the neck and is connected to the generator subcutaneously.

B. Side effects and contraindications. VNS is generally well tolerated. The most common side effects are voice alteration, dyspnoea, and neck pain.

C. Current status in treatment algorithms. The FDA indicated VNS for the adjunctive long-term treatment of chronic or recurrent depression in patients 18 years or older experiencing a major depressive episode in the setting of unipolar or bipolar disease who have not had an adequate response to four or more adequate antidepressant treatments.

D. Patient selection. VNS is approved as an adjunctive long-term treatment for chronic or recurrent depressive episodes in adults with a major depressive episode who have not had a satisfactory response to four or more adequate antidepressant trials. The efficacy of VNS in other disorders is unknown.

E. Dosing. The optimal dosing for psychiatric applications of VNS is still largely an area of investigation. The published studies do not identify optimal dosing parameters like time on, time off, frequency, current, or pulse width.

VII. Deep Brain Stimulation

The procedure involves placement of small-diameter brain "leads" (e.g., approximately 1.3 mm) with multiple electrode contacts into subcortical nuclei or specific white matter tracts. The surgeon drills burr holes in skull bone under local anaesthesia and then places the leads, guided by multimodal imaging and precise stereotactic land marking. Later, the "pacemaker" (also known as an implantable neurostimulator or pulse generator) is implanted sub dermally (e.g., in the upper chest wall) and connects it, via extension wires tunnelled under the skin, to the brain leads.

A. Indications. It is used to treat people with advanced Parkinson's disease, dystonia, and essential tremor whose symptoms are no longer controlled by medication.

B. Outcome with deep brain stimulation

1. Obsessive-compulsive disorder. DBS has been shown to have clinically significant symptoms reduction in patients with intractable OCD. DBS is placed at the ventral anterior limb of the internal capsule and adjacent ventral striatum (VC/VS).

2. Major depression. Functional neuroimaging research implicates the subgenual cingulate cortex as a node in circuits involved in the normal experience of sadness, symptoms of depressive illness, and responses to depression treatments. The treatment is in early stages and being studied but

chronic DBS for up to 6 months showed sustained remission of depression in a small number of patients. The advent of DBS in psychiatry has created tremendous interest and considerable research activity. DBS may therefore be accepted by patients who would not choose to undergo lesion procedures (although the reverse is also true). With all of its advantages, DBS requires that patients be treated by highly specialized teams willing and able to provide long-term care.

Assessment Procedure

Multiple choice questions based assessment after successful completion of theory and practical sessions

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BRAIN STIMULATION TECHNIQUES – A DETAILED REVIEW 2020

SL.NO	YEAR	ROLL.NO	NAME OF CRRI	SIGNATURE
1.	2020	U15MB307	KASANKANTH.V	
2.	2020	U15MB308	KADHIRAVAN.G	
3.	2020	U15MB309	KAVIN SHANMUGAVEL.R	
4.	2020	U15MB311	KISHORE.K	
5.	2020	U15MB313	LAKSHMI.M	
6.	2020	U15MB315	LINDA EVANS.M	
7.	2020	U15MB316	MADHAVA SRIRAM.N	
8.	2020	U15MB317	MAHALAKSHMI.M.N	
9.	2020	U15MB327	NAGALAKSHMI.P	
10.	2020	U15MB320	MALAINESAN.E	

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SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Candidate Name		Assessor Name	
Date of Assessment		Assessor Position	

Brain stimulation techniques – A detailed review

MULTIPLE CHOICE QUESTIONS

Course Code: PSYC12

I. ANSWER ALL THE QUESTIONS

1. The first use of *convulsive therapy* for the treatment of a psychiatric disorder in modern times is attributed to
A. Ladislaus von Meduna
B. A. E. Bennett
C. Egas Moniz
D. Kurt Schneider

2. The first therapeutic use of *electrically induced seizures* in the treatment of mental disorders is related to
A. Harold Sackeim
B. Luigi Bini and Ugo Cerletti
C. D. Goldman
D. G. Holmberg and S. Thesieff

3. The sequece of administration of medications in anesthesia for ECT is:
A. Atropine---thiopentone/methohexitol---succinylcholine
B. Succinylcholine---atropine---thiopentone/methohexitol
C. Atracurium---succinylcholine---atropine
D. Atropine--- succinylecholine---thiopentone/methohexitol

4. As per the current evidence, which statement is NOT correct?
A. Bilateral ECT is superior in efficacy to unilateral ECT.
B. Unilateral ECT is more likely to cause cognitive deficits.
C. Brief-pulse ECT delivery is associated with decreased cognitive deficits.
D. Unilateral ECT is administered to the non-dominant hemisphere

5. Which of the following drugs is associated with lower seizure thresholds when administering ECT?
A. Lithium
B. Anticonvulsants
C. Benzodiazepines
D. Barbiturates

6. What is the minimum seizure duration required for effectiveness of ECT?
A. 1 to 3 seconds
B. 5 to 10 seconds
C. 30 to 90 seconds
D. 180 to 200 seconds

7. What is the best accepted placement of electrodes in unilateral ECT?
A. Bifrontotemporal
B. Paritotemporal

C. Occipital
D. D'Elia position

8. What is considered as the gold standard for confirmation of seizure in ECT?
A. Cuff method
B. Electroencephalography (EEG)
C. Electromyogram (EMG)
D. Galvanic Skin Response (GSR)

9. What is the average mortality rate with ECT (modified)?
A. 3-4 per 100,000
B. 10-25 per 100,000
C. 10-20 per 10,000
D. 50-60 per 1000,00

10. Factors predisposing to postictal confusional state include, all EXCEPT:
A. Sine wave ECT
B. High-dose ECT
C. Existing CNS disease
D. Multiple ECT
E. A younger age group

11. Which is the best unit for quantification of ECT stimuli?
A. Millicoulombs (mC)
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C. Watts
D. Volt

12. Which of the following is NOT a recommended preparation for ECT procedure?
A. Informed consent in writing
B. Pre-ECT investigations
C. Morning bath, cleaning the oil from the head, overnight fast
D. Premedication with an anticholinergic agent
E. Administration of an anticonvulsant 30 minutes before ECT

13. The most common indication of ECT is:
A. Schizophrenia
B. Generalized Anxiety Disorder
C. Manic episodes
D. Major depression

14. rTMS is found to have antidepressant properties when applied to
A. Temporal– parietal regions of the cortex
B. Dorsolateral prefrontal cortex (DLPFC)
C. Occipital cortex
D. Parieto-occipital cortex

15. The most persistent adverse effect of ECT is
A. Retrograde amnesia
B. Fractures
C. Seizures
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Date of Assessment	18.5.2020	Assessor Position	ASSISTANT PROFESSOR

UNIVERSITY REG NO:- U1SMB311.

10/15

Brain stimulation techniques – A detailed review

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D. D'Elia position

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Candidate Name	KAVIN SIVAMUGAVEL.R	Assessor Name	DR. AGILA
Date of Assessment	18.5.2020	Assessor Position	ASSISTANT PROFESSOR

UNIVERSITY REG. NO: - 115MB309

11/15

Brain stimulation techniques – A detailed review

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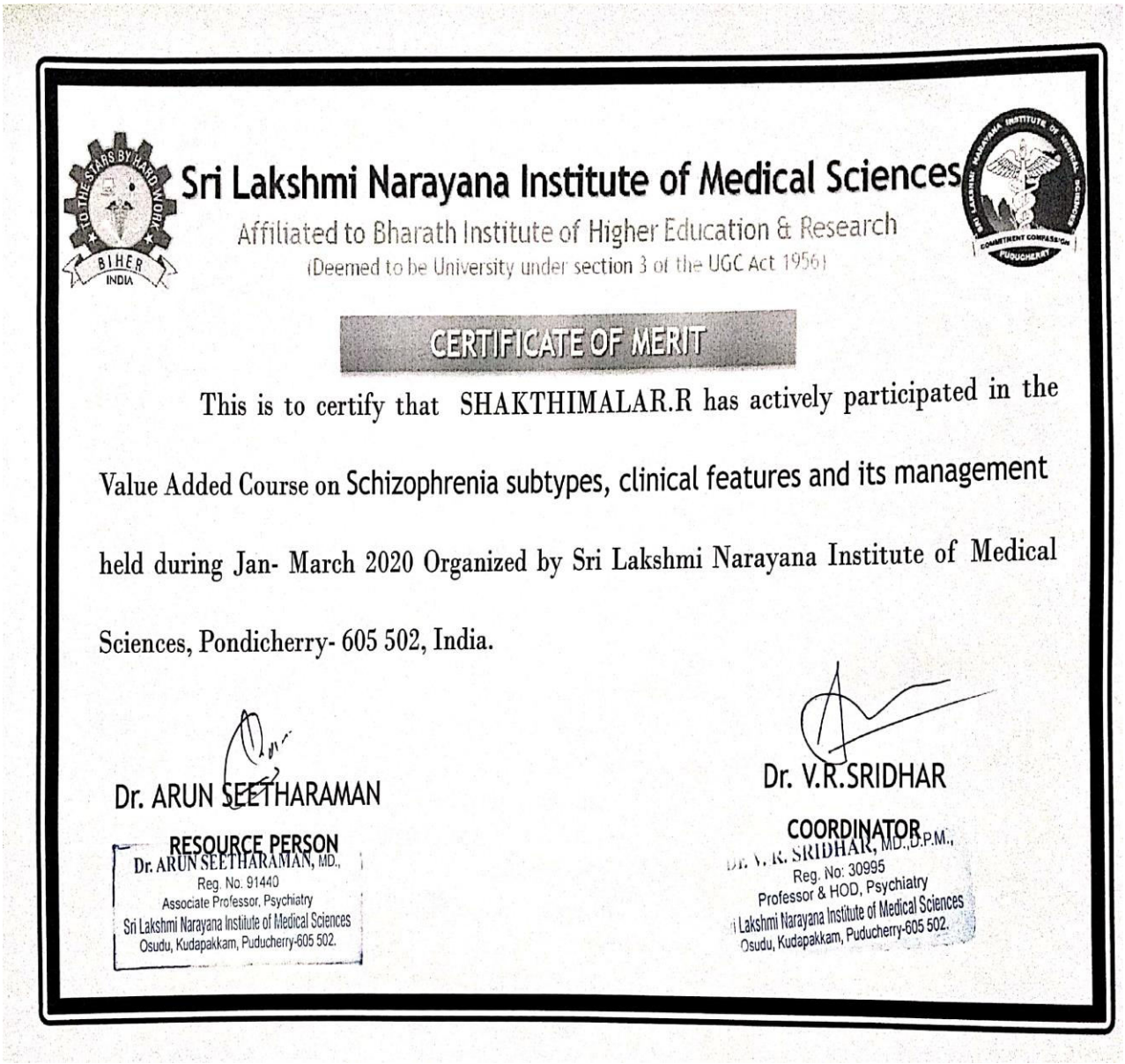

Sri Lakshmi Narayana Institute of Medical Sciences

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CERTIFICATE OF MERIT

This is to certify that SHAKTHIMALAR.R has actively participated in the Value Added Course on Schizophrenia subtypes, clinical features and its management held during Jan- March 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

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Dr. V.R.SRIDHAR

COORDINATOR
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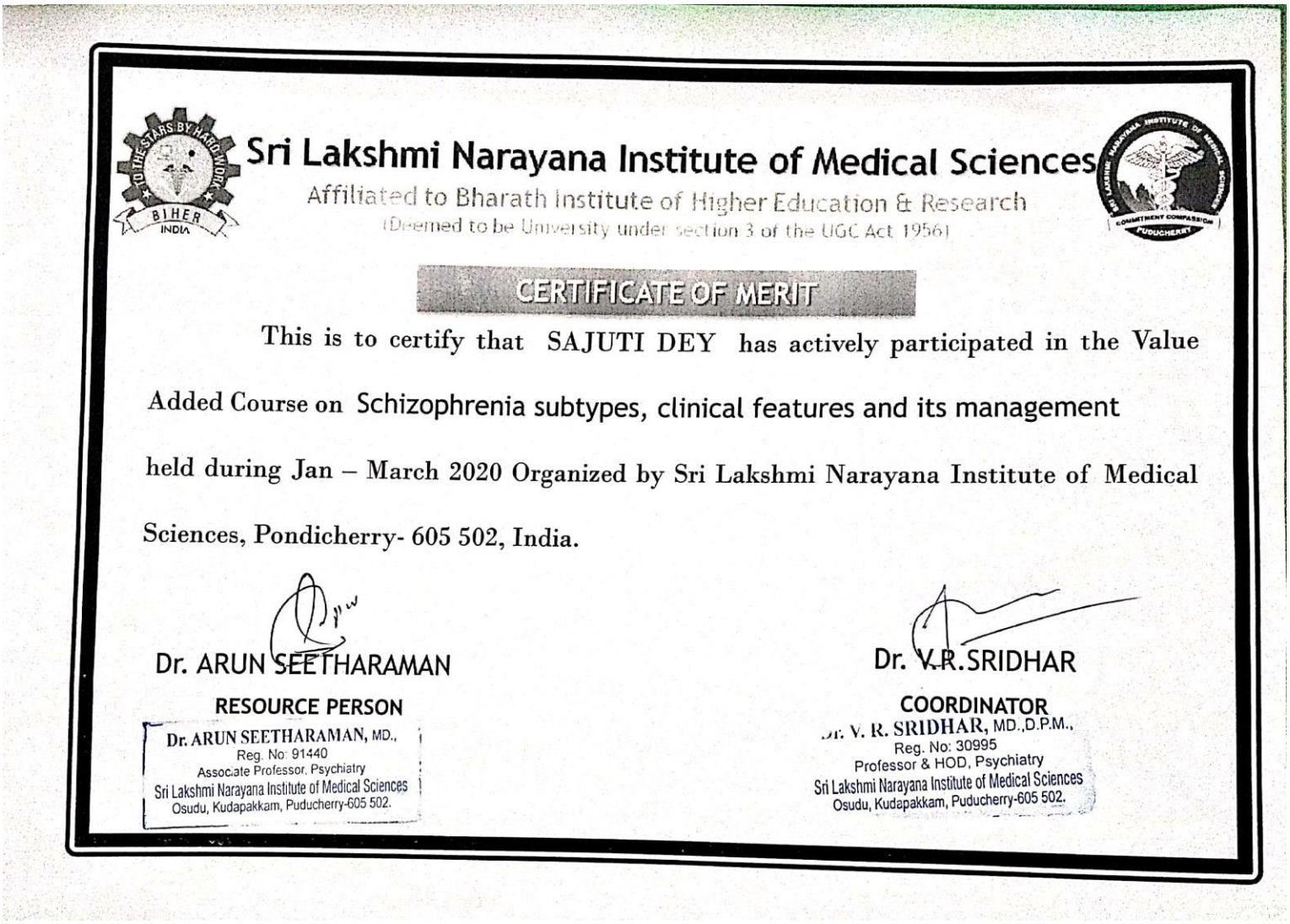

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Student Feedback Form

Course Name: **BRAIN STIMULATION TECHNIQUES**
Subject Code: **PSYC12**

Name of Student:_____ Roll No.:_____

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear					
2	Course contents met with your expectations					
3	Lecturer sequence was well planned					
4	Lectures were clear and easy to understand					
5	Teaching aids were effective					
6	Instructors encourage interaction and were helpful					
7	The level of the course					
8	Overall rating of the course	1	2	3	4	5

**** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory***

Suggestions if any:

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Student Feedback Form

Course Name: **BRAIN STIMULATION THERAPIES**
Subject Code: **PSYC12**

Name of Student: KASANKANTH . V Roll No.: U15MB307

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear			✓		
2	Course contents met with your expectations				✓	
3	Lecturer sequence was well planned			✓		
4	Lectures were clear and easy to understand					✓
5	Teaching aids were effective			✓		
6	Instructors encourage interaction and were helpful				✓	
7	The level of the course			✓		
8	Overall rating of the course	1	2	3	4 ✓	5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

Signature

Date:

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Student Feedback Form

Course Name: **BRAIN STIMULATION THERAPIES**
Subject Code: **PSYC12**

Name of Student: KADHIRAVAN-G Roll No.: U15MB308

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Sl. NO	Particulars	1	2	3	4	5
1	Objective of the course is clear				✓	
2	Course contents met with your expectations					✓
3	Lecturer sequence was well planned				✓	
4	Lectures were clear and easy to understand			✓		
5	Teaching aids were effective				✓	
6	Instructors encourage interaction and were helpful					✓
7	The level of the course			✓		
8	Overall rating of the course	1	2	3	4	✓ 5

** Rating: 5 – Outstanding; 4 - Excellent; 3 – Good; 2– Satisfactory; 1 - Not-Satisfactory*

Suggestions if any:

Signature

Date:

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Date: 30-06-2020

From

Dr.V.R.Sridhar
Professor and Head,
Department of Psychiatry,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To

The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

BIHER

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Sub: Completion of value-added course: Brain stimulation techniques – A detailed review

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: **Brain stimulation techniques – A detailed review**. We solicit your kind action to send certificates for the participants that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards,

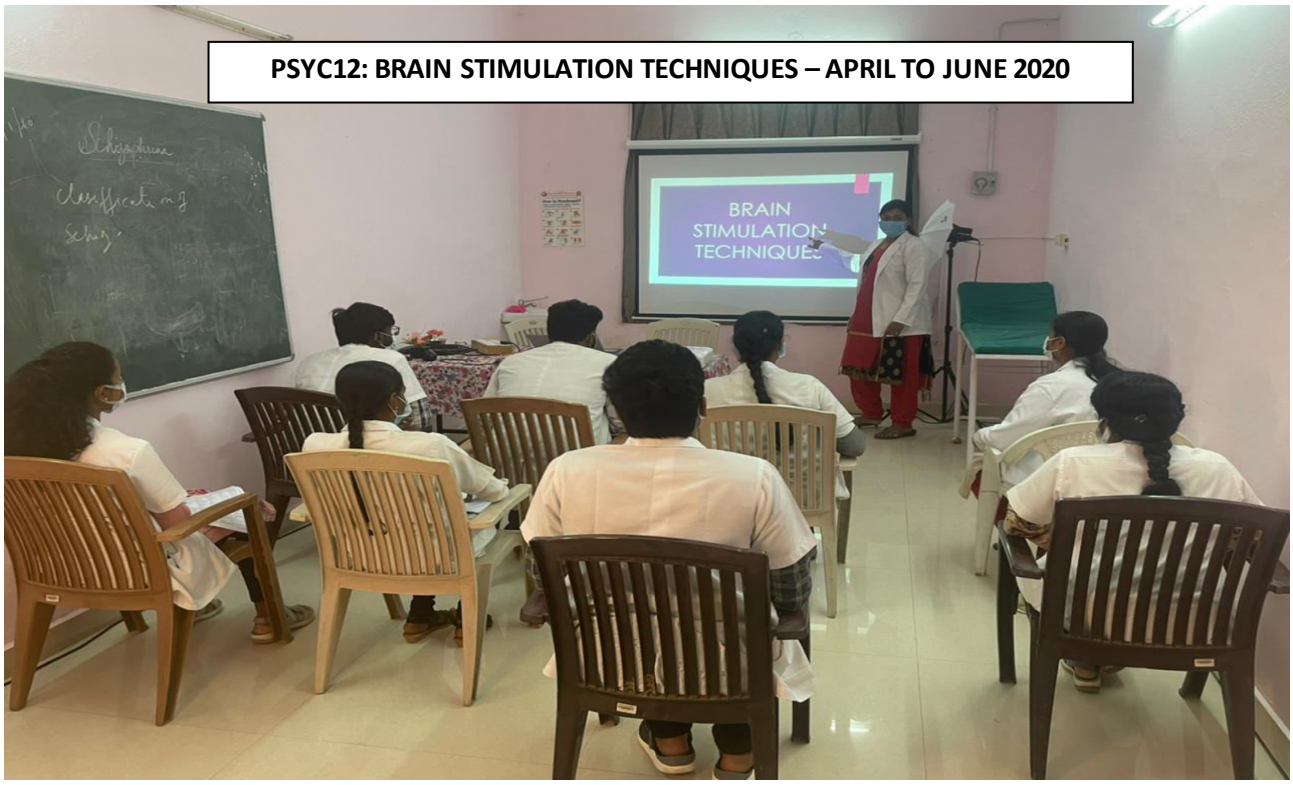
Dr. Sridhar

Dr. V. R. SRIDHAR, MD.,D.P.M.,
Reg. No. 30995
Professor & HOD, Psychiatry
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry-605 502.

