Sri Lakshmi Narayana Institute of Medical Sciences

Date: 03.05.2021

From
Dr. Nithianandam
Professor and Head,
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: Assessment of unconscious patient and airway management

Dear Sir,

With reference to the subject mentioned above, the department proposes to conduct a value-added course titled: **ASSESSMENT OF UNCONSCIOUS PATIENT AND AIRWAY MANAGEMENT** for undergraduates from July- December 2021. We solicit your kind permission for the same.

Kind Regards

Dr. NITHIANANDAM. S

FOR THE USE OF DEANS OFFICE

Names of Committee members for evaluating the course:

The Dean: Dr JAYAKUMAR

The HOD: Dr.NITHIANANDAM. S

The Expert: Dr CHANDRASEKAR

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

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

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

10.06.2021

Sub: Organizing Value-added Courses: Assessment of unconscious patient and airway management - 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 **"_ASSESSMENT OF UNCONSCIOUS PATIENT AND AIRWAY MANAGEMENT"** course in July- Dec 2021. 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 15/06/2021. 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: ASSESSMENT OF UNCONSCIOUS PATIENT AND AIRWAY MANAGEMENT

Course Objective:

1.To enable the students to learn about unconsciousness, its various causes and to assess the level of unconsciousness by GCS. It will also teach the students to understand the airway anatomy and to manage the unprotected airway.

2. To learn about advanced management of the unconscious patient and to learn about recent advances in airway management skills.

Course Outcome:

On successful completion of the course the students will have skill in assessing the unconscious patient and protecting the airway of such patients.

Course Audience: II year MBBS students

Course Coordinator: Dr S NITHIANANDAM

Course Faculties with Qualification and Designation:

1. Dr Chandrashekar- Associate Professor
2. Dr. Thanigai Vendan-Associate Professor

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

S.No	Date	Topics	Time	Hours	Faculty
1	16.07.2021	Definition and etiology	2-4PM	2	Dr Chandrashekar
2	23.07.2021	GCS and its interpretation	2-4PM	2	Dr. Thanigai Vendan
3	30.07.2021	Pathophysiology and clinical features	2-4PM	2	Dr Chandrashekar
4	06.08.2021	Neurological assessment	2-4PM	2	Dr. Thanigai Vendan
5	13.08.2021	Diagnostic tests	2-4PM	2	Dr Chandrashekar
6	20.08.2021	Complications of immobility	2-4PM	2	Dr. Thanigai Vendan
7	27.08.2021	Medical management	2-4PM	2	Dr Chandrashekar
8	03.09.2021	Nursing management	2-4PM	2	Dr. Thanigai Vendan
9	10.09.2021	Anatomy of airway	2-4PM	2	Dr Chandrashekar
10	17.09.2021	Airway examination	2-4PM	2	Dr. Thanigai Vendan
11	24.09.2021	Airway obstruction	2-4PM	2	Dr Chandrashekar
12	01.10.2021	Airway maneuvers	2-4PM	2	Dr. Thanigai Vendan
13	08.10.2021	Skill demonstration	2-4PM	2	Dr Chandrashekar
14	15.10.2021	Advanced airway techniques	2-4PM	2	Dr. Thanigai Vendan
15	22.10.2021	Final assessment	2-4PM	2	Dr Chandrashekar

REFERANCES :

1) Specialty training curriculum for acute internal medicine Joint Royal College of Physicians Training Board-2009

2) Crisis Checklist Collaborative. Crisis check lists for in-hospital emergencies: expert consensus, simulation testing and recommendations for a template…CPSubbe, J Kellett, P Barach, C Chaloner, H Cleaver …-BMCHealthServRes,2017

3) Manual of emergency airway management, Ron M Walls, Michael Francis Murphy Lippincott Williams & Wilkins, 2008

VALUE ADDED COURSE

1.Name of the program & Code

ASSESSMENT OF UNCONSCIOUS PATIENT AND AIRWAY MANAGEMENT

, ANAES 03

2. Duration & Period

30 hrs: July 2021- December 2021

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 2021-DEC 2021

8. Year of discontinuation: 2021

9. Summary report of each program year-wise

Value Added Course- July 2021- December 2021					
Sl. No	**Course Code**	**Course Name**	**Resource Persons**	**Target Students**	**Strength & Year**
1	ANAES 03	ASSESSMENT OF UNCONSCIOUS PATIENT AND AIRWAY MANAGEMENT	DR. CHANDRASEKAR	II MBBS	20 2021

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

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

Dr S NITHIANANDAM

Annexure I

ASSESSMENT OF UNCONSCIOUS PATIENT

TOPICS:

Definition and etiology
GCS and its interpretation
Pathophysiology and clinical features
Neurological assessment
Diagnostic tests
Complications of immobility
Medical management
Nursing management
Anatomy of airway
Airway examination
Airway obstruction
Airway manoeuvres
Skill demonstration
Advanced airway tecniques
Final assessment

Definition and **Etiology** of unconsciousness

Unconscious: 1. Interruption of awareness of oneself and one's surroundings, lack of the ability to notice or respond to stimuli in the environment. A person may become unconscious due to oxygen deprivation, shock, central nervous system depressants such as alcohol and drugs, or injury.