Encl: Certificates

Photographs

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH



BIHER

Sri Lakshmi Narayana Institute of Medical Sciences

Date: 07.09.2019

From
Dr.G.Jayalakshmi
Professor
Department of Microbiology,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

To
The Dean,
Sri Lakshmi Narayana Institute of Medical College
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: Self Directed Learning and its Implication &CD/ME02

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **Self Directed Learning and its Implication** for II MBBS Students 01.10.2019. We solicit your kind permission for the same.

Kind Regards

Dr.G.Jayalakshmi

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: Dr.G.Jayalakshmi

The HOD: Dr. Abarna

The Expert: Dr.G.Jayalakshmi

The committee has discussed about the course and is approved.

Dean

Dr. G. JAYALAKSHMI, BSC.,MBBS.,DTCD.,M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Ageram Kudapakkam, Post,
Villanur Commune Puducherry-605 502.

Subject Expert

HOD

PROFESSOR & HOD
DEPARTMENT OF MICROBIOLOGY
Sri Lakshmi Narayana Institute Of Medical Sciences
PONDICHERRY - 605 502

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute Of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,

PUDUCHERRY – 605 502

Circular

15.09.2019

Sub: Organising Value-added Course: Self Directed Learning and its Implication .reg

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research** is organizing **"Self Directed Learning and its Implication "**. The course content is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before 25th September-2019. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

Dr. G. JAYALAKSHMI, BSC.,MBBS.,DTCD.,M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Agaram Kudapakkam, Post,
Villianur Commune Puducherry-605 502.

Encl: Copy of Course content.

Course Proposal

Course Title: **Self Directed Learning &MIC14**

Course Objective:

1. **Self-directed learners** are individuals who can identify their own **learning** needs,
2. **A**lso they can utilize different **learning** strategies,
3. methods and techniques,
4. manage their **learning** processes, plan their time effectively,
5. Evaluate their **learning** outcomes, and identify and amend their **learning** deficiencies.

Course Outcome: From the group activity-the concept of self directed learning, importance, process will be discussed with the students.

How the assessment of self-directed learning takes place? – importance of assignments

Course Audience: II MBBS Students of 2018-19 Batch

Course Coordinator: Dr.G.Jayalakshmi

Course Faculties with Qualification and Designation:

1.Dr.G.Jayalakshmi, Professor & HOD

2. Dr.Abarna, Associate Prof.

3. Dr. Jayapradha, Assistant Professor

2.Dr.Naveen kumar, Assistant Professor

Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Time	Hours	Lecture taken by
1.	1.10.2019	Introduction SDL,, Definition of SDL	4-5p.m	1	**Dr.G.Jayalakshmi**
2.	3.10.2019	Aim and Objectives	4-5p.m	1	**Dr.G.Jayalakshmi**
3.	4.10.2019	Steps … how to impart to learners	4-5p.m	1	**Dr.Abarna**
4.	5.10.2019	Technology supports learners in self-directed learning	2-4p.m	2	**Dr.G.Jayalakshmi**
5.	9.10.2019	Self-Directed Learning: A Four-Step Process	4-6p.m	2	**Dr.G.Jayalakshmi**
6.	10.10.2019	Characteristics of Learning	4-5p.m	1	**Dr.Naveen kumar**
7.	11.10.2019	Materials and methods **Assignment**	4-5P.M	1	**Dr.G.Jayalakshmi**
8.	12.10.2019	Self-Directed Learning: Values and Goals	2-4p.m	2	**Dr.G.Jayalakshmi**
9.	14.10.2019	Teaching the Self Directed Learning	4-5p.m	1	**Dr.G.Jayalakshmi**

10.	15.10.2019	Assessing SDL	4-5p.m	1	**Dr.G.Jayalakshmi**
11.	16.10.2019	Recent Application of SDL	4-5p.m	1	**Dr.Naveen kumar**
12.	17.102019	Progressive Learning	4-5p.m	1	**Dr.G.Jayalakshmi**
13.	18.10.2019	Self Directed Learning Vs. Progressive Learning	4-5p.m	1	**Dr.G.Jayalakshmi**
14.	19.10.2019	Makes Self-Directed Learning Effective?	2-4p.m	2	**Dr.G.Jayalakshmi**
15.	21.10.2019	Pursue More Self-Directed Learning	4-5pm	1	**Dr. Jayapradha**
16.	22.10.2019	A Framework for 10 self-directed learning Questions	4-5p.m	1	**Dr.G.Jayalakshmi**
17.	23.10.2019	Benefits of Self-Directed Learning	4-5 p. m	1	**Dr.Abarna**
18.	24.10.2019	The Advantages and Disadvantages of Self Directed Learning	4-5 p. m	1	**Dr. Jayapradha**
		Practical Class I			
13.	25.10.2019	Reflection writing, ,	4-6 p. m	2	**Dr.Naveen kumar**
14.	26.10.2019	Group Discussion	2-6 p. m	4	**Dr.G.Jayalakshmi**
15.	28.10.2019	Problem solving capacity and self assessment	4-6 p. m	2	**Dr.G.Jayalakshmi**
		Total		30 hrs	

REFERENCE BOOKS:

1. **Implementation and evaluation of a self-directed learning activity for first-year medical students:Molly Hill , Megan Peters , Michelle Salvaggio , Jay Vinnedge & Alix Darden .To cite this article:** Molly Hill , Megan Peters , Michelle Salvaggio , Jay Vinnedge & Alix Darden (2020) Implementation and evaluation of a self-directed learning activity for first-year medical students, Medical Education Online, 25:1, 1717780, DOI: 10.1080/10872981.2020.1717780

2. Knowles M. Self-directed learning: A guide for learners and teachers. 1975
3. https://doi.org/10.1016/j.compedu.2013.08.006
4. Williamson SN (2007) The Development of Self-Rating Scale of Self-Directed Learning. *Nurse Researcher* 14(2): 65 – 72.

Date : 28.10.2019

From
Dr.G.Jayalakshmi
Professor of Microbiology,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To
The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: Self Directed Learning and its Implication

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: **Self Directed Learning and its Implication &CD/ME02 on** October 2019 II MBBS Students. We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards,

Dr.G.Jayalakshmi

Encl: Certificates

Photographs



VALUE ADDED COURSE

1. Name of the programme & Code

Self Directed Learning and its implication & CD/ME02

2. Duration & Period

30 hrs & October 2019

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Self-Rating Scale for Self-Directed Learning (SRSSDL) Tool

- *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

1 time October 2019

8. Year of discontinuation: 2020

9. Summary report of each program year-wise

Value Added Course- December 2019 & Jan- Feb 2020					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	CD/ME02	Self Directed Learning & MIC14	Dr. G.Jayalakshmi Dr. Abarna Dr. Jayapradha Dr.C.Naveen Kumar	II MBBS Students	20 students OCT- 2019)

10. Course Feed Back

Enclosed as Annexure- V

RESOURCE PERSON

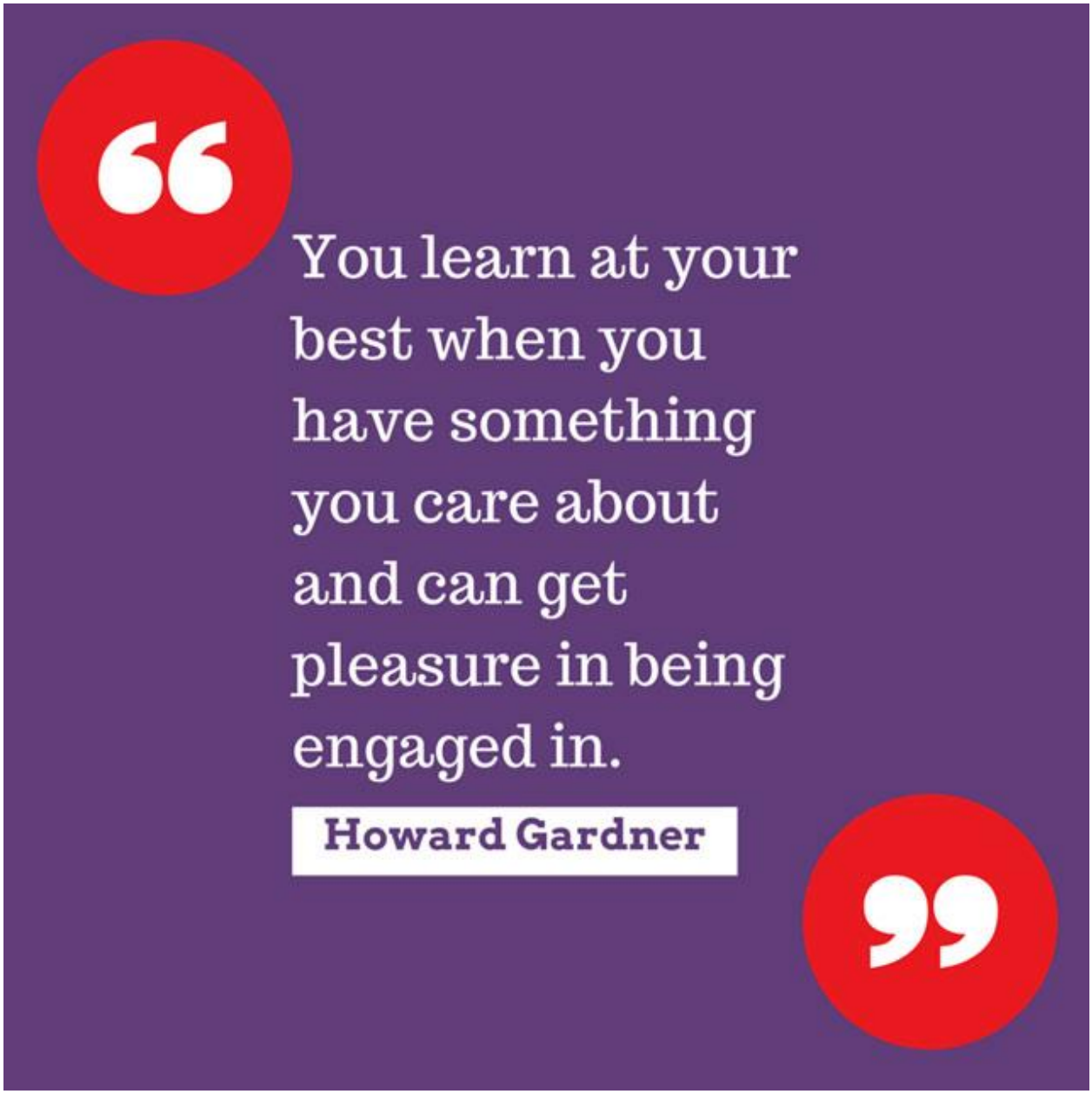
1. **Dr.G.Jayalakshmi**
2. **Dr.Abarna**
3. **Dr.Jayapradha**
4. **Dr. V. Naveen Kumar**

COORDINATOR

Dr.G.Jayalakshmi

Annexure- I

Self Directed Learning and its Implications



PARTICIPANT HAND BOOK

BIHER SLIMS

COURSE DETAILS

Particulars	Description
Course Title	**Self Directed Learning its Implication**
Course Code	CD/ME02
Topics and content of the course in the Hand book	1. Introduction SDL 2. Definition of SDL 3. Aim and Objectives 4. Steps … how to impart to learners 5. Technology supports learners in self-directed learning 6. Self-Directed Learning: A Four-Step Process 7. Characteristics of Learning 8. Materials and methods *Assignment* 9. Self-Directed Learning: Values and Goals 10. Teaching the Self Directed Learning 11. Assessing SDL 12. Recent Application of SDL 13. Progressive Learning 14. Self Directed Learning Vs. Progressive Learning 15. Makes Self-Directed Learning Effective? 16. Pursue More Self-Directed Learning

	17. A Framework for 10 self-directed learning Questions 18. Benefits of Self-Directed Learning 19. The Advantages and Disadvantages of Self Directed Learning.
Interactive discussion with examples	From the group activity-the concept of self directed learning, importance, process will be discussed with the students. How the assessment of self-directed learning takes place? – importance of assignments
Further learning Opportunities	• A common learning goal will be established • Each group will be given a topic to carry out self directed learning to achieve common goal • Each group will discuss the resources required for the topic, the methods of self directed learning they will be using to achieve the common goal. Each group will present their self directed learning plan
Key Competencies	**Self-Assessment Process** • Met cognitive judgment of some aspect of self • Potential (knowledge, ability) • Reality (performance) Assessment of Self-Rating for Self-Directed Learning using SRSSDL Tool
Target Student	II MBBS Students (2019-2020)
Duration	30hrs
Theory Session	22hrs
Practical Session	8hrs(Reflection writing, Group Discussion, Problem solving capacity and self assessment)
Assessment Procedure	Self-Rating Scale for Self-Directed Learning (SRSSDL) Tool

INTRODUCTION:

Self-directed learning (SDL) is a vital **educational** principle in higher **education** that has been promoted by various institutions due to its value in developing professionals to become lifelong **learners**. ... Hence, the **medical student** is responsible for his or her own **learning**.

Growing up on Chicago's South Side, Tiffany Mikell had little choice *but* to become a self-directed learner. As a poor student with few opportunities handed to her, she figured out at an early age that the things she learned from her teachers wouldn't be enough to help change her situation–and the situation of those around her– for the better.
Mikell and her sisters created reading lists and visited the library weekly, as well as local museums on all the free days. They sacrificed new clothes in exchange for piano lessons and had family discussions about the importance of economic development in our community. If something wasn't taught in a course, they figured out a way to obtain the knowledge through community-building and project-based learning.

"Very early in life, we became aware of the skills and talents we had that we could use to either earn a small income or improve conditions in our neighborhood," she says, writing for Dale Stephens' Uncollege blog. "I'm a firm believer (and living proof) that affluence does not determine your level of intelligence or your capacity for learning."
She quickly discovered that she could use her own "customised education" to solve problems that she truly cared about, which is what self-directed learning is really about.

Defined by adult education expert Malcolm Knowles, self-directed learning "describes a process by which individuals take the initiative, with or without the assistance of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, and evaluating learning outcomes." It's an especially important concept in today's educational climate, where MOOCs and other supplemental learning tools abound. Before long, we'll be earning digital badges instead of degrees, and when this happens, self-directed learning will be a critical skill possessed by any student who hopes to succeed.

The closely related term "autodidacticism" has roots in the Ancient Greek words *autós*, or "self," and *didaktikos*, meaning "teaching." The idea is, and always has been, quite simple really: that students should be encouraged to do more independent work. Early autodidacts like Leonardo da Vinci may have been societal outliers during their time, but the Industrial Revolution created more opportunities for people to pursue advanced academic careers and drive their own learning.

What we're seeing now, in the 21st century, is a widespread acceptance of DIY methods of education. The traditional model no longer yields the results it once did, and many of today's graduates are left high and dry without jobs or– perhaps worse– any real interest in learning.

One of the most recent trends in education is that learning environments should cater towards students' individual needs, goals, and interests. This model adopts the idea of inquiry-based learning, where students are presented with scenarios to identify their own research, questions, and knowledge on a particular topic. At the most successful institutions, students are now being provided with opportunities to "experience and interact" with knowledge, just as da Vinci did, making learning enjoyable and natural.

Self-Directed Learning is based on **the idea that an individual takes *responsibility for their own learning*** b choosing, managing, and evaluating their own learning activities. Proponents of Self-Directed Learning believe that learning goes far beyond academics. They believe education is all encompassing. It is everything someone knows in order to live a satisfying life. It can be done anywhere and at any age. Essential elements of Self-Directed Learning include the following:

- Student control over as much of the learning experience as possible;
- Development of skills that lead to productive activity;
- Self management; and
- Self motivation.

Informally, Self-Directed Learning is happening constantly in people's everyday lives as they pursue personal interests. The motivation behind this learning is usually due to things like curiosity, social interests, personal betterment, or simply an internal motivation to learn more about a specific topic or even the world as a whole.

This type of learning obviously leads different individuals down different paths – two people each pursuing the same topic will not learn about it in the same way or necessarily end up having participated in the same experiences in order to learn. That fact is what motivates proponents of Self-Directed Learning – **individuals should learn with their individuality driving the experience**.

Self-Directed Learning is the opposite of what learning in most traditional schools looks like today. Much of today's traditional school-based learning can be considered imposed schooling, which is forced upon individuals regardless of their desire for it, and is motivated by a system of rewards and punishments rather than an individual's internal, self-motivating

desire to learn. It actually often does the opposite and suppresses an individual's natural curiosity.

'Everyone in healthcare has two jobs when they come to work every day: to do their work and to improve it.' In the near future, medical knowledge will double every few months; therefore, it is critical that medical students develop life-long learning skills. Self-directed learning (SDL) is considered an important component of life-long learning and thus is a key competency in medical school curricula. Historically, self-directed learning was defined by Knowles as a process in which a learner takes the initiative, diagnoses their learning needs, creates learning goals, identifies resources for learning, applies appropriate learning strategies and evaluates their learning outcomes. The Liaison Committee on Medical Education (LCME) now requires medical schools to provide opportunities for students to participate in SDL activities as described in Standard 6.3 'The faculty of a medical school ensure that the medical curriculum includes self-directed learning experiences and time for independent study to allow medical students to develop the skills of lifelong learning. Skills that embody a lifelong learner include the ability to recognize one's knowledge gaps, to know where and how to find credible sources with the relevant information, and then to synthesize this information and apply it to one's clinical practice.'