Introduction

Consciousness is the awareness of one's self and the environment and the ability to respond to external stimuli. Impaired consciousness can be defined as reduced alertness, ability to be aroused, or awareness of one's self and the environment.A patient who is initially observed to be unconscious can ultimately manifest a variety of clinical states. Some patients will regain full consciousness without intervention, while others will require intensive management and intricate diagnostic testing. Etiologies of persistent unconsciousness can be reversible or permanent. During unconsciousness, the patient losses all protective reflexes and sensation response and is prone to aspiration and skin ulcersComa is a profound and occasionally persistent state of unconsciousness. Coma is defined by Plum and Posner as "a state of unresponsiveness in which the patient lies with eyes closed and cannot be aroused to respond appropriately to stimuli even with vigorous stimulation.Coma has also been defined objectively as a Glasgow Coma Scale (GCS) <8.

Etiology

Unconsciousness is generally caused by a temporary or permanent impairment of either the reticular activating system in the brainstem, both cerebral hemispheres, or bilateral thalamus. The three main mechanisms of are structural brain lesions, diffuse neuronal dysfunction secondary to a systemic pathology, and rarely psychiatric causes

Structural Causes

These causes either destroy an area or exert indirect damage by way of compression or increased intracranial pressure. Increased intracranial

pressure impairs global cerebral blood flow and can promote tissue distortion and brain herniation.

- Stroke
- Traumatic brain injury (TBI)
- Intracranial, epidural, subdural hemorrhages
- Intracranial tumors
- Inflammation
- Venous thrombosis
- Acute hydrocephalus

Systemic Causes

- Hypoglycemia
- Hyperglycemia
- Hyponatremia
- Hypernatremia
- Hypercalcemia
- Seizures
- Systemic infections (sepsis)
- Meningitis
- Encephalitis
- Adrenal crisis
- Pituitary apoplexy with pituitary hormonal insufficiency
- Endocrine abnormalities
- Myxedema coma
- Medication overdose
- Illicit drug use
- Neuroleptic malignant syndrome
- Excessive alcohol intake
- Hepatic encephalopathy
- Uremia
- Heavy metals (lead poisoning)
- Malaria
- Fungemia (aspergillosis)
- Herbicides
- Gases (carbon monoxide)

- Anesthesia

Psychiatric Causes

- Catatonia
- Severe depression
- Conversion disorder
- Malingering

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GCS and it's interpretations:

Glasgow Coma Scale

Eye Response

4 = eyes open spontaneously
3 = eye-opening to verbal command
2 = eye-opening to pain
1 = no eye-opening

Motor Response

6 = obey commands
5 = localizing pain
4 = withdrawal from pain
3 = flexion response to pain
2 = extension response to pain
1 = no motor response

Verbal Response

5 = oriented
4 = confused
3 = inappropriate words
2 = incomprehensible sounds
1 = no verbal response

Four SCORE

Eye Response

4 = eyelids open or opened, tracking, or blinking to command
3 = eyelids open but not tracking
2 = eyelids closed but open to a loud voice
1 = eyelids closed but open to pain

0 = eyelids remain closed with pain

Motor Response
4 = thumbs-up, fist, or peace sign
3 = localizing to pain
2 = flexion response to pain
1 = extension response to pain
0 = no response to pain or generalized myoclonic status
Brainstem Reflexes
4 = pupil and corneal reflexes present
3 = one pupil wide and fixed
2 = pupil or corneal reflexes absent
1 = pupil and corneal reflexes absent
0 = absent pupil, corneal, and cough reflex
Respiration
4 = not intubated, regular breathing pattern
3 = not intubated, Cheyne-Stokes breathing pattern
2 = not intubated, irregular breathing
1 = breaths above the ventilator rate
0 = breaths at ventilator rate or below

Pathophysiology

The pathophysiology of unconsciousness involves neuronal dysfunction from a decrease in the supply of glucose or oxygen to the brainStructural lesions of the central nervous system may lead to coma from direct destruction of arousal areas of the brain or from secondary damage from shifting of intracranial structures, vascular compression, or increased intracranial pressure.[
The anatomical seat of arousal is the ascending reticular activating system in the brainstem. Neurons of this system originate in the dorsal pons and midbrain, connect in the thalamus, and project to several areas in the cortex. The cortex processes, integrates, and gives context to the information provided to it thus generating awareness] The reticular

activating system receives impulses by the spinal cord and cortex to be aware of the environment

The many causes for an unconscious patient can be classified as affecting three main areas of the brain:[

Bilateral Hemispheric Damage/Effect

Extensive damage to the bilateral cerebral cortex, as can occur with hypoxic-ischemic injury or brain trauma, causes neuronal death and de-innervation of cortical regions. Such patients lose the ability to process and consciously respond to stimuli. The systemic causes of coma can also be placed in this category, as they produce an abnormal physiologic environment that inhibits neuronal function. This type of pattern is generally reversible if the systemic abnormality can be corrected.

Diencephalic (Thalamic) Injury

The thalamus contains relay nuclei which direct afferent input to the cortex, therefore, bilateral thalamic lesions can mimic the result of a bilateral cortical injury.

Upper Brainstem Injury

The dorsal pons and midbrain contain the reticular activating system. Lesions in this area can inhibit consciousness and result in a comatose state.

History and Physical

History regarding an unconscious patient is based on supplementary data. Questioning a person who has good knowledge of the recent history of the patient is preferable.[Knowing the patient's medical history can provide important clues to the diagnosis. A history of chronic cardiopulmonary, hepatic, or renal disease may be contributing. The use of or access to sedative or psychoactive drugs may suggest intoxication

Abrupt onset of altered mental status points towards drug poisoning or acute structural lesions such as trauma or stroke. Most metabolic disorders and compressive structural injuries have a relatively gradual onset.

Neurological abnormalities or a headache in an unconscious patient point toward a structural lesion. Cranial nerve abnormalities can suggest brainstem involvement. Metabolic disturbances usually cause diffuse

forebrain dysfunction manifesting as confusion, delirium, or encephalopathy before unconsciousness or coma.

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Clinical features:

People who become unconscious don't respond to loud sounds or shaking. They may even stop breathing or their pulse may become faint. This calls for immediate emergency attention. The sooner the person receives emergency first aid, the better their outlook will be. Unconsciousness can be brought on by a major illness or injury, or complications from drug use or alcohol misuse.
Common causes of unconsciousness include:

- a car accident
- severe blood loss
- a blow to the chest or head
- a drug overdose
- alcohol poisoning

A person may become temporarily unconscious, or faint, when sudden changes occur within the body. Common causes of temporary unconsciousness include:

- low blood sugar
- low blood pressure
- syncope, or the loss of consciousness due to lack of blood flow to the brain
- neurologic syncope, or the loss of consciousness caused by a seizure,stroke, or transient ischemic attack (TIA)
- dehydration
- problems with the heart's rhythm
- straining
- hyperventilating

Symptoms that may indicate that unconsciousness is about to occur include:

- sudden inability to respond
- slurred speech
- a rapid heartbeat
- confusion
- dizziness or lightheadedness

NEUROLOGICAL ASSESSMENT

Evaluation

ABCs

The initial step in the evaluation of an unconscious patient is to evaluate for the basic signs of life. The American Heart Association recommends examining for a pulse, followed by assessing for airway patency and breathing pattern. If the patient does not have a pulse or does not have a regular breathing pattern, basic life support/advanced cardiovascular life support is indicated.

For patients with a pulse, who are breathing adequately, the evaluation shifts to a detailed neurological examination. The neurologic examination would serve to determine the location and nature of the neurological lesion and to determine prognosis. The examination is considered most useful if the patient is well perfused, normothermic, normoglycemic, and without the effects of neurologically active toxins or medication

Responsiveness

The initial step is to evaluate for reactivity, using objective measures. Address the patient verbally, and then progress to light shaking, then progress to more intense mechanical stimulation. Sufficient stimulus to the supraorbital ridge, nail beds, or temporomandibular joint can be painful without risk of tissue injury. Response to these painful stimuli should be graded bilaterally, in case of a focal spinal cord lesion. If these measures do not produce a response, vigorously pressing the examiner's

knuckles up and down the sternum should arouse any patient who is not deeply comatose

The best practice for reporting level of responsiveness is to document specifically how the patient reacted to the external stimulus that was provided for testingComa scales such as the Glasgow Coma Scale (GCSand the Full Outline of Unresponsiveness (FOUR) exist to aid in objectifying results for provider communication, trending, and prognosis. The physical exam should be repeated at least daily, in a sequential fashion and documented systematically

Pupils

Initial eye position and movements should be noted. Nystagmus is uncommonly seen in unconscious patients but may indicate an irritating brain lesion or even occult seizure activity. The size of the pupils (using a pupilometer) and reaction to light should be documented. A strong light should be used, as pupillary responses may be sluggish in unconscious patients.

Cranial Nerves

If available, a funduscopic exam may reveal essential findings such as papilledema or subhyaloid hemorrhage.

Examination of eye movement with oculocephalic or oculovestibular testing can provide information regarding cranial nerves III, IV, VI, and VIII. In general terms, patients with intact brainstem functioning should have a normal response to these maneuvers. Oculovestibular testing via caloric stimulation should be performed in patients who do not have a cleared cervical spine.

The corneal reflex can be established by stimulating the cornea and observing for blinking. Stimulation should elicit both a direct and consensual response and suggests the normal function of CN V and VII nuclei in the brainstem. It is recommended to stimulate the cornea with drops of normal saline to prevent corneal damage. Contact lenses will markedly reduce this reflex.

The gag and cough reflexes suggest normal function of cranial nerves IX and X nuclei in the brainstem.

Motor Function

Motor function is tested by examining muscular tone, movement patterns, and peripheral tendon reflexes. Decerebrate or decorticate postures carries a bad prognosis.