To develop self-directed learners, Knowles states that teachers must facilitate the acquisition of SDL skills. Moreover, medical educators should not assume that medical students possess all the skills needed to engage successfully in SDL activities without training.

Implementing an SDL activity in a paraclinical course at our institution presented several challenges including allotting time in a short, fast-paced course that is primarily lecture-based, providing individual feedback to a large class, designing SDL activities relevant to the course content, and assigning significant weight to the SDL grade. Therefore, the two goals of this course were to determine the feasibility of including an SDL activity in a lecture-based paraclinical medical school course and, gain insight into the medical student perspective of engaging in the SDL activity.

Definition:

Self-directed learning (SDL) is an instructional strategy where the students, with guidance from the teacher, decide what and how they will learn. It can be done individually or with group learning, but the overall concept is that students take ownership of their learning.

For example, a teacher may give a general learning goal, such as to learn about a geographical area. Students would then work with the teacher to decide the scope of the project, length of time, and the end result that would demonstrate their learning. One student may decide to learn all of South America and create an educational website. Another student may choose to research the deforestation effects of Borneo and write a report for the government. Another student may choose a specific city and focus on the historical significance, creating a video vignette from personal interviews. By allowing

students to choose different learning objectives and outcomes, it allows students to choose based on their personal interests and strengths.

AIM AND OBJECTIVIES:

Self-directed learners are individuals who can identify their own **learning** needs, also they can utilize different **learning** strategies, methods and techniques, manage their **learning** processes, plan their time effectively, evaluate their **learning** outcomes, and identify and amend their **learning** deficiencies.

Review of literature

Self-directed Learning

More than 30 years ago, Knowles (1975), defined Self-directed Learning as a process in which individuals take the initiative, with or without the help of others, to diagnose their learning needs, formulate learning goals, identify human and material resources for learning, choose and implement appropriate learning strategies, and evaluate learning outcomes.

Long (1998) identified three aspects of Self-directed Learning: the Sociological, Pedagogical, and Psychological. Long contended that much of the discussion around Self-directed Learning has focused on the Sociological (independent task management) and Pedagogical (application in educational contexts).

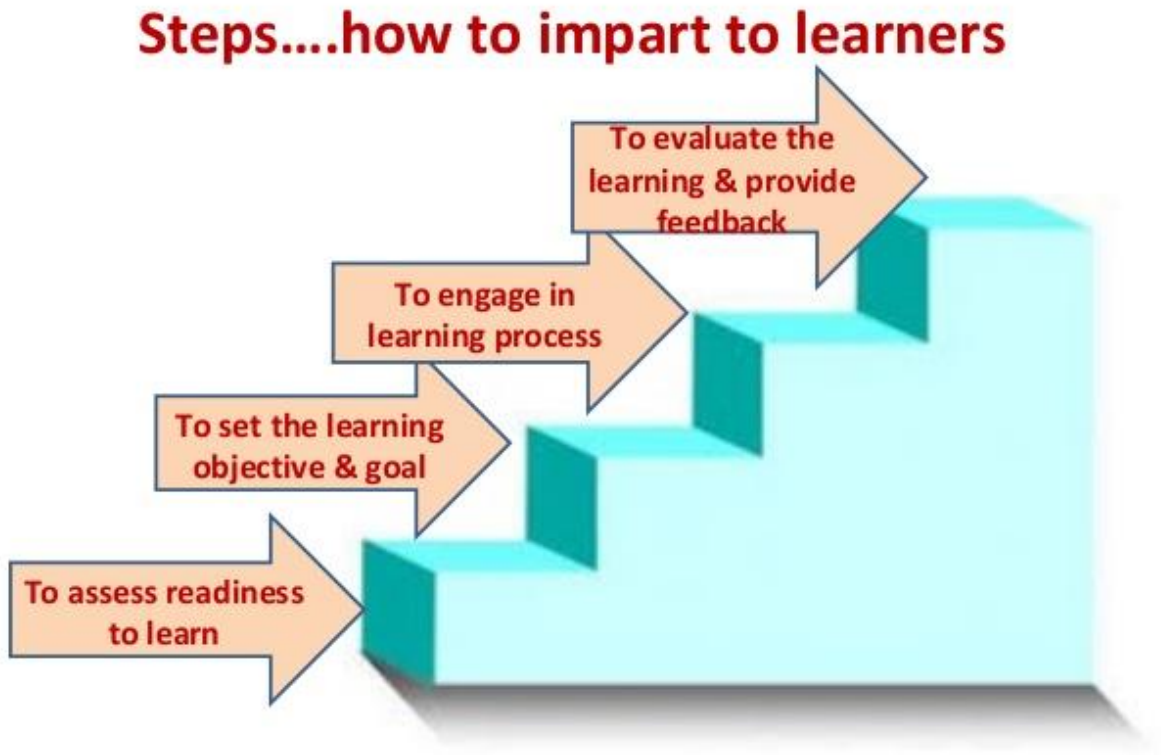
Costa and Kallick (2004) described the Self-directed Learners as being

1) Self-Managing, (the willingness to be engaged in activities with awareness of the results for their learning and the academic load, and essential information they need, and use of prior experiences, looking forward to signs of achievement, and generating substitutes for accomplishment),

2) Self Monitoring (having adequate self-awareness about what is effective, employing cognitive and met cognitive strategies to assess their learning), and

3) Self-Modifying (thinking over, assessing, and constructing meaning from experience and utilizing their knowledge to future activities, and tasks). Parasafar (2012) defined Self-directed Learning as a kind of learning that has characteristics like self-planned, self-initiated, and independent learning.

The Self-directed Learning (SDL) Model views learners as responsible owners and managers of their own learning process and integrates self-management (management of the context, including the social setting, resources, and actions) with self-monitoring (the process whereby the learners monitor, evaluate and regulate their cognitive learning strategies) (Brockett, 2002).



Technology Supports Learners In Self-Directed Learning

There are various other **ways in which technology supports learners in self-directed learning**, some tools and strategies for the purpose are:

Online Learning : It exposes students to a wide range of resources available online, covering their areas of interests, which they can learn at their own pace, personally. Online learning increases the effectiveness in student learning.

Free OER: Open Educational Resources are quality resources provided for learning, for free. Through these resources students are able to learn any subject they want on their own, and the constant need for a teacher is eliminated.

Personal Learning Networks : PLN form the core of passionate self-directed learning. These can be created through blogs, social networks such as, Twitter, Facebook, etc. They facilitate collaboration which helps in self-directed learning.

Video-conferencing tools : Tools like Skype, help turn classrooms into global communication centers for free. Students can connect with anyone around the world, to discuss topics of their interest, and with experts or educators to learn from.

Self-publishing : It can be used by students to reach an audience beyond their teacher. They can share their ideas and work with real audiences outside of their schools. This is made possible through blogging or social sites.

Twitter : It helps students create micro-blogs, through which they can connect with the people who share their interests. They can follow them, reply to them and use the search term in their tweets for others to see what they share.

YouTube/iTunes : YouTube adds the visual element to make learning more powerful. Both these platforms are used by school and college/university professors to share content for free. They empower students and teachers to design their own learning.

ePortfolios : These help students keep track of their own achievements and share them with others. They are free and easy to create; students create a container like, a blog, wiki or website, organize it and post their work.

Self-assessment : Students instead of relying on teachers to get evaluated, should assess themselves by; sharing their work with others to get feedback for improvement, practice tests on a test prep and review site, create videos and look for views and comments on them, develop their own learning plans/assessments and more.

Self-directed learning gives us a clear understanding of the relationship between learning and technologies. Technology provides boundless access for learners to connect with others, explore topics of interests and be a part of opportunities and events across the globe. Latest technologies also allow for newer ways to modernize classrooms, providing higher flexibility to students to organize their own resources, adopt their own learning styles, and study individually or collaboratively. Clearly, technology has significant implications for the development and support of self-directed learning. Share your views and knowledge with us. Make your comments in the Comment Box.

Self-Directed Learning: A Four-Step Process

Learning independently can be challenging, even for the brightest and most motivated students. As a means of better understanding the processes involved in this mode of study, this Teaching Tip outlines key components of four key stages to independent learning, known as self-directed learning: being ready to learn, setting learning goals, engaging in the learning process, and evaluating learning.

Step 1: Assess readiness to learn

Students need various skills and attitudes towards learning for successful independent study. This step involves students conducting a self-evaluation of their current situation, study habits, family situation, and support network both at school and at home and also involves evaluating past experiences with independent learning. For a detailed Learning Skills Assessment Tool, read our Readiness to Learn Teaching Tip. Signs of readiness for self-directed learning include being autonomous, organised, self-disciplined,

able to communicate effectively, and able to accept constructive feedback and engage in self-evaluation and self-reflection.

Step 2: Set learning goals

Communication of learning goals between a student and the advising instructor is critical. We've developed a set of questions for students to consider as they map out their learning goals: our Unit Planning Decision Guide). Also critical in developing a clear understanding of learning goals between students and instructors are learning contracts. Learning contracts generally include:

- Goals for the unit of study
- Structure and sequence of activities
- Timeline for completion of activities
- Details about resource materials for each goal
- Details about grading procedures
- Feedback and evaluation as each goal is completed
- Meeting plan with the advising instructor
- Agreement of unit policies, such as a policy on late assignments

Once created, contracts should be assessed by the advising faculty member and questions about feasibility should be raised (e.g., What could go wrong? Is there too much or too little work? Is the timeline and evaluation reasonable?).

Step 3: Engage in the learning process

Students need to understand themselves as learners in order to understand their needs as self-directed learning students — referring students to our resource on learning preferences may be helpful. Students should also consider answering the following questions:

- What are my needs re: instructional methods?
- Who was my favourite teacher? Why?
- What did they do that was different from other teachers? Students should reflect on these questions throughout their program and substitute “teacher” with “advising instructor”

Students also need to understand their approach to studying:

- A **deep approach** to studying involves transformation and is ideal for self-directed learning. This approach is about understanding ideas for yourself, applying knowledge to new situations and using novel examples to explain a concept, and learning more than is required for unit completion.
- A **surface approach** involves reproduction: coping with unit requirements, learning only what is required to complete a unit in good standing, and tending to regurgitate examples and explanations used in readings.

- A **strategic approach** involves organization: achieving the highest possible grades, learning what is required to pass exams, memorizing facts, and spending time practicing from past exams.

Earlier academic work may have encouraged a surface or strategic approach to studying. These approaches will not be sufficient (or even appropriate) for successful independent study. Independent study requires a deep approach to studying, in which students must understand ideas and be able to apply knowledge to new situations. Students need to generate their own connections and be their own motivators.

Step 4: Evaluate learning

For students to be successful in self-directed learning, they must be able to engage in self-reflection and self-evaluation of their learning goals and progress in a unit of study. To support this self-evaluation process, they should:

- regularly consult with the advising instructor,
- seek feedback, and
- engage in reflection of their achievements, which involves asking:
    - How do I know I've learned?
    - Am I flexible in adapting and applying knowledge?
    - Do I have confidence in explaining material?
    - When do I know I've learned enough?
    - When is it time for self-reflection and when is it time for consultation with the advising faculty member?

Responsibilities in the four-step process

Successful independent study requires certain responsibilities or roles of both students and advising faculty members. The following is a brief list of the more important roles. It is useful for both students and advising faculty members to periodically review this list and communicate as to whether each feels the other is fulfilling their share of the responsibility.

Students' roles

- Self-assess your readiness to learn
- Define your learning goals and develop a learning contract
- Monitor your learning process
- Take initiative for all stages of the learning process — be self-motivated
- Re-evaluate and alter goals as required during your unit of study
- Consult with your advising instructor as required

Advising instructors' roles

- Build a co-operative learning environment
- Help to motivate and direct the students' learning experience
- Facilitate students' initiatives for learning
- Be available for consultations as appropriate during the learning process

- Serve as an advisor rather than a formal instructor

Characteristics of Learning (Explained)

Learning is the process by which one acquires, ingests, and stores or accepts information. The main characteristic of learning that; it is a process of obtaining knowledge to change human behavior through interaction, practice, and experience.

Our experiences with learned information compose our bodies of knowledge. Learning is a process unique to each individual.

Some learn quickly, scanning the information and mastering the concept or skill seemingly effortlessly.

Others stumble while processing information, taking longer to grasp the concept of requiring numerous exposures over a sustained time.

Characteristics of learning are;

1. Learning involves change.
2. All learning involves activities.
3. Learning Requires Interaction.
4. Constitute Learning.
5. Learning is a Lifelong Process.
6. Learning Occurs Randomly Throughout Life.
7. Learning Involves Problems Solving.
8. Learning is the Process of Acquiring Information.
9. Learning Involves far more than Thinking.
10. Experience is Necessary for Learning.

Let's explain and understand these characteristics of learning.

Learning involves change.

It is a reconstruction, combined thinking, skill, information and appropriation in a single unity process.

For example, when a child learns to read they can retain this knowledge and behavior for the rest of their lives. It is not always reflected in performance. The change from the learning may not be clear until a situation arises in which the new behavior can occur.

All learning involves activities

These activities involve either physical or mental activity. They may be simple mental activities of complex, involving various muscles, bones, etc.

So also the mental activities may be very simple involving one or two activities of mind or complex which involve higher mental activities.

Learning Requires Interaction

At the time of learning, the individual is constantly interacting with and influenced by the environment. This experience makes him change or modify his behavior to deal effectively with it.

Constitute Learning

To constitute learning, the change should be permanent. Temporary changes may be only reflective and fail to represent any learning.

Learning is a Lifelong Process

Learning is a lifelong process of gaining and using the information presented to a person. It is not static.

A person never stops acquiring new information. It keeps a person's mind active and aware but also conscious of the world around them.

Learning Occurs Randomly Throughout Life

Some learning occurs randomly throughout life, from new experiences, gaining information and from our, perceptions, for example: reading a newspaper or watching a news broadcast, talking with a friend or colleague, chance meetings, and unexpected experiences.

Learning Involves Problems Solving

Learning involves problem-solving i.e. understanding and discovering relations between different contents in a situation.

Learning is the Process of Acquiring Information

Learning is the process of acquiring information, knowledge, wisdom, and skills. It occurs as a result of interaction with the person's environment.

Learning Involves far more than Thinking

Learning involves far more than thinking: it involves the whole personality – senses, feelings, intuition, beliefs, values, and will.

If we do not have the will to learn, we cannot learn and if we have learned, we are changed in some way. If the learning makes no difference it can have very little significance.

Experience is Necessary for Learning

Some sort of experience is necessary for learning. We can get the experience from direct observation or from formal approaches to learning such as training, mentoring, coaching and teaching.

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Learning is more or less the acquisition of a new discourse, a new way of speaking, acting, interacting, looking at the world, and knowing it.

It will be successful only when the information gained is used and understood.

It is a continuous process followed by an individual that allows for the acquisition of information, attitudes, and practices, through observation, seeking previous knowledge, searching out guides, and looking within as well as without. It is a key process in human behavior.

If we compare the simple ways in which a child feels and behaves, with the complex modes of adult behavior, his skills, habits, though, sentiments and the like we will know what difference learning has made to the individual.

Methods:

How to Implement SDL- The Road map

A review of the literature indicated that research investigating the relationship between self-directed learning readiness and first-generation college student success is notably absent. In addition, few empirical studies exist concerning the implementation of summer bridge programs as a tool to augment academic success and retention of first generation students. Identified gaps in the literature reveal possible interrelationships between theoretical frameworks in the fields of adult and higher education. The purpose of this study was to investigate the change in self-direction among first-generation college students participating in the Freshmen Summer Institute (FSI), a summer bridge program at the University of South Florida. This course was designed to answer the following research questions

: 1. What is the relationship between pre-test scores of the Personal Responsibility Orientation to Self-Direction in Learning Scale and previous academic achievement as measured by university admissions grade point average?

2. What differences in scores were measured between pre-test (given July, 2009) and post-test (given January, 2010) administration of the Personal Responsibility Orientation to Self-Direction in Learning Scale?

3. What is the relationship between post-test scores of the Personal Responsibility Orientation to Self-Direction in Learning Scale and academic 78 achievement as measured by university grade point average at the end of the third full semester?

4. How are participants' levels of self-direction following involvement in a summer bridge program, as indicated by post-test scores of the Personal Responsibility Orientation to Self-Direction in Learning Scale, different for participants' based on gender and ethnicity?

5. How is the impact of a summer bridge program, as indicated by a change in self-direction scores on the Personal Responsibility Orientation to Self-Direction in Learning Scale, different for participants' based on gender and ethnicity?

Self-Directed Learning: Value and Goals

- Understand the qualities of a self-directed learner
- Consider the effect of emotions on motivation and learning abilities
- Become actively involved and take personal responsibility for the quality of learning experiences
- Practice creating an open and receptive mind
- Understand the larger purpose of what you are learning
- Identify the origin of personal values
- Clarify values and goals
- Use critical thinking to align values and goals with choices
- Make a connection between values, motivation, and learning

Learner Experience

The learner experience is crucial when it comes to designing environments where students can learn to be self-directed. Here are four things educators should consider:

- **Autonomy & Responsibility.** Are students doing work that they have ownership over? Or is it just the textbook put into a different form. What is the task? Does it make sense for students to do on their own? What are the desired outcomes? Be sure students know the outcomes and how they can scaffold their own learning to progress towards meeting them.
- **Complexity.** What are students being asked to do? How much of the work can they feel successful doing on their own and what percentage of the task do they need support with. Find the sweet-spot between challenge and students feeling successful.
- **Duration.** How much time on task are students already consistently demonstrating? How much time have students spent learning content or skills to prepare them to work independently? Teachers need to think about having a mixture of short and supported experiences as well as some that are more long-term and independent. This will increase students ability to sustain self-directed learning.
- **Voice & Choice.** Students need to feel like they have voice and choice in their learning and environment. This means time for interest based learning,

opportunities to shape assignments and deliverables and choice in how they showcase what they have learned. When students and teachers co-construct projects, they can be interest-based *and* packed with important learning targets.



Like writing and problem-solving, self-directed learning is a progression—the combination of knowledge, skills and mindsets deployed in different environments toward different aims.

Students that haven't built the muscles of self-direction in middle grades often flounder initially in a project-based high school that demands a high degree of self- and project-management.

Ideally, self-direction should be developed on a continuum from preschool to independent postsecondary learning. The expectations, environment, scaffolding and supports should reflect increasing degree of self-direction.