DIAGNOSTIC TESTS

Neuroimaging

Neuroimaging is extremely valuable in evaluating the unconscious patient as an intracranial insult is important to define as soon as possible. Computed tomographic (CT) scan of the brain is commonly the first study performed and can reveal several key findings including hemorrhage, infarction, space-occupying lesion, herniation, edema, and hydrocephalus. Magnetic resonance imaging is a worthwhile study in cases that are still unclear after initial neuroimaging

Lab Testing

Serum testing usually includes: complete blood counts, serum electrolytes including calcium and glucose, renal/hepatic functions, coagulation panel, and toxicology studies

Lumbar Puncture

Lumbar puncture should be considered if the diagnosis remains unclear after the above testing or if a cerebral infection is suspectedIf meningitis is suspected, empiric antibiotics and antivirals should not be delayed by the lumbar puncture procedure. The risk of herniation in patients with supratentorial mass effect is controversial, but a CT should generally still be performed before the lumbar punctureCerebrospinal fluid analysis should include opening pressure, cell count, gram stain, glucose, protein, culture, and viral testing

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Treatment / Management

Because the etiology of unconsciousness is often initially unclear, initial treatment paradigms occur before full evaluation or diagnostics.

Principles of initial management of unconscious patients

- Ensure oxygenation
- Maintain circulation
- Control glucose
- Lower intracranial pressure
- Stop seizures

- Treat infection
- Restore acid-base balance and electrolyte balance
- Adjust body temperature
- Administer thiamine
- Consider specific antidotes (naloxone, flumazenil)
- Control agitation

If the above goals are completed, management can then be tailored based on the results of diagnostic testing. Patients who are persistently comatose despite initial interventions often require a high level of care such as an intensive care unit.

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Differential Diagnosis

The differential diagnosis for the causes of unconsciousness is broad Some etiologies are straight forward such as anoxic brain injury, cerebrovascular accidents, seizures, and poisonings but some categories have a wide differential in and of themselves. For example, metabolic causes of coma may include hepatic encephalopathy, uremia, electrolyte abnormalities, and endocrine disorders. Infections, shock, disorders of temperature regulation, respiratory failure, and trauma can also cause a coma

When examining an unconscious patient, it is crucial to differentiate organic causes of coma from disorders that cause psychiatric unresponsiveness such as catatonia, severe depression, conversion disorder, and malingeringPsychogenic unresponsiveness is more likely to include active lid closing, reactive pupils, nystagmus, variable motor tone, eupnea or hyperventilation, the absence of pathologic reflexes, and a normal EEGStructural brain disorders can also mimic psychiatric illness. Psychogenic coma should be diagnosed only after a thorough medical and neurological assessment

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Prognosis

The prognosis of patients who are unconscious is variable and highly dependent on the etiology, the severity of brain injury, and individual patient factors. The GCS is used to evaluate outcomes for research purposes

TBI has been the most studied etiology of coma, likely due to its high prevalence and highly variable outcomes. Estimated mortality in patients in a coma from TBI ranges from 40 to 50%.[] Predictors that are linked to outcomes include patient age, motor findings, neuro-ophthalmologic signs, secondary injuries, neuroimaging findings, and duration of coma.[Patients with non-traumatic etiologies that do not recover quickly have an even worse prognosis than the TBI cohort. The mortality rate of non-traumatic coma varied from 25–87%.[Patients who have a non-traumatic loss of consciousness lasting more than six hours had a one-month mortality rate of 76%Non-traumatic coma outcomes are quite variable by etiology. Non-traumatic unconsciousness due to depressant overdose, demyelinating disease, seizures, poisoning, or auto-immune encephalitis carries an excellent prognosis with adequate supportive care. Vascular causes such as a large stroke or aneurysmal hemorrhage carry a grave prognosis, as does hypoxic-ischemic injury. Neuro-ophthalmologic signs and motor function are consistent predictors of long term outcomes

Complications

- Permanent initial brain damage
- Secondary brain injury from anoxia
- Coma
- Aspiration pneumonia
- Bladder bowel dysfunction
- Skin ulcers

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Deterrence and Patient Education

Prevention is preferable to late interventions. Patients need to be educated about their systemic illnesses and how to prevent complications. Some conditions leading to unconsciousness may allow interventions prior to the development of a coma. Closer monitoring and education of patients with poorly controlled diabetes might be an opportunity for prevention. For those patients at risk for drug overdoses or illicit drug use intoxication, early intervention and counseling will prevent many complications. Patients can be educated as to establish

wishes regarding life decisions in the case that they become unconscious.

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Enhancing Healthcare Team Outcomes

Unconsciousness is caused by a temporary or permanent impairment of the bilateral forebrain (thalamus/cerebrum) or reticular activating system of the brainstem. Because of the diverse causes for an unconscious patient, the condition is best managed by an interprofessional team that consists of a neurologist, internist, intensivist, primary care provider, and neurosurgeon. A systematic evaluation of the unconscious patient is recommended. Because many cases of unconsciousness are reversible, the management of unconscious patients necessitates thorough history-taking, patient evaluation, stabilizing treatment, and diagnostic testing occurring simultaneously. The prognosis of persistently unconscious patients is variable but generally poor. The most consistent prognostic exam findings are neuro-ophthalmologic responses and motor function (Level V)

The nurse helps the patient with the absent protective reflexes, elimination, skincare, re-orientation to the surroundings, and orientation for the family (problem-oriented approach) to improvesoutcomesEarly communication with the next of kin, family, or appropriate advocate is always necessary. When the prognosis is poor these interprofessional discussions will include consideration of future withdrawal of treatment, and cardiopulmonary resuscitation.[2] It is essential to have an idea of the patient's state of health before their presentation. Understanding that prognosis in many comatose patients is poor, a pre-morbid condition will inform decisions regarding the escalation of care and appropriateness of cardiopulmonary resuscitation. Decisions have to be consistent with the patient's established wishes. If you see a person who has become unconscious, take these steps:

- Check whether the person is breathing. If they're not breathing, have someone call 911 or your local emergency services

immediately and prepare to begin CPR. If they're breathing, position the person on their back.

- Raise their legs at least 12 inches above the ground.
- Loosen any restrictive clothing or belts. If they don't regain consciousness within one minute, call 911 or your local emergency services.
- Check their airway to make sure there's no obstruction.
- Check again to see if they're breathing, coughing, or moving. These are signs of positive circulation. If these signs are absent, perform CPR until emergency personnel arrive.
- If there's major bleeding occurring, place direct pressure on the bleeding area or apply a tourniquet above the bleeding area until expert help arrives.

CPR is a way to treat someone when they stop breathing or their heart stops beating.

If a person stops breathing, call your local emergency services or ask someone else to. Before beginning CPR, ask loudly, "Are you OK?" If the person doesn't respond, begin CPR.

1. Lay the person on their back on a firm surface.
2. Kneel next to their neck and shoulders.
3. Place the heel of your hand over the center of their chest. Put your other hand directly over the first one and interlace your fingers. Make sure that your elbows are straight and move your shoulders up above your hands.
4. Using your upper body weight, push straight down on their chest at least 1.5 inches for children or 2 inches for adults. Then release the pressure.
5. Repeat this procedure again up to 100 times per minute. These are called chest compressions.

To minimize potential injuries, only those trained in CPR should perform rescue breathing. If you haven't been trained, perform chest compressions until medical help arrives.

If you're trained in CPR, tilt the person's head back and lift the chin to open up the airway.

6. Pinch the person's nose closed and cover their mouth with yours, creating an airtight seal.
7. Give two one-second breaths and watch for their chest to rise.
8. Continue alternating between compressions and breaths — 30 compressions and two breaths — until help arrives or there are signs of movement.

If unconsciousness is due to low blood pressure, a doctor will administer medication by injection to increase blood pressure. If low blood sugar level is the cause, the unconscious person may need something sweet to eat or a glucose injection.

Medical staff should treat any injuries that caused the person to become unconscious.

Potential complications of being unconscious for a long period of time include coma and brain damage.

A person who received CPR while unconscious may have broken or fractured ribs from the chest compressions. The doctor will X-ray the chest and treat any fractures or broken ribs before the person leaves the hospital.

Choking can also occur during unconsciousness. Food or liquid may have blocked the airway. This is particularly dangerous and could lead to death if it isn't remedied

Anatomy of Airway

Introduction

The airway, or respiratory tract, describes the organs of the respiratory tract that allow airflow during ventilationThey reach from the nares and buccal opening to the blind end of the alveolar sacs. They are subdivided into different regions with various organs and tissues to perform specific functions. The airway can be subdivided into the upper and lower airway, each of which has numerous subdivisions as follows.

Upper Airway

The pharynx is the mucous membrane-lined portion of the airway between the base of the skull and the esophagus and is subdivided as follows:

- Nasopharynx, also known as the rhino-pharynx, post-nasal space, is the muscular tube from the nares, including the posterior nasal cavity, divide from the oropharynx by the palate and lining the skull base superiorly
- The oro-pharynx connects the naso and hypopharynx. It is the region between the palate and the hyoid bone, anteriorly divided from the oral cavity by the tonsillar arch
- The hypopharynx connects the oropharynx to the esophagus and the larynx, the region of pharynx below the hyoid bone.

The larynx is the portion of the airway between the pharynx and the trachea, contains the organs for the production of speech. Formed of a cartilaginous skeleton of nine cartilages, it includes the important organs of the epiglottis and the vocal folds (vocal cords) which are the opening to the glottis.

Lower Airway

The trachea is a ciliated pseudostratified columnar epithelium-lined tubular structure supported by C-shaped rings of hyaline cartilage. The flat open surface of these C rings opposes the esophagus to allow its expansion during swallowing. The trachea bifurcates and therefore terminates, superior to the heart at the level of the sternal angle.

The bronchi, the main bifurcation of the trachea, are similar in structure but have complete circular cartilage rings.