As there has been much interest in 'active self-directed learning' in the last few years, assessing this kind of learning should receive more attention. It often happens that the ability to learn actively and in a self-directed way has been a policy goal in education, but that little or no information has been gathered about reaching that goal. Even if one does not regard managing the skills of active self-directed learning as a goal, but as a means to obtain good learning results it is advisable to assess these skills.

A review study by Simpson, Hynd, Nist and Burrell (1997) shows that this is not done in most cases. They give an overview of four kinds of college academic assistance programs; in this overview they map the goals, the placement as -assessment methods (diagnosis), the instructional methods and the program evaluation

Methods for all four programs.

It is striking that, in these programs, the effects are often measured in terms of improved study results only (GPA and persistence at university) and that there is much less attention for the question whether the skills trained have improved. We see the same in the review study by Hattie, Biggs and Purdie (1996).

Assessing skills for active self-directed learning (called 'learning skills' from here on) certainly is not a simple matter. Teachers, educational consultants as well as

researchers often have problems with it. Not everyone knows that there are many assessment methods available, besides the often used learning skills questionnaires. And if they do know this, they often find it difficult to select an appropriate one.

To assist them, this chapter not only gives an overview of available assessment methods, it also gives information to help make a responsible choice for a certain specific situation. The chapter starts with the first two questions one should ask oneself if one wants to assess learning skills: why do I want to assess learning skills and which specific skills would I like to assess?

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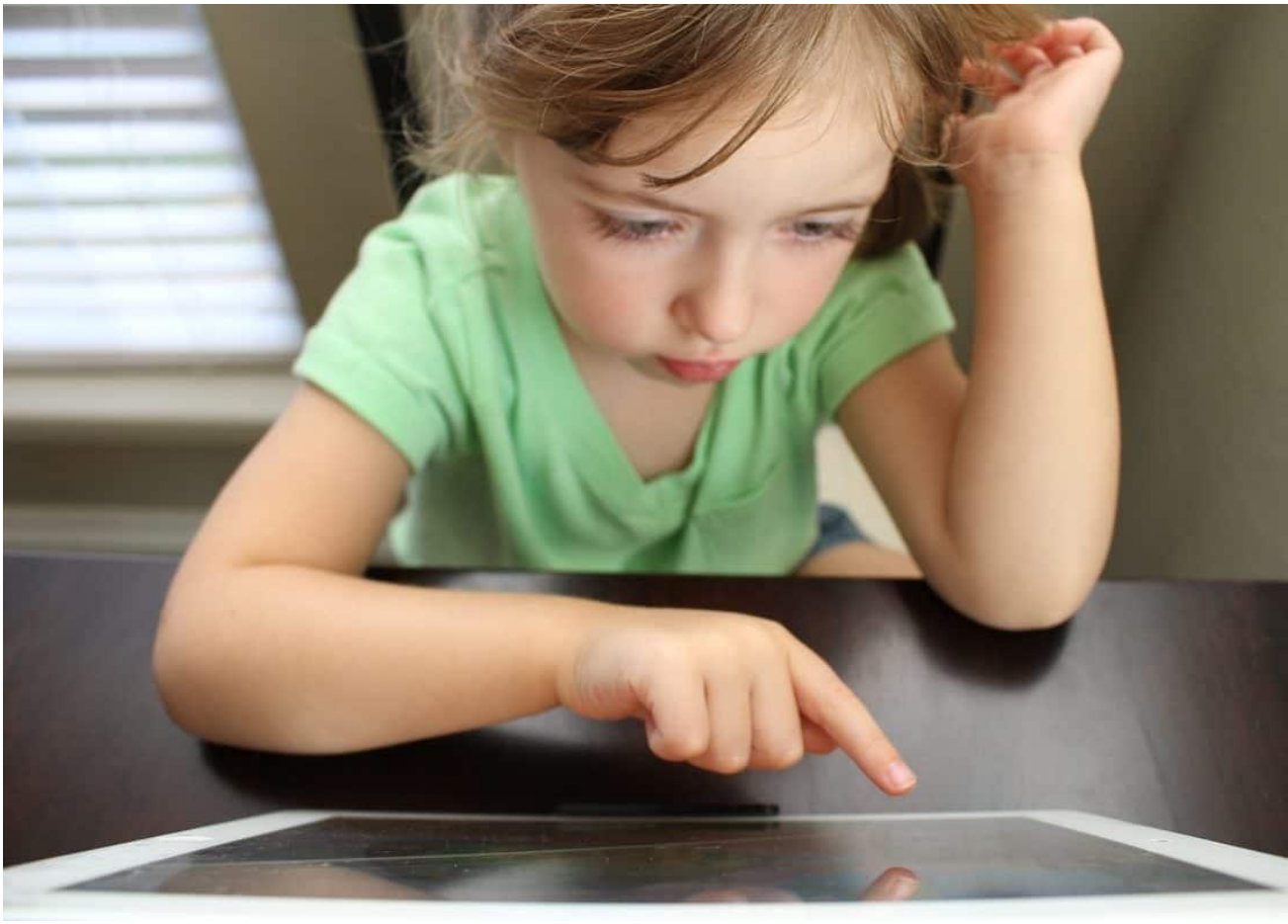
Specific skills would I like to assess?

PROGRESSIVE LEARNING

Progressive Learning values experience over learning facts. **The philosophy behind Progressive Learning is that *educators should teach children how to think*** rather than relying on the memorization of facts and information. Progressive Learning is all about the process of learning by doing and relies on hands-on experiences that allow students to learn by actively engaging in activities that put their knowledge to use.

With Progressive Learning, the student still directs their own learning, but they are assisted by a teacher who is knowledgeable about the subjects. In this model, **the teacher is a facilitator rather than a classroom leader**. Montessori schools, which most people are either familiar with or have at least heard of, employ Progressive Learning. In a Montessori classroom the teacher guides learning rather than directing learning, as is done in a traditional classroom.



SELF DIRECTED LEARNING VS. PROGRESSIVE LEARNING

Self-Directed and Progressive Learning have a number of things in common. They are both in direct contrast to, and in many ways in reaction to, the way traditional schooling is implemented today. They both center on the student as the driver of learning experiences – they both put the learner in charge of what they learn. **Both Self-Directed Learning and Progressive Learning empower the student to take control of their learning, which creates lifelong learners out of students.**

The fundamental elements of each method are slightly different. *With Self-Directed Learning, the essential element is developing skills in order for a person to self manages and self motivate their own learning. With Progressive Learning, everything centers around learning by doing as the basis of the learning experience.* Progressive Learning relies on a teacher to act as a facilitator in this process, while Self-Directed Learning does not have a formal role for a teacher.

These learning methods are not right for every student, at least for their formal education. While your child (or you) may be able to self motivate and manage learning about a

personal interest like cooking or karate, you may have a harder time being able to extend that self motivation to other areas like math or computers. There is absolutely nothing wrong with that.

These methods are a major shift in the way most people have been taught how to learn. Deciding for you what and how to learn seems like a foreign concept. It is important to understand your child's or your own limitations and needs when considering the type of learning environment and method that is the best fit.

Even if Self-Directed and Progressive Learning are not the right educational fit for your child on an everyday basis, most people informally (not as part of their formal schooling) learn things in their everyday lives through at least some of the elements in both of these methods. Whether it is a purely personal interest in a topic or something pursued for professional development, people generally either find information and learn about it on their own or find someone to help guide them through learning about the topic.

- Understand your own approach. ...
- Use game-based motivation strategies. ...
- Start with background on a topic. ...
- Cultivate intrinsic motivation.

Makes Self-Directed Learning Effective?

According to the Association for Psychological Science, much of the success of the self-directed learning method can be attributed to the cognitive advantages associated with it.
In an article published in Perspectives on Psychological Science, a journal of the Association for Psychological Science, researchers Todd Gureckis and Douglas Markant of New York University found that cognitive psychology offers several explanations for the advantages of self-directed learning. For example, self-directed learning "helps us optimise our educational experience, allowing us to focus effort on useful information that we don't already possess and exposing us to information that we don't have access to through passive observation." The active nature of self-directed learning also helps us in encoding information and retaining it over time.

But we're not always optimal self-directed learners, Gureckis and Markant point out. "The many cognitive biases and heuristics that we rely on to help us make decisions can also influence what information we pay attention to and, ultimately, learn." The researchers note that computational models commonly used in machine learning research can provide a framework for studying how people evaluate different sources of information and decide about the information they seek out and attend to. Work in machine learning can also help identify the benefits – and weaknesses – of independent exploration and the situations in which such exploration will confer the greatest benefit for learners.

Drawing together research from cognitive and computational perspectives will provide researchers with a better understanding of the processes that underlie self-directed learning and can help bridge the gap between basic cognitive research and applied educational research. Gureckis and Markant hope that this integration will help researchers

to develop assistive training methods that can be used to tailor learning experiences that account for the specific demands of the situation and characteristics of the individual learner.

Pursue More Self-Directed Learning

Now that we've covered some of the background and benefits associated with self-directed learning, let's look at some of the steps we can take to achieve it. Below are 20 ways to put yourself first when it comes to your education.

1. Identify your learning goals.

You can't achieve what you haven't envisioned. Identifying what you want to learn is the first step of the process.

2. Question the significance of things.

Make a habit of not taking things for face value and you'll start to ask questions because you acutally care about the answer.

3. Seek out interesting challenges.

Who says challenges are unpleasant by definition? Identify a problem you care about and reward yourself by solving it. That's what genuine learning is all about.

4. Monitor your own learning process.

Learning is much more enjoyable when you've set your own standards. Whether you receive the grade you want or not, try to measure your progress against your own personal learning goals.

5. Understand your own approach.

Many of us assume we know our own learning style and preferences, but do we really? Take a moment to consider what format or medium helps you learn best.

6. Use game-based motivation strategies.

Reward systems can work wonders when it comes to self-directed learning. Give yourself fun reasons to challenge yourself and work hard.

7. Start with background on a topic.

Get to know your topic by reading the Wiki page on it first. It's important to have context before you dive into details.

8. Cultivate intrinsic motivation.

Intrinsic motivation doesn't come naturally to everyone, but it can be learned. Help yourself enjoy learning more by collecting interesting facts or planning to share your knowledge with other people.

9. Share your learning with peers and mentors.

Knowing you are going to share what you've learned with someone else can make a huge difference when it comes to learning. Your attention and memory both receive a boost when you picture yourself relaying new material to another person.

10. Create something out of what you've learned.

Make a habit of creating something–a diagram, a song, a journal entry– with the new material you've learned. Not only will it help solidify the material in your long term memory, but it will also help you look forward to future learning endeavors.

11. Build your own personal learning syllabus.

Have you ever looked at a syllabus from a course and wished you had more of a say in it? Now's your chance. Learn what you want, when you want, how you want.

12. Use time (or lack thereof) to your advantage.

We're all busy, but sometimes this can be an advantage. Take the thirty minutes you have during your lunch hour or post-work session at the gym to complete a "unit" on a topic of interest.

13. Pursue knowledge, not good grades.

It's hard to ignore grades when they seem to mean so much to university admissions staff. But it's important to keep in mind that they aren't the end-all-be-all. Grades don't always reflect how much you've actually learned, and that's what counts in the end.

14. Create your own personal learning record.

There are so many great tools out there to help you document your learning. Have some fun with a digital learning portfolio– especially ten years down the road when you're going through your old notes and projects!

15. Verbalise your achievements.

It's one thing to know what you've learned; it's quite another to make it known. Verbalising your achievements can be extremely rewarding, and can help you reflect on what you think you've learned vs. what you've actually learned.

16. Make a list of topics "to master."

Creating a list of topics to master is almost as fun as crossing them off. Remember to make concrete, easily-achievable goals as well as more general, overarching ones.

17. Practise using what you've learned.

We all value knowledge we can actually use. Sometimes we need to make an effort to use it, though. Create your own opportunities to use your knowledge and you'll find the results very rewarding.

18. Value progress over performance.

We never stop learning, and that's one of the many reasons why self-directed learning can be so enjoyable. Countless topics, questions, and problems means countless opportunities to feel stimulated and accomplished.

19. Keep your goals realistic.

One of the major killjoys of self-directed learning is created not by the "system" but by ourselves: unrealistic goals. It's easy to get discouraged when we don't achieve what we want to. Try to keep things in perspective and create goals you can reasonably achieve.

20. Build a network of "learning colleagues."

We are collaborative learners by nature. Take advantage of online and in-person communities that will support you through your learning journey and help illuminate your path.

Benefits of Self-Directed Learning

Parents whose children make the switch to self-directed learning often remark that this is more than just a new approach to education, it's a new way of living. This is because self-directed learning reflects a belief that people have the right to live their own lives and follow their own paths—to "pursue happiness" in their own ways, as long as they don't interfere with the rights of others to do the same. Self-directed learning speaks to the creation of a collaborative culture, one in which individual liberties are valued and exercised in synergistic ways that support "liberty *and* justice for all." It is based on the assumption that we, as individuals, will each benefit most from making the proverbial pie bigger, not by fighting over the existing pie (let alone its crumbs). It is a win-win philosophy. Some of the most significant benefits of self-directed learning include the following:

Self-directed learning promotes the natural development of self-confidence, initiative, perseverance and life satisfaction. While we do not ultimately *control* our lives (due to many outside factors that affect us all, including genes to environmental circumstances), we are each *in charge of* our own life. We are responsible for making the choices that help create our own paths, certainly once we become of age. Self-directed learning greatly increases a person's ability to make sound, intelligent, self-affirming choices when the stakes are high. The more practice people have with making their own decisions–with reading their own ideas, feelings, wants, and needs and weighing them against available options–when they are young, the more likely they are to grow into mature, sensible, healthy, productive and compassionate adults.

Self-directed learning decreases the probability that children will suffer from the life-long wounds commonly produced by coercive schooling. This does not mean that no one will ever say anything derisive to them, call them stupid, or suggest that they are incompetent in one way or another. It does suggest, however, that they will not experience *systemic reinforcement* of such negative messages, such as being put into a lower reading group in the first grade because they're not on the same schedule as their friends, or having it

suggested that they are “unmotivated” or lazy because they prefer their own path over that which school authorities lay out. In *How Children Fail*, John Holt wrote, “School is a place where children learn to feel stupid.” This also applies to the many young people that schools deem to be “winners” by virtue of their high grades. As Holt, and later Kirsten Olson (in her book *Wounded By School*), have so artfully described, no one is impervious to the secret fear that she or he may, at any time, be exposed as a “failure,” when failure and success are pinned on arbitrary tests and measures devised by others, as occurs in school. Such wounds are lifetime sentences. We may try to bury them under many years of successful post-school experiences, but they don’t disappear. For many people, the battle to compensate for such feelings is a constant drain. Consider how much happier and more successful we could be if we didn’t have to keep trying to prove that we are not the dummies we were led to fear that we might be, or that we are the intellectually superior ones that we were labeled as at school. How much better listeners and learners we could be if we didn’t always have to defend ourselves and prove our knowledge to others. How much more open and inquisitive we could be—as we were when we were two—if our self-esteem had been neither pummeled nor falsely bolstered for all those years.

Self-directed learning provides opportunities to pursue a far wider range of interests than is possible in a typical school with its pre-defined curriculum, fixed schedule, and inability to accommodate the needs and interests of individuals. Even those topics that are within the usual school curriculum can be explored in greater depth, and more meaningfully, in self-directed learning—such as by actually building and sailing a boat rather than merely reading about how others have done so, or by surveying a plot of ground rather than simply calculating the area of a polygon presented on a worksheet. And if the boat sinks, one can repair it and learn from the mistake, instead of having it marked wrong and moving on to the next “project.” When the boat floats, there can be time to take it for a sail—even a long one, perhaps one that results in the exploration of an entirely new set of interests. Whatever restrictions there may be, they are not the result of some pre-determined curriculum.

Self-directed learning reinforces collaboration, within and beyond the family. Without the imposed requirements of a school curriculum, parents and youth are free to create, discuss, negotiate, design, explore—do—what *they* decide will best serve their goals, values and personal desires. Experience has demonstrated that this approach does the opposite of what most skeptics fear. The result tends to be young adults who are comfortable in their own skin and deeply sensitive to the needs of others. This is often reflected in their choice of occupation and manner of work: They choose to work collaboratively and empower others rather than seek power *over* others. Happiness breeds more happiness, and the same can be said for self-direction. People who feel in charge of their own lives are more likely to support self-direction in others and to accept the responsibilities of membership in the human family.

The **advantages** of SDL were in free selecting of sources, topics, time, space and time management were 23.3%, 27.9%, 7.6%, 20.9%, and 20.3% respectively, while

the **disadvantages** were the difficulties in selecting sources and materials, accessing guide/tutor, time wastage, and language barrier in that order were 21.3%

ASSESSMENT AND EVALUATION FOR SDL

Framework for 10 Self-Directed Learning Questions

The framework below features 10 essential self-directed learning questions broken down into further key points for consideration. **This is by no means a complete framework but is intended as a basic guideline for further exploration and development.** Have learners use these points to examine the value of each question as they consider how to apply it to their own self-directed learning pursuits.

1. What Do I Want to Learn/Need to Learn?

- **What is important or necessary**
  - a specific problem to be solved
  - a challenge that must be faced
  - information that will construct something of value to me/others
- **What is interesting or relevant**
  - a hobby or skill
  - personal knowledge development
  - learning for a job or a career

2. Why Is This Important?

- What has motivated me to seek this knowledge?
- What circumstances have led me to want to learn this?
- Why is this meaningful to me or to others?
- What would happen if I don't find out what I need to?
- How will this knowledge change things?

3. How Do I Intend to Use This Knowledge?

- personal development
- problem-solving
- general interest
- developing other learning challenges
- responding to a question(s)

4. What Do I Know and What Do I Need to Find Out?

- **Current knowledge**

- exploration of assumptions
- personal experience
- knowledge gained from others

- **Missing knowledge**
  - who, what, where, when, why, how
  - the history of the problem or challenge
  - what others have missed in the past

5. What Are My Capabilities/Limitations?

- What do I know or what can I do now that will help me?
- What can't I do? Can I learn how to do it? (considering time frame, budget, etc.)

6. Where Can I Find out What I Need to Know?

- **Traditional sources**
  - books
  - articles
  - film
  - art and design
  - conversation/collaboration
  - courses
  - hands-on workshops
  - seminars
  - mentoring/practicums
- **Online sources**
  - websites
  - blogs
  - wikis
  - videos
  - podcasts
  - online learning/MOOCs

7. Who Can I Ask for Help?

- Family, friends, and teachers
- Other professionals and experienced enthusiasts
- Those who have failed to solve the problem and gained insights from that

8. How Will I Apply and Share My Knowledge?

- **Production and Delivery**
  - developing and giving a presentation
  - writing/publishing a book

- building and publishing a website or wiki
- starting a blog
- filming and hosting a video tutorial
- recording and hosting a podcast

9. How Will I Know My Learning Was Successful?

- What were the results of my efforts?
- How did I succeed or fall short of accomplishing my goal?
- What went well, and what didn't?
- How can I improve my efforts, processes, and outcomes in the future?
- Where/when/how else can I use what I've learned?