- Main bronchi: There are two supplying ventilation to each lung. The right main bronchus has a larger diameter and is aligned more vertically than the left
- Lobar bronchi: Two on the left and three on the right supply each of the main lobes of the lung
- Segmental bronchi supply individual bronchopulmonary segments of the lungs.

Bronchioles lack supporting cartilage skeletons and have a diameter of around 1 mm. They are initially ciliated and graduate to the simple columnar epithelium and their lining cells no longer contain mucous producing cells.

- Conducting bronchioles conduct airflow but do not contain any mucous glands or seromucous glands
- Terminal bronchioles are the last division of the airway without respiratory surfaces
- Respiratory bronchioles contain occasional alveoli and have surface surfactant-producing They each give rise to between two and 11 alveolar ducts.

Alveolar is the final portion of the airway and is lined with a single-cell layer of pneumocytes and in proximity to capillaries. They contain surfactant producing type II pneumocytes and Clara cells.

- Alveolar ducts are tubular portions with respiratory surfaces from which the alveolar sacs bud.
- Alveolar sacs are the blind-ended spaces from which the alveoli clusters are formed and to where they connect. These are connected by pores which allow air pressure to equalize between them. Together, with the capillaries, they form the air-blood barrier.

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Structure and Function

Airways allow airflow in ventilation from the external environment to the respiratory surfaces where gas exchange for respiratory processes can occur

To allow this and to maintain homeostasis and adequate protection from the external environment they must also perform other barrier functions.

- Moisture barrier is the mucous lining of the airway that provides a barrier to prevent loss of excessive moisture during ventilation by increasing the humidity of the air in the upper airway
- Temperature barrier is relative to body temperature as the external environment is nearly always colder, and the increased vasculature and structures such as nasal turbinates warm air as it enters the airways
- A barrier to infection as the airways are lined with a rich lymphatic system including mucosa-associated lymphoid tissue (MALT) that prevents early access to any invading pathogens. Macrophages also patrol the respiratory surfaces providing an important component of the “air-blood barrier."

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Embryology

The upper airways develop from the pharyngeal arches as part of the embryological development of the head and neck structures.
At around four weeks, the larynx and lower airways develop from the longitudinal laryngotracheal groove which forms a medial, groove-like structure becoming a tubular, blind-ended structure called the laryngotracheal diverticulum. This eventually separates from the developing foregut by the formation of the tracheo-oesophageal folds.
The laryngeal cartilages and musculature develop from the four and six pharyngeal arches, and the glottic opening forms connecting this region to the trachea.
The trachea forms from the extension of the laryngotracheal diverticulum, and it is lined with endodermal tissue which forms the specialized respiratory linings and mesodermal structures that form the cartilage and smooth muscle walls.
As development continues, the laryngotracheal diverticulum continues to branch and bud and forms the bronchi and branching bronchioles.
From 16 weeks onward, respiratory surfaces begin to form, and the maturation of the lungs develops with alveolar sacs forming and pneumocyte development forming the respiratory membrane.

The formation of the alveoli and the respiratory membrane is not complete until after birth, and alveolar formation continues until the age of eight.

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Blood Supply and Lymphatics

The upper airways receive blood supply from various branches of the external carotid artery and drain into the internal jugular. The naso and oropharynx also receive blood supply from the facial artery branch of the external carotid via the tonsillar artery. The venous drainage of these structures is via the pharyngeal plexus into the internal jugular vein. The lymphatic drainage is through various lymphatic plexuses of the neck surrounding the internal jugular vessels.

The lower airways receive blood flow from two sources: the pulmonary circulation and the bronchial circulation.

The pulmonary circulation provides blood from the heart for oxygenation through the right and left pulmonary arteries which follow a branching structure similar to that of the airways themselves. This blood returns as oxygenated blood through the pulmonary veins which follow an independently branching structure to return to the right ventricle.

Bronchial circulation provides oxygenated blood to the airway structures themselves. These arteries arise independently from the systemic circulation. The two left bronchial arteries emerge from the thoracic aorta; whereas, the right bronchial artery arises either from one of the superior posterior intercostal arteries or a common trunk with the left superior bronchial artery. These provide nutrition and oxygen to tissues as far as the end of the conducting airways where they anastomose with the pulmonary circulation.

The bronchial veins are only present near the lung hilum which drain blood from the trachea, and bronchi drain into the azygos vein on the right and either the accessory hemiazygos veins or the intercostal vessels on the left. Pulmonary veins drain the more distal circulation where a small amount of deoxygenated blood makes a minimal impact on the saturation of the returning blood.

Lymphatic drainage of the lower airways is through the deep lymphatic plexuses of the pulmonary lymphatic plexuses. These drain to the

superior and inferior tracheobronchial lymph nodes bilaterally and then to the right and left ducts connecting to the venous angles, usually directly but on the left, this may converge with the thoracic duct first. Paratracheal nodes drain lymph from the trachea directly into the right and left lymphatic ducts.

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Nerves

Innervation of the pharynx is via cranial nerves VII, IX, X, and XII. The larynx is supplied by the vagus (cranial nerve X) by the superior laryngeal branch directly and the clinically important recurrent laryngeal branch.

The lower airways receive parasympathetic fibers from the vagus, some of which are afferent sensory nerves that transmit cough sensations from specialized J receptors in the mucosa as well as stretch receptors from the bronchial muscles and inter-alveolar connective tissues. The efferent fibers of the vagus cause broncho-constriction and secretion from the glandular tissues in the airways. The efferent sympathetic fibers cause bronchodilation by inhibiting the activity of the smooth muscles of the airways.

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Muscles

The muscles of the pharynx and larynx provide the structure of the upper airways and form from striated muscles under visceral and somatic control. They relate to the action of swallowing.

The lower airways have a layer of smooth muscle within their walls. It is present along all of the conducting airways and allows for visceral control of bronchoconstriction

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Physiologic Variants

The most common anatomic variation is an abnormal tracheo-oesophageal fistula. This variation occurs most commonly in males and often is associated with oesophageal atresia. It occurs with the incomplete fusion of the tracheo-oesophageal folds which would divide the developing foregut into respiratory and oesophageal portions.

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Surgical Considerations

The anatomy of the airway is important in all trauma and emergency surgical scenarios. As in any emergency assessment, a practitioner should know it is most important to consider and evaluate the patent airway

The upper airways can be controlled using airway devices and bypassed using endotracheal intubation. If this is not possible, emergent surgical access to the airway is imperative and is performed through an emergency cricothyroidotomy.

Airway assessment is relevant to many common surgeries:

- Tonsils causing any airway compromise indicate surgical removal.
- Any neck trauma external to the airway can cause an external compression which can compromise the airway. This compromise is of particular importance in trauma and operations on surrounding structures such as thyroidectomy.

Clinical Significance

The importance of the upper airway assessment is paramount in both emergency and anesthetic scenarios.

The upper airway assessment can be performed and enhanced by the following assessment tools:

- The Malampati score which describes the visible airway
- The "3, 3, 2" rule in which three estimated measurements of the inter incisor distance
- The hyoid-mental distance, hyoid-thyroid cartilage distance is measured, and if these are shortened, it implies a difficult airway.

The cricoid cartilage is important both as a clinical landmark and also as the only complete cartilage ring within the upper airway used during cricoid pressure maneuvers.

The narrowest portion of the upper airway is the cricoid cartilage in children; therefore, cricothyroidotomy is not recommended in children younger than the age of eight. As children grow and mature, the glottic opening becomes the most narrow point in the airway, and therefore, the most likely point of obstruction and allows bypass by the insertion of a cricothyroidotomy airway.

The trachea is the most anterior structure of the neck except for where the thyroid covers it. This means that it can be accessed to provide an airway in both emergencies (cricothyroidotomy) and elective procedures (tracheotomy).
The trachea should align with the sternal notch. If this alignment deviates, it can indicate a lung or mediastinal pathology.
The right, main bronchus is shorter, wider, and vertically aligned, and this means it is the most common site for aspiration, both in a foreign body aspiration and during the occurrence of an aspiration pneumonitis causing right lower lobe consolidation.
In clinical assessment of the lower airways, through auscultation and by the presence of "wheezing" as turbulent airflow generates a musical noise, airway narrowing through edema or bronchoconstriction can be detected.

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Anticipating and recognizing respiratory decompensation is only the first step in emergency airway management. Practitioners must be familiar with the indications and techniques for airway intervention and how to anticipate a difficult airway. The basic approach includes assuring airway patency, protection from aspiration, and providing adequate oxygenation and ventilation. This slideshow describes the steps involved in airway assessment, provision of rapid sequence induction (RSI), endotracheal intubation, and confirmation of tube placement as well as steps to take in the event of a failed or difficult intubation.
This image shows the use of a GlideScope video laryngoscope (a commonly used laryngoscope and one of the many portable video laryngoscopes on the market) to intubate the trachea of a morbidly obese patient with challenging airway anatomy.

Indications

- Treatment of suspected upper airway obstruction in obtunded or unresponsive patients
- Part of initial emergency treatment for apnea or impending respiratory arrest
- Improvement of airway patency during BVM ventilation and sometimes during spontaneous breathing
- Confirmation of apnea

Contraindications

Absolute contraindications:

- There is no medical contraindication to providing rescue breathing; however, a patient may have a legal contraindication (do-not-resuscitate order or specific advance directive in force).

Relative contraindications:

- Suspected or actual cervical spine injury

Tilting the head or otherwise moving the neck is contraindicated in a patient with a possible cervical spine injury, but maintaining an airway and ventilation is a greater priority. In the setting of a possible cervical spine injury, the jaw-thrust maneuver, in which the neck is held in a neutral position, is preferred over the head tilt–chin lift maneuver.