10. Where/When/How Else Can I Use What I've Learned?

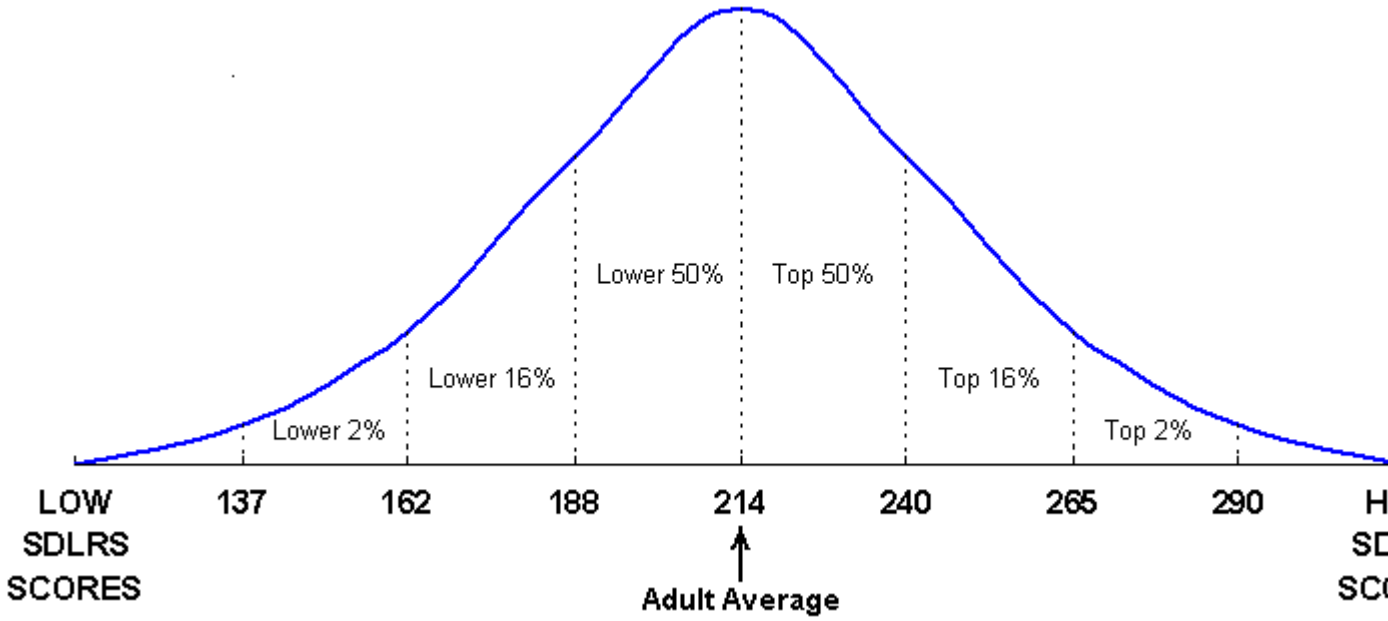
- Parts of learning (or the whole) can potentially be applied to other future problems of a similar nature
- We can find other ways to share our learning (e.g. teaching it to others
- Knowledge retention and reuse can effectively exercise overall positive cognitive development

HOW TO INTERPRET YOUR *SDLRS-A/LPA* SCORE

Your score is a measure of your current level of *Self-Directed Learning Readiness*.

***SDLRS-A* score**	**Readiness for self-directed learning**
58-201	Below average
202-226	Average
227-290	Above average

Some people have a low level of readiness because they have consistently been exposed to other-directed instruction. Recent research has indicated that country culture may affectscores. **The most important thing to remember about your score is that it can be improved. Most persons with below average levels of self-directed learning readiness can increase their skills with practice.**



The average score for adults completing the *SDLRS-A* questionnaire is *214* and the standard deviation is *25.59*. The *SDLRS/LPA* measures your current level of readiness for self-directed learning. Research has suggested that individuals who have developed high self-directed learning skills tend to perform better in jobs requiring:

1. A high degree of problem solving ability.
2. A high degree of creativity.
3. A high degree of change.

Persons with high *SDLRS* scores usually prefer to determine their learning needs and plan and implement their own learning. This does not mean that they will never choose to be in a structured learning situation. They may well choose traditional courses or workshops as a part of a learning plan.

Persons with average *SDLRS* scores are more likely to be successful in more independent situations, but are not fully comfortable with handling the entire process of identifying their learning needs and planning and implementing the learning.

Persons with below average *SDLRS* scores usually prefer very structured learning options such as lecture and traditional classroom settings.

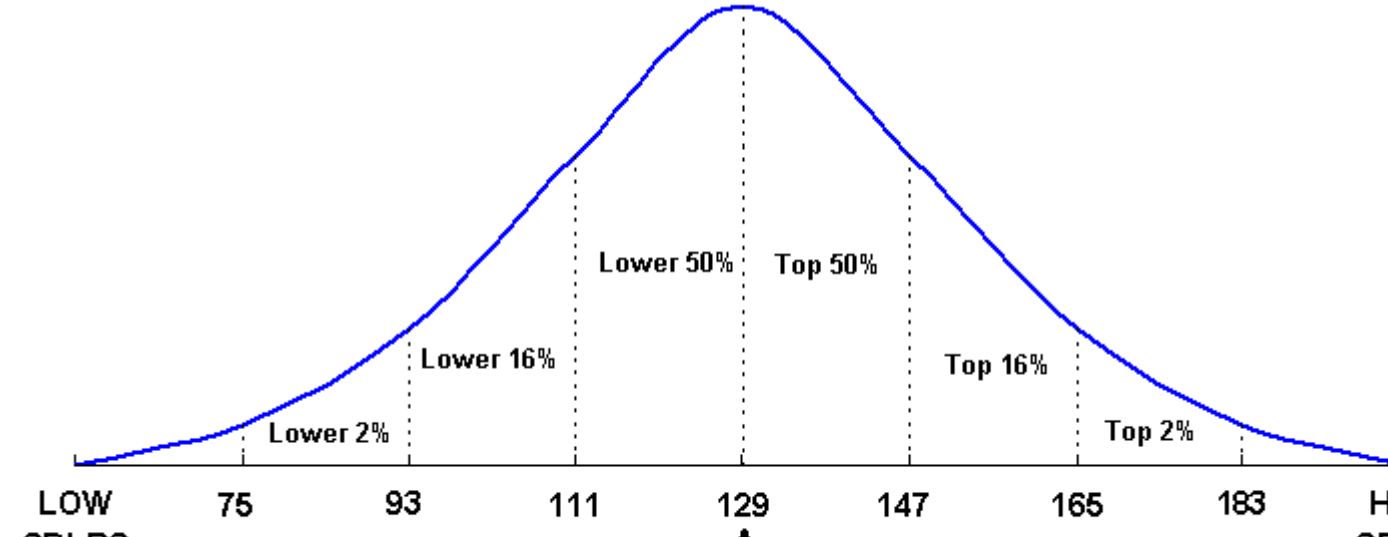
Again, your *SDLRS* score indicates your current level of readiness for self-directed learning. Research studies have proven that levels of self-directed learning readiness can be raised through appropriate educational interventions.

HOW TO INTERPRET YOUR *SDLRS-ABE* SCORE

Your score is a measure of your current level of *Self-Directed Learning Readiness*.

***SDLRS-ABE* score**	**Readiness for self-directed learning**
34-119	Below average
120-138	Average
139-170	Above average

Some people have a low level of readiness because they have consistently been exposed to other-directed instruction. **The most important thing to remember about your score is that it can be improved. Most persons with below average levels of self-directed learning readiness can increase their skills with practice.**



The average score for adults completing the *SDLRS-ABE* questionnaire is *129* and the standard deviation is *18.0*.The *SDLRS* measures your current level of readiness for self-directed learning. Research has suggested that individuals who have developed high self-directed learning skills tend to perform better in jobs requiring:

1. A high degree of problem solving ability.
2. A high degree of creativity.
3. A high degree of change.

Persons with high *SDLRS* scores usually prefer to determine their learning needs and plan and implement their own learning. This does not mean that they will never choose to be in a structured learning situation. They may well choose traditional courses or workshops as a part of a learning plan.

Persons with average *SDLRS* scores are more likely to be successful in more independent situations, but are not fully comfortable with handling the entire process of identifying their

learning needs and planning and implementing the learning.

Persons with below average *SDLRS* scores usually prefer very structured learning options such as lecture and traditional classroom settings.

Again, your *SDLRS* score indicates your current level of readiness for self-directed learning. Research studies have proven that levels of self-directed learning readiness can be raised through appropriate educational interventions.

HOW TO INTERPRET YOUR *SDLRS-E/LPA* SCORE

Your score is a measure of your current level of *Self-Directed Learning Readiness*.

***SDLRS-E* score**	**Readiness for self-directed learning**
58-188	Low
189-203	Below average
204-218	Average
219-232	Above average
233-290	High

Conclusion:

In summary, we recommend that SDL assignments occur regularly throughout the pre-clinical curriculum to promote life-long learning skills. This course demonstrates that SDL assignments will incorporate Self-learning skills, *Collaboration, Application and Metacognition* all of which can be successfully implemented in Para-clinical course and are valued by the students as contributing to the skills they view as necessary for delivering effective patient care.

Annexure- II

VALUE ADDED COURSE

Self Directed Learning and its Implication &CD/ME02

4. List of Students Enrolled October- 2019

II MBBS (Batch 2018- 19)		
Sl. No	**Name of the Student**	**Roll No**
1	DEBOPRIYA DEY	U18MB280
2	DHANUSHA S	U18MB282
3	DHARANEESHWARAN .S	U18MB283
4	DHISHVANTH DHEEPAK A.N	U18MB284
5	DHYAN DAVID S.V	U18MB285
6	DISHA SHEORAN	U18MB286
7	ELDHO BABU	U18MB290
8	G SRI SAI NITISH	U18MB292
9	GAUR DARSHANA PURUSHOTTAM GAUR	U18MB293
10	GHATKAR SAYALI KRISHNA	U18MB294
11	GOKUL M S	U18MB295
12	SHASHANK RITU RAJ	U18MB366
13	HARI BALA SIDDHARTH T.R	U18MB297
14	SEENUVAS .P	U18MB364
15	HIBA MOIDEEN .K	U18MB299
16	PRANITHRAJ .K	U18MB344
17	MANIVANNAN N	U18MB322
18	CHARAN VARMA C.A	U18MB275
19	SWAPNIL	U18MB384
20	JAGADEESAN S.R	U18MB304

RESOURCE PERSON **COORDINATOR**

SRI LAKSHMI NARAYANA INSITUTE OF MEDICAL SCIENCES

Attendance List **Date:01.10.2019**

S.no.	Roll. No.	Students Name	Signature
1	U18MB280	DEBOPRIYA DEY	
2	U18MB282	DHANUSHA S	
3	U18MB283	DHARANEESHWARAN .S	
4	U18MB284	DHISHVANTH DHEEPAK A.N	
5	U18MB285	DHYAN DAVID S.V	
6	U18MB286	DISHA SHEORAN	
7	U18MB290	ELDHO BABU	
8	U18MB292	G SRI SAI NITISH	
9	U18MB293	GAUR DARSHANA PURUSHOTTAM GAUR	
10	U18MB294	GHATKAR SAYALI KRISHNA	
11	U18MB295	GOKUL M S	
12	U18MB366	SHASHANK RITU RAJ	
13	U18MB297	HARI BALA SIDDHARTH T.R	
14	U18MB364	SEENUVAS .P	
15	U18MB299	HIBA MOIDEEN .K	
16	U18MB344	PRANITHRAJ .K	
17	U18MB322	MANIVANNAN N	
18	U18MB275	CHARAN VARMA C.A	
19	U18MB384	SWAPNIL	
20	U18MB304	JAGADEESAN S.R	

RESOURCE PERSON

COORDINATOR

Dr. G. JAYALAKSHMI, BSC.,MBBS.,DTCD.,M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Ageram Kudapakkam, Post,
Villanur Commune Puducherry-605 502.

Dr. G. JAYALAKSHMI, BSC.,MBBS.,DTCD.,M.D.,
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Ageram Kudapakkam, Post,
Villanur Commune Puducherry-605 502.

Annexure - III

Students Were Evaluated Using This Tool

Self-Rating Scale for Self-Directed Learning (SRSSDL) Tool

The aim of this tool is to identify learner's levels of self-directedness in learning in higher education. Please read and encircle the most appropriate response to each statement indicating the level at which you rate yourself. Please note that your first reaction to the statement is the most accurate response; therefore do not spend too long a time on each item.

The 'any other' space is provided for you to add any other issues about self-directedness in learning you think relevant. A 'scoring sheet' is included for you to assess the level of your self-directedness in learning.

Students Name: **Register No.:**

Response Key: 5 = Always 4 = Often 3 = Sometimes 2 = Seldom 1 = Never

1	Awareness	Score				
1.1	Identify my own learning needs	5	4	3	2	1
1.2	I am able to select the best method for my own	5	4	3	2	1
1.3	I consider teachers as facilitators of learning rather than providing information only	5	4	3	2	1
1.4	I keep up to date on different learning resources available	5	4	3	2	1
1.5	I am responsible for my own learning	5	4	3	2	1
1.6	I am responsible for identifying my areas of deficit	5	4	3	2	1
1.7	I am able to maintain self-motivation	5	4	3	2	1
1.8	I am able to plan and set my learning goals	5	4	3	2	1
1.9	I have a break during long periods of work	5	4	3	2	1
1.10	I need to keep my learning routine separate from my other commitments	5	4	3	2	1
1.11	I relate my experience with new information	5	4	3	2	1
1.12	I feel that I am learning despite not being instructed by a lecturer	5	4	3	2	1
1.13	Any other: ……	5	4	3	2	1

2	**Learning Strategies**	**Score**				
2.1	I participate in group discussions	5	4	3	2	1
2.2	I find peer coaching effective	5	4	3	2	1
2.3	I find 'role play' is a useful method for complex learning	5	4	3	2	1
2.4	I find inter-active teaching-learning sessions more effective than just listening to lectures	5	4	3	2	1
2.5	I find simulation in teaching-learning useful	5	4	3	2	1
2.6	I find learning from case studies useful	5	4	3	2	1
2.7	My inner drive directs me towards further development and improvement in my learning	5	4	3	2	1
2.8	I regard problems as challenges	5	4	3	2	1
2.9	I arrange my self-learning routine in such a way that it helps develop a permanent learning culture in my life	5	4	3	2	1
2.10	I find concept mapping is an effective method of learning	5	4	3	2	1
2.11	I find modern educational interactive technology enhances my learning process	5	4	3	2	1
2.12	I am able to decide my own learning strategy	5	4	3	2	1
2.13	Any other: ……	5	4	3	2	1

3	**Learning Activities**	**Score**				
3.1	I rehearse and revise new lessons	5	4	3	2	1
3.2	I identify the important points when reading a chapter or an article	5	4	3	2	1
3.3	I use concept mapping/outlining as a useful method of comprehending a wide range of information	5	4	3	2	1
3.4	I am able to use information technology effectively	5	4	3	2	1
3.5	My concentration intensifies and I become more attentive when I read a complex study content	5	4	3	2	1
3.6	I keep annotated notes or a summary of all my ideas, reflections and new learning	5	4	3	2	1

3.7	I enjoy exploring information beyond the prescribed course objectives	5	4	3	**2**	**1**
3.8	I am able to relate knowledge with practice	5	4	3	2	1
3.9	I raise relevant question(s) in teaching- learning sessions	5	4	3	2	1
3.10	I am able to analyse and critically reflect on new ideas, information or any learning experiences	5	4	3	2	1
3.11	I keep an open mind to others' point of view	5	4	3	2	1
3.12	I prefer to take any break in between any learning task	5	4	3	2	1
3.13	Any other: ……....	5	4	3	2	1

4	**Evaluation**	**Score**				
4.1	I self-assess before I get feedback from instructors	5	4	3	2	1
4.2	I identify the areas for further development in whatever I have accomplished	5	4	3	2	1
4.3	I am able to monitor my learning progress	5	4	3	2	1
4.4	I am able to identify my areas of strength and weakness	5	4	3	2	1
4.5	I appreciate when my work can be peer reviewed	5	4	3	2	1
4.6	I find both success and failure inspire me to further learning	5	4	3	2	1
4.7	I value criticism as the basis of bringing improvement to my learning	5	4	3	2	1
4.8	I monitor whether I have accomplished my learning goals	5	4	3	2	1
4.9	I check my portfolio to review my progress	5	4	3	2	1
4.10	I review and reflect on my learning activities	5	4	3	2	1
4.11	I find new learning challenging	5	4	3	2	1
4.12	I am inspired by others' success	5	4	3	2	1
4.13	Any other: ……	5	4	3	2	1

5	**Interpersonal Skills**	**Score**				
5.1	I intend to learn more about other cultures and languages I am frequently exposed to	5	4	3	2	1

5.2	I am able to identify my role within a group	5	4	3	2	1
5.3	My interaction with others helps me to develop the insight to plan for further learning	5	4	3	2	1
5.4	I make use of any opportunities I come across	5	4	3	2	1
5.5	I need to share information with others	5	4	3	2	1
5.6	I maintain good inter-personal relationships with others	5	4	3	2	1
5.7	I find it easy to work in collaboration with others	5	4	3	2	1
5.8	I am successful in communicating verbally	5	4	3	2	1
5.9	I identify the need for inter-disciplinary links for maintaining social harmony	5	4	3	2	1
5.10	I am able to express my ideas effectively in writing	5	4	3	2	1
5.11	I am able to express my views freely	5	4	3	2	1
5.12	I find it challenging to pursue learning in a culturally diverse milieu	5	4	3	2	1
5.13	Any other: ……	5	4	3	2	1

Once you have responded to all the items of the SRSSDL transfer the scores to the correct boxes below and add up your scores as in the following example.

Score	5	4	3	2	1	
Items 1.1 - 1.12	3	4	3	5	0	
Total	15	16	9	10	0	Total Score = 50

Score	5	4	3	2	1	
Items 1.1 - 1.12						
Total						**Total Score** =

Score	5	4	3	2	1	
Items 2.1 - 2.12						
Total						**Total Score** =

Score	5	4	3	2	1	
Items 3.1 - 3.12						
Total						**Total Score =**

Score	5	4	3	2	1	
Items 4.1 - 4.12						
Total						**Total Score =**

Score	5	4	3	2	1	
Items 5.1 - 5.12						
Total						**Total Score =**
Add all the Total Scores						

Check the total score with the following scoring range in order to identify your level of self- directedness in learning.

Scoring range	Level of Self-Directedness in learning	Interpretation
60 – 140	Low	Guidance is definitely needed from the teacher. Any specific changes necessary for improvement must be identified and a possible complete re-structuring of the identified and a possible complete re-structuring of the methods of learning.
141 - 220	Moderate	This is half way to becoming a self-directed learner. Areas for improvement must be identified, evaluated and a strategy adopted with teacher guidance when necessary.
221 – 300	High	This indicates effective self Directed learning. now is to maintain progress by identifying strengths and methods for consolidation of the students' effective self-directed learning.

No matter what your total score, it is essential that you pay particular attention to any individual items of the SRSSDL in which you have scored below 3 as these are the areas in which you may need to improve.

Thank you for completing the questionnaire.

Annexure - III

Students Were Evaluated Using This Tool

Self-Rating Scale for Self-Directed Learning (SRSSDL) Tool

The aim of this tool is to identify learner's levels of self-directedness in learning in higher education. Please read and encircle the most appropriate response to each statement indicating the level at which you rate yourself. Please note that your first reaction to the statement is the most accurate response; therefore do not spend too long a time on each item.

The 'any other' space is provided for you to add any other issues about self-directedness in learning you think relevant. A 'scoring sheet' is included for you to assess the level of your self-directedness in learning.

Students Name: CHARAN VARMA C.A **Register No.:** U18MB275

Response Key: 5 = Always 4 = Often 3 = Sometimes 2= Seldom 1 = Never

1	**Awareness**	**Score**

1.1	Identify my own learning needs	5	4	3	2	1
1.2	I am able to select the best method for my own	5	4	3	2	1
1.3	I consider teachers as facilitators of learning rather than providing information only	5	4	3	2	1
1.4	I keep up to date on different learning resources available	5	4	3	2	1
1.5	I am responsible for my own learning	5	4	3	2	1
1.6	I am responsible for identifying my areas of deficit	5	4	3	2	1
1.7	I am able to maintain self-motivation	5	4	3	2	1
1.8	I am able to plan and set my learning goals	5	4	3	2	1
1.9	I have a break during long periods of work	5	4	3	2	1
1.10	I need to keep my learning routine separate from my other commitments	5	4	3	2	1
1.11	I relate my experience with new information	5	4	3	2	1
1.12	I feel that I am learning despite not being instructed by a lecturer	5	4	3	2	1
1.13	Any other:	5	4	3	2	1

35 20 =55

2	Learning Strategies	Score				
2.1	I participate in group discussions	5	4	3	2	1
2.2	I find peer coaching effective	5	4	3	2	1
2.3	I find 'role play' is a useful method for complex learning	5	4	3	2	1
2.4	I find inter-active teaching-learning sessions more effective than just listening to lectures	5	4	3	2	1
2.5	I find simulation in teaching-learning useful	5	4	3	2	1
2.6	I find learning from case studies useful	5	4	3	2	1
2.7	My inner drive directs me towards further development and improvement in my learning	5	4	3	2	1
2.8	I regard problems as challenges	5	4	3	2	1
2.9	I arrange my self-learning routine in such a way that it helps develop a permanent learning culture in my life	5	4	3	2	1
2.10	I find concept mapping is an effective method of learning	5	4	3	2	1
2.11	I find modern educational interactive technology enhances my learning process	5	4	3	2	1
2.12	I am able to decide my own learning strategy	5	4	3	2	1
2.13	Any other:	5	4	3	2	1

35 20 55

3	Learning Activities	Score				
3.1	I rehearse and revise new lessons	5	4	3	2	1
3.2	I identify the important points when reading a chapter or an article	5	4	3	2	1
3.3	I use concept mapping/outlining as a useful method of comprehending a wide range of information	5	4	3	2	1
3.4	I am able to use information technology effectively	5	4	3	2	1
3.5	My concentration intensifies and I become more attentive when I read a complex study content	5	4	3	2	1
3.6	I keep annotated notes or a summary of all my ideas, reflections and new learning	5	4	3	2	1

15 12 27

3.7	I enjoy exploring information beyond the prescribed course objectives	5	4	3	2	1
3.8	I am able to relate knowledge with practice	5	4	3	2	1
3.9	I raise relevant question(s) in teaching- learning sessions	5	4	3	2	1
3.10	I am able to analyse and critically reflect on new ideas, information or any learning experiences	5	4	3	2	1
3.11	I keep an open mind to others' point of view	5	4	3	2	1
3.12	I prefer to take any break in between any learning task	5	4	3	2	1
3.13	Any other:	5	4	3	2	1

20 12 32

4	Evaluation	Score				
4.1	I self-assess before I get feedback from instructors	5	4	3	2	1
4.2	I identify the areas for further development in whatever I have accomplished	5	4	3	2	1
4.3	I am able to monitor my learning progress	5	4	3	2	1
4.4	I am able to identify my areas of strength and weakness	5	4	3	2	1
4.5	I appreciate when my work can be peer reviewed	5	4	3	2	1
4.6	I find both success and failure inspire me to further learning	5	4	3	2	1
4.7	I value criticism as the basis of bringing improvement to my learning	5	4	3	2	1
4.8	I monitor whether I have accomplished my learning goals	5	4	3	2	1
4.9	I check my portfolio to review my progress	5	4	3	2	1
4.10	I review and reflect on my learning activities	5	4	3	2	1
4.11	I find new learning challenging	5	4	3	2	1
4.12	I am inspired by others' success	5	4	3	2	1
4.13	Any other:	5	4	3	2	1

55 8 =63

5	Interpersonal Skills	Score				
5.1	I intend to learn more about other cultures and languages I am frequently exposed to	5	4	3	2	1

5

5.2	I am able to identify my role within a group	5	4	3	2	1
5.3	My interaction with others helps me to develop the insight to plan for further learning	5	4	3	2	1
5.4	I make use of any opportunities I come across	5	4	3	2	1
5.5	I need to share information with others	5	4	3	2	1
5.6	I maintain good inter-personal relationships with others	5	4	3	2	1
5.7	I find it easy to work in collaboration with others	5	4	3	2	1
5.8	I am successful in communicating verbally	5	4	3	2	1
5.9	I identify the need for inter-disciplinary links for maintaining social harmony	5	4	3	2	1
5.10	I am able to express my ideas effectively in writing	5	4	3	2	1
5.11	I am able to express my views freely	5	4	3	2	1
5.12	I find it challenging to pursue learning in a culturally diverse milieu	5	4	3	2	1
5.13	Any other:	5	4	3	2	1

30 16 =46

46+5=51.

Once you have responded to all the items of the SRSSDL transfer the scores to the correct boxes below and add up your scores as in the following example.

Score	5	4	3	2	1	
Items 1.1 - 1.12	3	4	3	5	0	55
Total	15	16	9	10	0	Total Score = 50

Score	5	4	3	2	1	
Items 1.1 - 1.12						55
Total						**Total Score =**

Score	5	4	3	2	1	
Items 2.1 - 2.12						55
Total						**Total Score =**

Score	5	4	3	2	1	
Items 3.1 - 3.12						32
Total						**Total Score =**

Score	5	4	3	2	1	
Items 4.1 - 4.12						63
Total						**Total Score =**

Score	5	4	3	2	1	
Items 5.1 - 5.12						46
Total						**Total Score =**
Add all the Total Scores						306

Check the total score with the following scoring range in order to identify your level of self- directedness in learning.

Scoring range	**Level of Self-Directedness in learning**	**Interpretation**
60 – 140	Low	Guidance is definitely needed from the teacher. Any specific changes necessary for improvement must be identified and a possible complete re-structuring of the identified and a possible complete re-structuring of the methods of learning.
141 - 220	Moderate	This is half way to becoming a self-directed learner. Areas for improvement must be identified, evaluated and a strategy adopted with teacher guidance when necessary.
221 – 300 306	High	This indicates effective self Directed learning. now is to maintain progress by identifying strengths and methods for consolidation of the students' effective self-directed learning.

No matter what your total score, it is essential that you pay particular attention to any individual items of the SRSSDL in which you have scored below 3 as these are the areas in which you may need to improve.

Thank you for completing the questionnaire.

Evaluated by

Dr. G. JAYALAKSHMI
COURSE COORDINATOR.
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences

Annexure- V

Student Feedback Form

Course Name: **Self Directed Learning and its Implication**

Subject Code: MIC14

Name of Student: _____ Roll No.: _____

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Feedback Form
FIVE POINT LIKERT SCALE

1. All the Sessions covered all the competencies like knowledge, analysis, training, practical Demonstration, Performance skill on your own and all other aspects related to overall global skills.

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

2. The content, method of delivery and ambience in the lecture session will help you to develop an overall performer?

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

3. The components of Self-learning skills like *Collaboration, Application and Metacognition* were can be implemented was done with clarity and made you to understand thoroughly.

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

4. This Methodology of SDL method made you to understand all aspects of SDL skill for implementation of self learning and carrier development thoroughly.

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

5. You really feel that this method is good and definitely will increase in the self-confidence?

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

6. This SDL course is comprehensive in developing all competencies.

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

7. Self-Rating Scale for Self-Directed Learning (SRSSDL) Tool was useful in self assessment.

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

8. This method of assessment is Transparent?

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

9. You were given direction to analyze your mistakes and rectify in future form the Self-Rating Scale for Self-Directed Learning (SRSSDL) Tool

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

10. Though it is elaborate and time consuming we can apply in future?

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

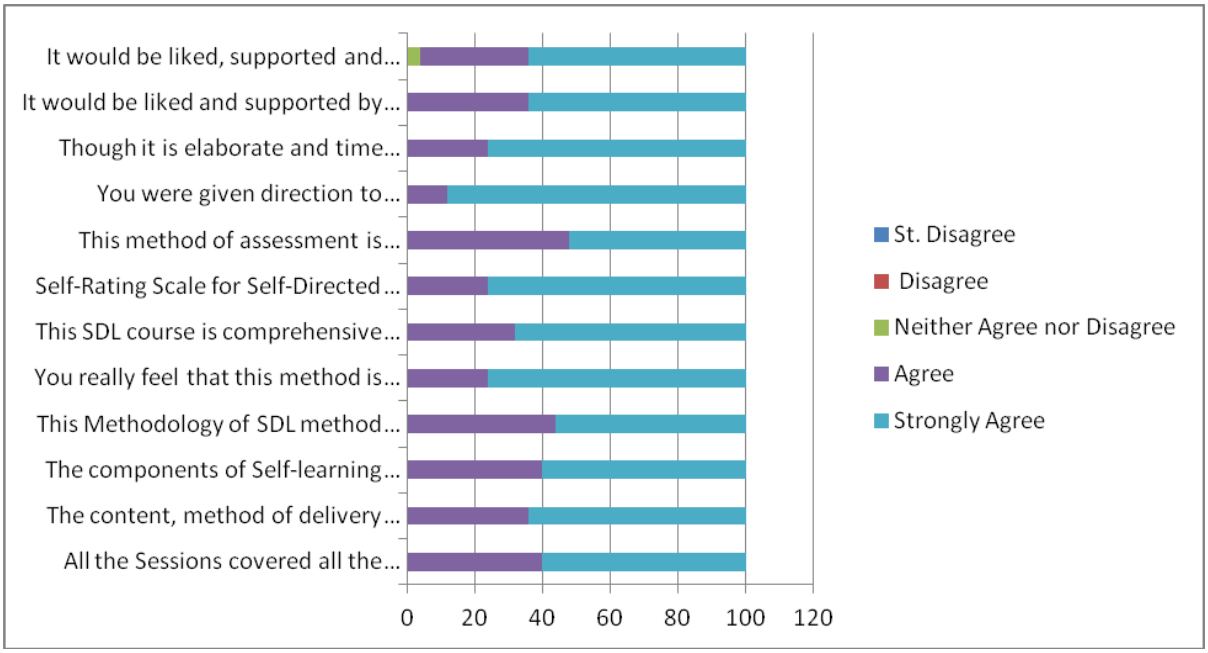
11. It would be liked and supported by you to have such comprehensive competency testing assessment methods in future?

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

12. It would be liked, supported and strongly recommended by you in future.

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

Signature of the Students:
Date:


It would be liked, supported and...
It would be liked and supported by...
Though it is elaborate and time...
You were given direction to...
This method of assessment is...
Self-Rating Scale for Self-Directed...
This SDL course is comprehensive...
You really feel that this method is...
This Methodology of SDL method...
The components of Self-learning...
The content, method of delivery...
All the Sessions covered all the...
0
20
40
60
80
100
120
St. Disagree
Disagree
Neither Agree nor Disagree
Agree
Strongly Agree

Student Feedback Form

Course Name: **Self Directed Learning and its Implication**

Subject Code: MIC14

Name of Student: DHISHVANTH DEEPAK. AN Roll No.: U18MB283

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Feedback Form
FIVE POINT LIKERT SCALE

1. All the Sessions covered all the competencies like knowledge, analysis, training, practical Demonstration, Performance skill on your own and all other aspects related to overall global skills.

1. Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

2. The content, method of delivery and ambience in the lecture session will help you to develop an overall performer?

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

3. The components of Self-learning skills like *Collaboration, Application and Metacognition* were can be implemented was done with clarity and made you to understand thoroughly.

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

4. This Methodology of SDL method made you to understand all aspects of SDL skill for implementation of self learning and carrier development thoroughly.

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

5. You really feel that this method is good and definitely will increase in the self-confidence?

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

6. This SDL course is comprehensive in developing all competencies.

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

7. Self-Rating Scale for Self-Directed Learning (SRSSDL) Tool was useful in self assessment.

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

8. This method of assessment is Transparent?

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

9. You were given direction to analyze your mistakes and rectify in future form the Self-Rating Scale for Self-Directed Learning (SRSSDL) Tool

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

10. Though it is elaborate and time consuming we can apply in future?

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

11. It would be liked and supported by you to have such comprehensive competency testing assessment methods in future?

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

12. It would be liked, supported and strongly recommended by you in future.

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

Signature of the Students: Dhivyadharshini.

Date: 28/10/2019

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that DHISHVANTH DHEEPAK A.N has actively participated in the Value Added Course on **Self Directed Learning and its Implications** held during October 2019 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr.G. Jayalakshmi

RESOURCE PERSON

Dr. G. JAYALAKSHMI, BSC.,MBBS.,DTCD.,M.D.
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Ageram Kudapakkam, Post,
Villianur Commune Puducherry-605 502.

Dr.G. Jayalakshmi

COORDINATOR

Dr. G. JAYALAKSHMI, BSC.,MBBS.,DTCD.,M.D.
DEAN
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Ageram Kudapakkam, Post,
Villianur Commune Puducherry-605 502.

Sri Lakshmi Narayana Institute of Medical Sciences

Date: 05.04.2020

From
Dr.G.Jayalakshmi
Professor and Head,
Department of Microbiology,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

To
The Dean,
Sri Lakshmi Narayana Institute of Medical College
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Permission to conduct value-added course: STEPS frame work model as TL method in enhancing the procedural and performance skill in CRRI

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: STEPS frame work model as TL method in enhancing the procedural and performance skill in CRRI for interns May to June 2020. We solicit your kind permission for the same.

Kind Regards

Dr.G.Jayalakshmi

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: Dr. K. Balagurunathan

The HOD: Dr. G.Jayalakshmi

The Expert: Dr. G.Jayalakshmi

The committee has discussed about the course and is approved.

Dean Subject Expert HOD

DEAN
Prof.K.BALAGURUNATHAN,M.S
(General surgeon)
SRI LAKSHMI NARAYANA
INSTITUTE OF MEDICAL SCIENCES
OSUDU PONDICHERRY

Dr. G. JAYALAKSHMI, B.Sc.,MBBS.,DTCD.,M.D.,(Micro).,
DEAN -UNIVERSITY AFFAIRS
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, Puducherry- 605 502.

OFFICE OF THE DEAN

Sri Lakshmi Narayana Institute Of Medical Sciences

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,

PUDUCHERRY – 605 502

Circular

24.04.2020

Sub: Organising Value-added Course: STEPS frame work model as TL method in enhancing the procedural and performance skill in CRRI. reg

With reference to the above mentioned subject, it is to bring to your notice that Sri Lakshmi Narayana Institute of Medical Sciences, **Bharath Institute of Higher Education and Research** is organizing **"STEPS frame work model as TL method in enhancing the procedural and performance skill in CRRI"**. The course content is enclosed below."

The application must reach the institution along with all the necessary documents as mentioned. The hard copy of the application should be sent to the institution by registered/ speed post only so as to reach on or before 30th April 2020. Applications received after the mentioned date shall not be entertained under any circumstances.

Dean

DEAN
Prof.K.BALAGURUNATHAN,M.S
(General surgeon)
SRI LAKSHMI NARAYANA
INSTITUTE OF MEDICAL SCIENCES
OSUDU PONDICHERRY

Encl: Copy of Course content

Course Proposal

Course Title: **STEPS frame work model as TL method in enhancing the procedural and performance skill in CRRI**

Course Objective:

1. To enhance the performance skill of biomedical waste segregation by training the CRRI Using STEPS Framework Model.
2. To assess the BMW segregation performance skill using DOPS after conventional teaching like Didactic lectures and Video demonstration which is equivalent to the first step of the STEPS Model – SET Induction.
3. To assess the BMW segregation performance skill using DOPS after full implementation of all steps of STEPS Framework Model.

To assess the reaction of target CRRI students towards the STEPS Framework Model and DOPS method by getting their feedback.

Course Outcome: Improvement in the BMW segregation skill after implementing STEPS TL method
Course Audience: Medical Interns of 2015 Batch
Course Coordinator: Dr.G.Jayalakshmi
Course Faculties with Qualification and Designation:
1.Dr.G.Jayalakshmi, Professor & HOD
2.Dr.Naveen kumar, Assistant Professor
Course Curriculum/Topics with schedule (Min of 30 hours)

SlNo	Date	Topic	Time	Hours	Lecture taken by
1.	14.05.2020	Introduction to BWM, Background, Objectives,	4-5p.m	1	**Dr.G.Jayalakshmi**
2.	15.05.2020	BMW Rules	2-3p.m	1	**Dr.G.Jayalakshmi**
3.	16.05.2020	Infection and importance of BMW management	4-6p.m	2	**Dr.Naveen kumar**
4.	18.05.2020	PPE- Donning &Doffing practical &video demonstration	4-6p.m	2	**Dr.G.Jayalakshmi**
5.	19.05.2020	Categories of BMW, Labels of Bio Hazard Warning	4-6p.m	2	**Dr.Naveen kumar**
6.	20.05.2020	Collection & Segregation at the source of generation of waste conventional didactic lecture and video.	4-5p.m	2	**Dr.G.Jayalakshmi**
7.	21.05.2020	conventional didactic lecture and video	4-5P.M	1	**Dr.G.Jayalakshmi**
8.	22.05.2020	Transportation & common storage	4-5p.m	1	**Dr.G.Jayalakshmi**
9.	23.05.2020	Transportation and treatment at CTF facility	4-6p.m	1	**Dr.G.Jayalakshmi**
10.	27.05.2020	Liquid waste from Hospitals and effluent treatment	4-6p.m	2	**Dr.Naveen kumar**
11.	28.05.2020	Safe Handling of Sharps, needles and management of needle stick injuries	4-6p.m	1	**Dr.G.Jayalakshmi**

12.	29.05.2020	BMW in Special Situation, Limitations Of The Course And Its Implementation	4-6p.m	2	**Dr.G.Jayalakshmi**
13.	30.05.2020	Pre course and Post Course evaluation, Feedback analysis from Likert scale	2-5p.m	3	**Dr.Naveen kumar**
		Practical Class I			
13.	02.06.2020	Steps model explanation and various performance assessment methods	4-5 pm	1	**Dr.G.Jayalakshmi**
14.	03.06.2020	Orientation of the students about the training program and assessment methodology by DOPS	4-5 pm	1	**Dr.G.Jayalakshmi**
15.	04.06.2020	Video demonstration of BMW segregation, infection control practice, PPE, Donning & Doffing, Needle stick injuries and Biomedical waste management in special situation	4-6 pm	2	**Dr.G.Jayalakshmi**
16.	05.06.2020	Biomedical waste segregation procedure by STEPS model	4-6 pm	2	**Dr.Naveen kumar**
17.	06.06.2020	Assessment by DOPS procedure and giving feedback in weaker areas Obtaining feedback for the session.	2-6p.m	4	**Dr.G.Jayalakshmi**
		Total		30 hrs	

REFERENCE BOOKS:

1. Miller GE(1990), The assessment of clinical skills/competence/performance. Academic medicine, 65(9), 63-67.

2. Syndneysmee ABC of skill learning BMJ 2003; 326.703-706.

3. Biomedical Waste Management & Handling Rules (2016) with Amendment, updated on 2018.

4. BangBangal V. Training and assessment of medical interns using “direct observation of procedural skills (DOPS)” tool in obstetrics and gynecology.*MOJ Womens Health.* 2018;7(4):120–123. DOI: 10.15406/mojwh.2018.07.00181al V. Training and assessment of medical interns using “direct observation of procedural skills (DOPS)” tool in obstetrics and gynecology. *MOJ Womens Health.* 2018;7(4):120–123. DOI: 10.15406/mojwh.2018.07.00181

Date: 06.06.2020

From
Dr.G.Jayalakshmi
Professor and Head,
Department of Microbiology,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Through Proper Channel

To
The Dean,
Sri Lakshmi Narayana Institute of Medical Sciences
Bharath Institute of Higher Education and Research,
Chennai.

Sub: Completion of value-added course: STEPS frame work model as TL method in enhancing the procedural and performance skill in CRRI

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: Influence of STEPS frame work model as TL method in enhancing the procedural and performance skill in CRRI **on** May to June2020, 27 interns. We solicit your kind action to send certificates for the participants, that is attached with this letter. Also, I am attaching the photographs captured during the conduct of the course.

Kind Regards,

Dr.G.Jayalakshmi

Encl: Certificates

Photographs

Influence of STEPS frame work model as TL method in enhancing the procedural and performance skill in CRRI: **TEACHING SESSION**



Influence of STEPS frame work model as TL method in enhancing the procedural and performance skill in CRRI: **ASSESSMENT SESSION**



VALUE ADDED COURSE

1. Name of the programme & Code

STEPS frame work model as TL method in enhancing the procedural and performance skill in CRRI & CD/ME03

2. Duration & Period

30 hrs & May– June 2020

3. Information Brochure and Course Content of Value Added Courses

Enclosed as Annexure- I

4. List of students enrolled

Enclosed as Annexure- II

5. Assessment procedures:

Assessment Evolution by DOPS method - *Enclosed as Annexure- III*

6. Certificate model

Enclosed as Annexure- IV

7. No. of times offered during the same year:

1 times May– June 2020

8. Year of discontinuation: 2021

9. Summary report of each program year-wise

Value Added Course- May- June 2020					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	CD/ME03	STEPS frame work model as TL method in enhancing the procedural and performance skill in CRRI	Dr. G.Jayalakshmi Dr.C.Naveen Kumar	CRRI Interns	20 students MAY- JUNE 2020

10. Course Feed Back

Enclosed as Annexure- V

RESOURCE PERSON **COORDINATOR**

1. **Dr.G.Jayalakshmi** **Dr.G.Jayalakshmi**
2. **Dr. V. Naveen Kumar**

Annexure- I

STEPS frame work model as TL method in enhancing the procedural and performance skill in CRRI



PARTICIPANT HAND BOOK

BIHER SLIMS

COURSE DETAILS

Particulars	Description
Course Title	STEPS frame work model as TL method in enhancing the procedural and performance skill in CRRI
Course Code	CD/ME03
Topics and content of the course in the Hand book	1. Introduction of BMW 2. Background 3. Objectives 4. BMW Rules 2016 5. Infection and importance of BMW management 6. PPE – Donning & Doffing practical & video demonstration 7. Categories of BMW and colour coding containers 8. Labels of Bio Hazard Warning 9. Collection & Segregation at the source of generation of waste conventional didactic lecture and video. 10. Transportation & common storage 11. Transportation and treatment at CTF facility 12. Liquid waste from Hospitals and effluent treatment 13. Safe Handling of Sharps, needles and management of needle stick injuries 14. BMW in Special Situation 15. Limitations Of The Course And Its Implementation

	16. Pre course and Post Course evaluation 17. Feedback analysis from Likert scale 18. Practical sessions a. Steps model explanation. b. Orientation of the students about the training program and assessment methodology by DOPS. c. Video demonstration of BMW segregation, infection control practice, PPE, Donning & Doffing, Needle stick injuries and Biomedical waste management in special situation. d. Biomedical waste segregation procedure by STEPS model. e. Assessment by DOPS procedure and giving feedback in weaker areas
Advantages of learning and evaluation	• Proper Implementation of Biomedical Waste segregation evaluation by DOPS method • Correction of the mistake on the spot • Mistake will never be repeated
Further learning Opportunities	1. Structured TL methods like STEPS Frame work model are the need of the day. 2. Competency based assessment must be evaluated properly as per the IMG 2019 MCI guidelines. 3. Boost the self confidence of the students. 4. As they are the lifelong learner, the foundation will be laid strong. 5. As a responsible person committed to the society they know their roll and contribute to the society. 6. Can be included in I MBBS ECE period itself if the study is approved. 7. Can be included in the university examination for

	testing KH, SH, P and ethical issues. 8. WPBA conforms to the highest level of MILLER's PYRAMID as'' Does '' is assessed 9. Self satisfaction for the student as their performance is evaluated in a transparent method. WPBA asses the optimal and judicious uses of competencies in authentic settings.
Key Competencies	• The new curriculum focuses on competencies and outcomes. It gives a list of emphasis to skill development in all places. Competencies S H and P under supervision or independently is listed and they are related to the skill to be developed by IMG. The senior batch which can also be trained like the current batch of August 2019 at least in MUST KNOW areas for developing competencies. • Evaluation by DOPS method will satisfy the criteria of testing the apex of MILLERS PYRAMID.
Target Student	CRRI Interns
Duration	30hrs May to June 2020
Theory Session	20hrs
Practical Session	10hrs
Assessment Procedure	Assessment Evolution by DOPS method

INTRODUCTION:

Bio Medical Waste Management is the most known area in the Health sector as HAI, following which personal & Community protection from Health hazards can be prevented. BMW segregation Skill is the most needed one among the Interns.

Background

Bio Medical Waste Management is the must known area in the health sector as HAI, personal and community protection from health hazards can be prevented. BMW segregation skill is one of the must for any intern.

WPBA is strongly recommended for inclusion in the in-training assessment.

In this study the competencies like knowledge, technical skill, performance skill, attitude and professionalism will be taught and hence all the competencies will be evaluated.

AIM OF THE COURSE:

To evaluate the enhancement of Biomedical Waste(BMW) Segregation performance skills by DOPS method after implementing all steps of STEPS Framework Model.

OBJECTIVE

1. To enhance the performance skill of biomedical waste segregation by training the CRRI Using STEPS Framework Model.
2. To assess the BMW segregation performance skill using DOPS after conventional teaching like Didactic lectures and Video demonstration which is equivalent to the first step of the STEPS Model – SET Induction.
3. To assess the BMW segregation performance skill using DOPS after full implementation of all steps of STEPS Framework Model.

To assess the reaction of target CRRI students towards the STEPS Framework Model and DOPS method by getting their feedback.

METHODOLOGY

1. 25 CRRI students willing to take part in the study were included.
2. The study group students were briefed about the new curriculum, structured TL methods, performance evaluation at each level, DOPS, STEPS model method, and also a brief account of BMW, National guidelines and its importance.
3. Assessors were gives instructions and training to contact program. DOPS Score sheet was checked, validated and approved.
4. **STEPS Frame work Model** was implemented for Teaching BMW Segregations at source. **First step**: Set Induction of STEPS Model constituted the conventional and teaching method for the study group.

4.1 **S**et Induction: Didactic lectures with PP presentation and Video play were showed to project the procedures of segregation, hand washing technique, PPE components, spillage handling including how and when to use the PPE.

All aspects of BMW segregation management was covered in 2 sessions of Didactic lectures 30 minutes each with a break in between .A 20 Minutes session of Video play was done.

4.2 Assessment was done using a pre validated, checked assessment score for BMW segregation performance technical skill by DOPS method of evaluation. Feedbacks were given to the students in weaker areas.

4.3**T**utor Demonstration: without commentary this was done using Video Sessions for 20 minutes in mute condition showing all the Procedural skill of segregation of BMW into the appropriate color coded containers including PPE, donning, doffing, Hand hygiene and spillage management.

4.4**E**xplanation was followed demonstrating all the Aspects of segregation by the Expert to the students.

4.5 **P**erformance by Students on their own under practically expert supervision was done.

4.6**S**ubsequent practice was encouraged until they become competent to do the same on their own without supervision.

4.25. Final assessment of the Students performance of BMW segregating procedural performance skill was done using a pre validated checked ASSESSMENT score by DOPS method of evaluation. Feedbacks were given to the students in weaker areas.

5(a) Feedback were obtained from students for both the training given by STEPS model and the evaluation technique using DOPS method and they were analyzed optional.

b. Feedback was given by students for improvement based on performance.

BMW Rules 2016

- The Government of India made Bio medical Waste Management and Handling rules in July 1998
- Government of India Bio Medical waste Management Rules 2016

- The rule is applicable across the country to all the Health Care establishments

भारत का राजपत्र
The Gazette of India

MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE

NOTIFICATION

New Delhi, the 28th March, 2016



Salient features of New BMW Rules 2016

- Bio-Medical Waste has been classified into 4 categories instead of 10 to improve the segregation at source.
- The ambit of the rules has been expanded to include health camps, medical or surgical camps, vaccination camps, blood donation camps, first aid rooms of schools, forensic laboratories and research labs
- No occupier shall establish on-site treatment and disposal facility, if a service of common bio-medical waste treatment facility is available at a distance of seventy-five kilometre.
- Pre-treat the laboratory waste, microbiological waste, blood samples and blood bags through disinfection or sterilisation on-site in the manner as prescribed by the WHO or NACO guidelines and then sent to the CBMTF for final disposal
- Provide training to all its health care workers and others, involved in handling of bio medical waste at the time of induction and thereafter at least once every year and the details of training programmes conducted, number of personnel trained and number of personnel not undergone any training shall be provided in the Annual Report
- Immunise all its health care workers and others, involved in handling of bio-medical waste for protection against diseases including Hepatitis B and Tetanus that are likely to be transmitted by handling of bio-medical waste
- Vaccination to be certified & Documented.
- Ensure occupational safety of all its health care workers and others involved in handling of bio-medical waste by providing appropriate and adequate personal protective equipments
- maintain and update on day to day basis the bio-medical waste management register and display the monthly record on its website according to the bio-medical waste generated in terms of category and colour coding as specified in Schedule I.

Hospital A

Month	Nursing details	CBMWTF
Apr-15	73	73
May-15	144	144
Jun-15	79	79
Jul-15	84	84
Aug-15	90	90
Sep-15	75	75
Oct-15	97	97
Nov-15	95	95
Dec-15	12	18
Jan-16	60	75
Feb-16	149.7	83
Mar-16	122	122
Total	**1080.7**	**1035**

- BMW Staff- verify the daily bill from CBMWTF & their register. Then accept daily receipt.
- Office Superindentent- verify the monthly consolidated register from Staff nurse & CBMWTF. Then accept the bill from CBMWTF.

- make available the annual report on its web-site and all the health care facilities shall make own website within two years from the date of notification of these rules
- Establish a system to review and monitor the activities related to bio-medical waste management through BMW committee and the Committee shall meet once in every month and the record of the minutes of the meetings of this committee shall be submitted along with the annual report.
- Phase out use of chlorinated plastic bags, gloves and blood bags within two years from the date of notification of these rules
- All plastic bags shall be as per BIS standards (Bureau of Indian Standards).
- Untreated human anatomical waste, animal anatomical waste, soiled waste and, biotechnology waste shall not be stored beyond a period of forty –eight hours

Infection

The infectious agents enter into the body through

- Puncture
- Abrasion
- Cut in the skin
- Through mucous membranes
- By inhalation and ingestion.

Most Common Infections

1. Gastro enteric through faeces and/or vomit

e.g. *Salmonella, Vibrio Cholera, Helminthes Hepatitis A*

2. Respiratory through inhaled secretions

e.g. *Mycobacterium tuberculosis; Measles virus; Streptococcus pneumoniae*

3.Ocular infections through eye secretions

e.g. *Herpes virus*,

4. Skin infection through pus

e.g. *Streptococcus spp* ,

5. Meningitis through Cerebrospinal fluid

e.g. *Neisseria meningitides*

6. Blood borne diseases

- AIDS

ORGANISM	DISEASES CAUSED	RELATED WASTE ITEM
<u>VIRUSES</u> HIV, Hepatitis B, Hepatitis A,C, Arboviruses, Enteroviruses	AIDS, Infectious Hepatitis, Infectious Hepatitis, Dengue, Japanese encephalitis, tick-borne fevers, etc.	Infected needles, body Fluids, Human excreta, soiled linen, Blood, body fluids.
<u>BACTERIA</u> Salmonella typhi, Vibrio cholerae,	Typhoid, Cholera, Tetanus Wound infections, septicemia,	Human excreta and body fluid in landfills and hospital wards,

	rheumatic	Sharps such as
Clostridium Tetani,	fever, endocarditis, skin	needles, surgical blades in
Pseudomonas, Streptococcus	and soft tissue infections	hospital waste.
PARASITES	Cutaneous leishmaniasis,	Human excreta, blood and
Wucheraria Bancrofti,	Kala Azar, Malaria	body fluids in poorly
Plasmodium		managed sewage system of hospitals.

- Septicaemia and bacteraemia
- Viral Hepatitis B & C
- Hemorrhagic fevers through body fluids
- Lassa, Ebola and Marburg viruses

Genotoxicity and Cytotoxicity

- Irritant to skin and eyes

E.g. alkylating agent, intercalating agent

- Carcinogenic and Mutagenic

e.g. Secondary neoplasia due to chemotherapy



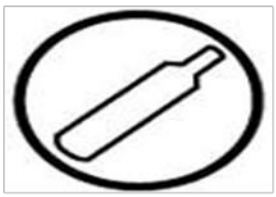
Label of Hazard Warnings



inflammable



toxic



Gas bottle



explosive



Radiation



biohazard



corrosive



Health danger

Segregation at the source of generation of waste



Pre course and Post Course evaluation

- At the end of the course, pre validated assessment score using DOPS method after Set induction step of STEPS model i.e. Didactic and video play (conventional teaching) for BMW segregation at source will be compared with the score using DOPS method after final step of the STEPS model i.e. subsequent practice on their own without supervision. And the difference if any will be evaluated.
- Feedback will be analyzed. Opinion, advantages, and requirement of improvements of the method can be inferred.
- Performance level of the CRRI for DOPS has definitely improved after STEPS than conventional teaching method.
- All the interns have given their opinion that this type of teaching learning method and WPBA improves their
- - Self confidence
- - Self satisfaction due to the transparency.
- - Assesses the KH, SH, Performance, communication, ethical, attitude and professional skills.

- - Foundation is laid strongly.
- - As responsible person their contribution to the society will be improved.
- - As all domains are assessed, it satisfies the goals of IMG 2019 and they will be Global Doctors.
- This type of Formative Assessment gives them guidance for improved learning skills due to feedback given on spot.
- Structured TLM like STEPS will make us to touch millers apex of the pyramid
- STEPS seem to be the best TLM for DOPS.
- Feedback of students favours this TLM for DOPS.
- Feedback of faculty indicates some difficulties but still they agree it is the best method.
- Periodic and regular FDP and motivation will make them to mould and adapt.

Limitations Of The Course And Its Implementation

1. Performed with limited no of students.
2. Takes extra time and effort
3. Motivation of all teachers to implement
4. Training of the assessors is mandatory.
5. Study is performed with limited number of interns.
6. Takes extra time and effort than conventional TLM and AM.
7. Periodic FDP is important to motivate the teachers.
8. Pre briefing and training of faculty is necessary for assessment and implementation.
9. Pre briefing of objectives expected out of students is necessary to achieve the goal.

Annexure- II

VALUE ADDED COURSE

STEPS frame work model as TL method in enhancing the procedural and performance skill in CRRI and CD/ME03

4. List of Students Enrolled May 2020 – June- 2020

CRRI Interns		
Sl. No	**Name of the Student**	**Roll No**
1	AMARNATH.S	U15MB258
2	DHANALAKSHMI.M	U15MB279
3	SIVARAJ.S	U14MB318
4	PIRAI NILA.M	U15MB337
5	MAHESWARI.C	U15MB 318
6	SHAKTHY.K	U15MB364
7	SREERAM.M	U15MB376
8	SOWMYALAKSHMI.I	U15MB375
9	VENKATESH.G	U15MB393
10	SURIYA.S	U15MB384
11	VIGNESH.V	U15MB395
12	ARUL NIVETHINI.V.A	U15MB263
13	ASWIN.B	U15MB269
14	EZHILARASI.R	U15MB286
15	AKSSHAYA.M.R	U15MB257
16	ARUN PRASAD.K	U15MB266
17	PADMA SUNDARI.P	U15MB336
18	ABDUL RAHMAN.A	U13MB151
19	ABINAYA.J	U15MB253
20	DEEPIKA DIVYA KUMARI	U15MB274

21	AARTHI.H	U15MB251
22	SIVASHAKTHIVELAN.A.V	U15MB370
23	ASHOK.VSI	U14MB223
24	DEVANATHAN.R	U15MB277
25	DEVANAND.M	U15MB276
26	DHANUSH.R	U15MB280
27	SHIYAM.M	U15MB368

RESOURCE PERSON **COORDINATOR**

Sri Lakshmi Narayana Insitute of Medical Sciences

Attendance List DATE :06.06.2020

S.NO.	NAME OF THE CRRI	ID.NO	SIGNATURE OF THE CRRI
1	AMARNATH.S	U15MB258	
2	DHANALAKSHMI.M	U15MB279	
3	SIVARAJ.S	U14MB318	
4	PIRAI NILA.M	U15MB337	
5	MAHESWARI.C	U15MB 318	
6	SHAKTHY.K	U15MB364	
7	SREERAM.M	U15MB376	
8	SOWMYALAKSHMI.I	U15MB375	
9	VENKATESH.G	U15MB393	
10	SURIYA.S	U15MB384	
11	VIGNESH.V	U15MB395	
12	ARUL NIVETHINI.V.A	U15MB263	
13	ASWIN.B	U15MB269	
14	EZHILARASI.R	U15MB286	
15	AKSSHAYA.M.R	U15MB257	
16	ARUN PRASAD.K	U15MB266	
17	PADMA SUNDARI.P	U15MB336	
18	ABDUL RAHMAN.A	U13MB151	
19	ABINAYA.J	U15MB253	
20	DEEPIKA DIVYA KUMARI	U15MB274	
21	AARTHI.H	U15MB251	
22	SIVASHAKTHIVELAN.A.V	U15MB370	
23	ASHOK.VSI	U14MB223	
24	DEVANATHAN.R	U15MB277	
25	DEVANAND.M	U15MB276	
26	DHANUSH.R	U15MB280	
27	SHIYAM.M	U15MB368	

RESOURCE PERSON

COORDINATOR

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

Annexure - III

Influence of STEPS frame work model as TL method in enhancing the procedural and performance skill in CRRI

Direct Observation Of Procedural Skills

DOPS Score Assessment Form

Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry

CANDIDATE AND ASSESSOR INFORMATION

Course code: CD/ME03

Candidate Name		**Assessor Name**	
Date of Assessment		**Assessor Position**	

PATIENT INFORMATION

Age of patient	NA	Patient gender	NA	Setting	WPBA Work Place Based Assessment
Procedure	BMW Segregation Procedure and Performance skill			Discipline	Microbiology

Please record a rating for each component of the procedure observed on the scale 0(extremely poor) to 4 (extremely good). A score of 0- is not observed, 1-is considered below expected level, 2 –borderline 3– adequate performance 4 above expected level, for the **MBBS standard**. Support ratings of 1-2 with an explanation / example in the comments box. Please add other relevant comments about this doctor's strengths and weaknesses that support your ratings and guide future learning.

0-not observed	Below expected level (0 to 1)	Borderline (1 to 2)	Adequate performance (2 to 3)	above expected level (3 to 4)

(I) Able to demonstrate the understanding of basic concepts of BMW, indications ,LIFECYCLE and implications with RULE **3x4=12**

1. What are the indications for Biomedical Waste Separation and Special Treatment? **(Marks)**

2. What is BMW Life cycle? Tell the components of it?

3. What are the various Bio Medical Rules with amendments you know off?

(II) <u>Obtains Ethical / Informed Consent</u> **3x4=12**

1. XDR TB patient is attending OP. You want to collect sputum from the patient and to do Bronchoscopy for the patient.
a)What advice and precaution you will give to the patient? **b)**What you are supposed to collect?

2. You want to collect blood from patient.

a) What precaution you will take.

b) Apart from blood what else you will collect?

(III)Aseptic Technique **3x 4= 12**

1. How and where will you dispose Sputum cups of plastic container containing sputum?

2. Why you want to use fresh hypochlorite? How will you prepare 1% hypo from 10% hypo?

3. Demonstrate six steps of hand washing techniques.

(IV) Demonstrates appropriate preparation: PPE procedural Donning
Donning: Sequence as follows **1 x 4 = 4**
Donning:

Shoe cover, Hand disinfection, Gown, Head cap- hand disinfection, Goggles, Mask, Gloves

(V) Demonstrates relevant indications, infrastructure, and Technical skills for the existing situation

3 x 4 = 12

1). Availability of 4 containers, Availability of general waste container, PPE, Hand disinfection solution. Availability of 2% glutaraldehyde, 1% and 10% hypochlorite solution.

2). How and where will you dispose broken glass ampoule containing cytotoxic drug?

3). Observes HIV BLOOD Spilled on the floor due to accidental dropping of a glass tube in transport. What action to be taken? What is spill kit? What are the risks associated? What preventive and Corrective measures you will take?

(VI) Technical skill **16 x 1 = 16**

Cotton soaked with pus+ blood, Drinking water bottle.
Petri dishes with media, Blood bag, Blood transfused set, Blade, Blood smeared glass slides, Broken glasses, Expired tablets, Tissue paper and newspaper, Ascetic fluid, Urobag , Endotracheal tube, Needle Syringes, Platinum metal dental implant ,amputated leg

(VII) In necessary situation seeking attenders/manpower /using resources /spot decision and action Planning **3 x4 = 12**

1) Unknown acid bottle broken with fumes all over

1) What action to be taken
2) To make everybody alert
3) To open the windows
4) To lower the temperature

2) See the mercury spillage on the ground. Ask them to tell 1) what they have to do like seek the help of an attender 2) plunge into action 3) cordoning off the area.

3) **How to collect the spill?**

(VIII)Post procedure management plan Doffing. **1x4=4**

(i) Removes gloves- yellow bin (ii) Removes grown - yellow bin (iii) Remove head cap- yellow bin (iv) Removes shoe cover- yellow bin. Checking the area for cleanlier Proper disposal of all the materials.

(IX) Communication skills: **2x 4 = 8**

(1) Do you know what is being done for BMW in CBMWTF- how do they dispose of.

(2) What are the various symbols you know off used in medical fieldof BMW? Can you explain 4 R s?

(X) Consideration for patient/ professionalism. **2 x 4 = 8**

What will be your reaction with the following situations?

1) If you see the auto clave temperature is set less than 121° C required for sterilization- your Reaction.

2) If a disposable needle syringe being reused for another Person without disposing it 0ff.

TOTAL MARKS OBTAINED BY THE CANDIDATE =

(XI)Overall performance

Please make sure to provide verbal feedback to the train once you complete the assessment.

Please use this space to give trainee suggestions about areas of strength and areas of improvement.

Assessor name	Signature	Date	Time taken for assessment

Examinees name	Signature	Date	Time taken for assessment

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(4) AARTHI Arthy

Direct Observation Of Procedural Skills
Pre-intervention- DOPS Score Assessment Form
Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry

CANDIDATE AND ASSESSOR INFORMATION

Candidate Name Dr. AARTHI
Assessor Name Dr. JAYALAKSHMI
Date of Assessment 06/06/2020
Assessor Position

PATIENT INFORMATION

Age of patient	NA	Patient gender	NA	Setting	WPBA Work Place Based Assessment
Procedure	BMW Segregation Procedure and Performance skill			Discipline	Microbiology

Please record a rating for each component of the procedure observed on the scale 0(extremely poor) to 4 (extremely good). A score of 0- is not observed, 1-is considered below expected level, 2 –borderline 3– adequate performance 4 above expected level, for the **MBBS standard**. Support ratings of 1-2 with an explanation / example in the comments box. Please add other relevant comments about this doctor's strengths and weaknesses that support your ratings and guide future learning.

0-not observed	Below expected level (0 to 1)	Borderline (1 to 2)	Adequate performance (2 to 3)	above expected level (3 to 4)

(I) Able to demonstrate the understanding of basic concepts of BMW, indications ,LIFECYCLE and implications with RULE 3x4=12 → (11)

1. What are the indications for Biomedical Waste Separation and Special Treatment? (Marks)

			3		(3)

2. What is BMW Life cycle? Tell the components of it?

	2				(2)

3. What are the various Bio Medical Rules with amendments you know off?

	2				(2)

(II) Obtains Ethical / Informed Consent 3x4=12 → (1.5

1. XDR TB patient is attending OP. You want to collect sputum from the patient and to do Bronchoscopy for the patient.
a)What advice and precaution you will give to the patient? **b)**What you are supposed to collect?

	2				(2)

b) Apart from blood what else you will collect :

3

(III)Aseptic Technique 3x 4= 12 → (8)

1. How and where will you dispose Sputum cups of plastic container containing sputum?

2.5 → 2.5

2. Why you want to use fresh hypochlorite? How will you prepare 1% hypo from 10% hypo?

2.5 → 2.5

3. Demonstrate six steps of hand washing techniques.

3 → 3

(IV) Demonstrates appropriate preparation: PPE procedural Donning
Donning: Sequence as follows 1 x 4 = 4 → (3)

Donning:
Shoe cover, Hand disinfection, Gown, Head cap- hand disinfection, Goggles, Mask, Gloves

3.2 → 3.2

(V) Demonstrates relevant indications, infrastructure, and Technical skills for the existing situation 3 x 4 = 12 → 7.6

1). Availability of 4 containers, Availability of general waste container, PPE, Hand disinfection solution. Availability of 2% glutaraldehyde, 1% and 10% hypochlorite solution.

2 → 2

2). How and where will you dispose broken glass ampoule containing cytotoxic drug?

3.1 → 3.1

3). Observes HIV BLOOD Spilled on the floor due to accidental dropping of a glass tube in transport. What action to be taken? What is spill kit? What are the risks associated? What preventive and Corrective measures you will take?

2.5 → 2.5

(VI) Technical skill 16 x 1 = 16 → (13)

Cotton soaked with pus+ blood, Drinking water bottle.
Petri dishes with media, Blood bag, Blood transfused set, Blade, Blood smeared glass slides, Broken glasses, Expired tablets, Tissue paper and newspaper, Ascetic fluid, Urobag , Endotracheal tube, Needle Syringes, Platinum metal dental implant ,amputated leg

15 → 15

SRI LAKSHMI NARAYANA INSTITUE OF HIGHER EDUCATON AND RESEARCH

(VII) In necessary situation seeking attenders/manpower /using resources /spot decision and action Planning

3 x4 = 12

8

1) Unknown acid bottle broken with fumes all over

1) What action to be taken
2) To make everybody alert
3) To open the windows
4) To lower the temperature

			3		

2) See the mercury spillage on the ground. Ask them to tell 1) what they have to do like seek the help of an attender 2) plunge into action 3) cordoning off the area.

		2			

3) How to collect the spill?

			3		

3

(VIII)Post procedure management plan Doffing. **1x4=4**

(i) Removes gloves- yellow bin (ii) Removes grown - yellow bin (iii) Remove head cap- yellow bin (iv) Removes shoe cover- yellow bin. Checking the area for cleanlier Proper disposal of all the materials.

			3		

(IX) Communication skills: **2x 4 = 8**

4.75

(1) Do you know what is being done for BMW in CBMWTF- how do they dispose of.

		2			

(2) What are the various symbols you know off used in medical fieldof BMW? Can you explain 4 R s?

			2.75		

(X) Consideration for patient/ professionalism. **2 x 4 = 8**

What will be your reaction with the following situations?

1) If you see the auto clave temperature is set less than 121° C required for sterilization- your Reaction.

			2.5		

2) If a disposable needle syringe being reused for another Person without disposing it Off.

			2.5		

TOTAL MARKS OBTAINED BY THE CANDIDATE =

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(XI)Overall performance

Please make sure to provide verbal feedback to the train once you complete the assessment.

Please use this space to give trainee suggestions about areas of strength and areas of improvement.

Strength

Technical skill +f

Communication Skill to improve.

Seeking to help and preventive steps implementation

Overall familiarity and checking for BMW

Assessor name assessment	Signature	Date	Time taken for
Dr A Jayalahl			20 min.

Examinees name assessment	Signature	Date	Time taken for
AARTHI			20 mins

PRE-intervention Total marks - 69.05

Grade -

1) Demonstration understanding (12) — 7
2) obtains ethical Consent (12) — 7.5
3) aseptic Techniques (12) — 8
4) Pre preparation (4) — 3.2
5) Relevant Indications (12) — 7.6
6) Technical skills (16) — 15
7) Seeks help (12) — 8
8) Post procedure (4) — 3
9) Communication skills (8) — 4.75
10) Consideration Professionalism (8) — 5

69.05

Annexure- V

Student Feedback Form

Course Name: STEPS frame work model as TL method in enhancing the procedural and performance skill in CRRI

Subject Code: CD/ME03

Name of Student: _____ Roll No.: _____

We are constantly looking to improve our classes and deliver the best training to you. Your evaluations, comments and suggestions will help us to improve our performance

Feedback Form
FIVE POINT LIKERT SCALE

1. All the Sessions covered all the competencies like knowledge, analysis, training, practical Demonstration, Performance skill on your own and all other aspects related to overall global skills.

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

2. The content, method of delivery and ambience in the lecture session will help you to develop an overall performer?

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

3. Procedural skill by Tutor demonstration was done with clarity and made you to understand thoroughly.

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

4. This Methodology of Teaching Learning method made you to understand all aspects of Technical skill thoroughly.

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

5. You really feel that this method is good and there is increase in the self-confidence?

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

6. This method of Teaching Learning method is comprehensive in developing all competencies.

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

7. By DOPS Assessment method your knowledge, performance general skills and overall ability were completely assessed?

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

8. This method of assessment is Transparent?

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

9. You were given chance to analyze your mistakes and rectify in future in the form of feedback from Examinee?

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

10. Though it is elaborate and time consuming we can apply in future?

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

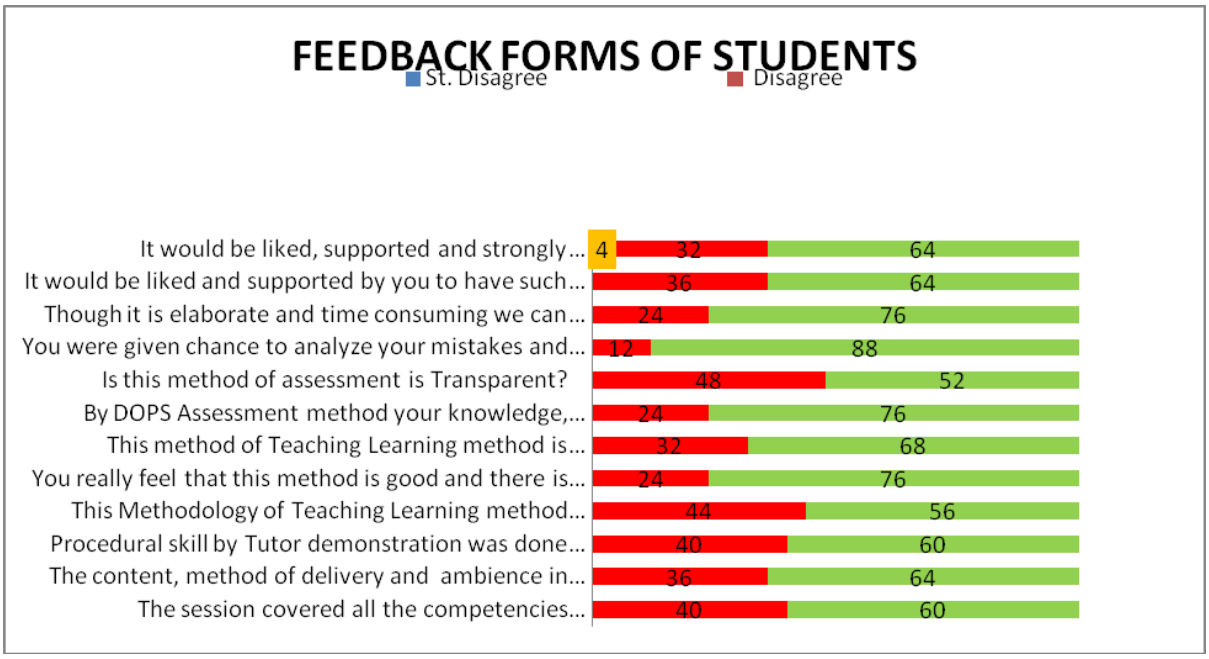
11. It would be liked and supported by you to have such comprehensive competency testing assessment methods in future?

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

12. It would be liked, supported and strongly recommended by you if this type of TL Method and assessment method is implemented in future.

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

Signature of the CRRI:
Date:


FEEDBACK FORMS OF STUDENTS
St. Disagree
Disagree
It would be liked, supported and strongly...
It would be liked and supported by you to have such...
Though it is elaborate and time consuming we can...
You were given chance to analyze your mistakes and...
Is this method of assessment is Transparent?
By DOPS Assessment method your knowledge,...
This method of Teaching Learning method is...
You really feel that this method is good and there is...
This Methodology of Teaching Learning method...
Procedural skill by Tutor demonstration was done...
The content, method of delivery and ambience in...
The session covered all the competencies...
4
32
64
36
64
24
76
12
88
48
52
24
76
32
68
24
76
44
56
40
60
36
64
40
60

6

Feedback Form
FIVE POINT LIKERT SCALE

1. All the Sessions covered all the competencies like knowledge, analysis, training, practical Demonstration, Performance skill on your own and all other aspects related to overall global skills.

1. Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

2. The content, method of delivery and ambience in the lecture session will help you to develop an overall performer?

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12. It would be liked, supported and strongly recommended by you if this type of TL Method and assessment method is implemented in future.

1, Strongly Disagree, 2. Disagree, 3. Neither Agree nor Disagree, 4. Agree, 5. Strongly Agree

Signature of the Student

Date:

Signature of the CRRI

Date: 06/6/2020

Sri Lakshmi Narayana Institute of Medical Sciences

Affiliated to Bharath Institute of Higher Education & Research

(Deemed to be University under section 3 of the UGC Act 1956)

CERTIFICATE OF MERIT

This is to certify that AMARNATH . S has actively participated in the Value Added Course on STEPS frame work model as TL method in enhancing the procedural and performance skill in CRRI in BMWM held during May 2020 – June 2020 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. G.Jayalakshmi
RESOURCE PERSON

Dr. G. JAYALAKSHMI, B.Sc., MBBS., DTCD., M.D. (Micro).
DEAN - UNIVERSITY AFFAIRS
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
OSUDU, KOODAPAKKAM, PUDUCHERRY - 605 ...

Dr. G.Jayalakshmi
COORDINATOR

Dr. G. JAYALAKSHMI, B.Sc., MBBS., DTCD., M.D., (Micro).,
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