Complications

Complications are uncommon and include

- Spinal cord injury if the cervical spine has an unstable bony or ligamentous injury
- Exacerbation of mandibular injury

Equipment

- Gloves, mask, gown (ie, universal precautions)

- Towels, sheets, or commercial devices (ramps) for elevating neck and head into optimal positioning
- Suctioning apparatus and Yankauer catheter; Magill forceps (if needed to remove easily accessible foreign bodies and patient has no gag reflex), to clear the pharynx as needed

Additional Considerations

- Suction should be used if necessary to clear the upper airway.

Positioning

The sniffing position—only in the absence of cervical spine injury

- Position the patient supine on the stretcher.
- Align the upper airway for optimal air passage by placing the patient into a proper sniffing position. Proper sniffing position aligns the external auditory canal with the sternal notch. To achieve the sniffing position, folded towels or other materials may need to be placed under the head, neck, or shoulders, so that the neck is flexed on the body and the head is extended on the neck. In obese patients, many folded towels or a commercial ramp device may be needed to sufficiently elevate the shoulders and neck. In children, padding is Head and neck positioning to open the airway: Sniffing position

- A: The head is flat on the stretcher; the airway is constricted. B: The ear and sternal notch are aligned, with the face parallel to the ceiling (in the sniffing position), opening the airway. Adapted from Levitan RM, Kinkle WC: The airway Cam Pocket Guide to Intubation, ed. 2. Wayne (PA), Airway Cam Technologies, 2007.
- Relevant Anatomy

- Aligning the external auditory canal with the sternal notch may help open the upper airway and establishes the best position to view the airway if endotracheal intubation becomes necessary.

- The degree of head elevation that best aligns the ear and sternal notch varies (eg, none in children with usually needed behind the shoulders to accommodate the enlarged occlarge occiputs, a large degree in obese patients).

- Step-by-Step Description of Procedure
- Head tilt–chin lift

- Tilt the patient's head back by pushing down on the forehead.

- Place the tips of your index and middle fingers under the chin and pull up on the mandible (not on the soft tissues). This lifts the tongue away from the posterior pharynx and improves airway patency.

- Be sure to pull up only on the bony parts of the mandible. Pressure to the soft tissues of the neck may obstruct the airway.
- Jaw thrust

- Stand at the head of the stretcher and place your palms on the patient's temples and your fingers under the mandibular rami.

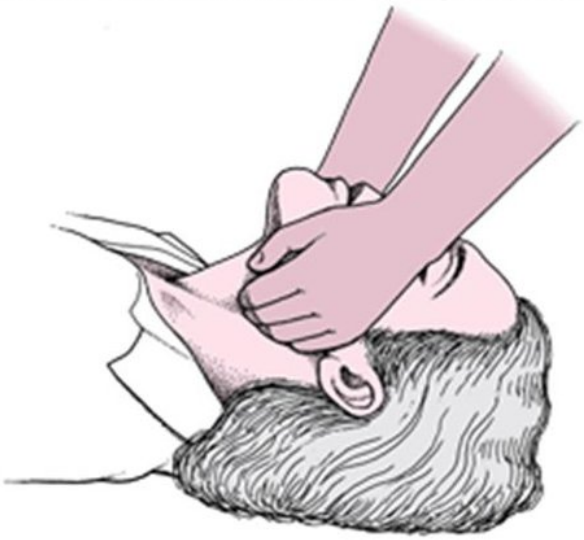
- In patients with possible cervical spine injury, avoid extending the neck.

- Lift the mandible upward with your fingers, at least until the lower incisors are higher than the upper incisors. This maneuver lifts the tongue along with the mandible, thus relieving upper airway obstruction.

- Be sure to pull or push up only on the bony parts of the mandible. Pressure to the soft tissues of the neck may obstruct the airwayiput.
- Jaw thrust
- How To Do The Head Tilt–Chin Lift and Jaw-Thrust Maneuvers

- Aftercare- Maintain these positions as long as necessary.

The head is flat on the stretcher; the airway is constricted. B: The ear and sternal notch are aligned, with the face parallel to the ceiling (in the sniffing position), opening the airway. Adapted from Levitan RM, Kinkle WC: The airway Cam Pocket Guide to Intubation, ed. 2. Wayne (PA), Airway Cam Technologies, 2007.



A:

VALUE ADDED COURSE

ASSESSMENT OF UNCONSIOUS PATIENT AND AIRWAY MANAGEMENT

Annexure II

STUDENT ENROLLMENT LIST (JULY-DEC 2021)

S.No.	University no	Name of the student	Year / CRRI	Signature
1.	U15MB330	NAVEEN ANUSH .R	II nd	
2.	U15MB331	NAYANA.G.CHANDRAN	II nd	
3.	U15MB332	NIVEDHITHA .A.N	II nd	
4.	U15MB333	NIVETHA. S	II nd	
5.	U15MB334	NIVETHITHA. R.N.	II nd	
6.	U15MB335	PADMA SUNDARI.P	II nd	
7.	U15MB336	PIRAI NILA. M	II nd	
8.	U15MB337	PRAJEETH BALAGE. B	II nd	
9.	U15MB338	PRAKASH .M	II nd	
10.	U15MB339	PRATIBA SHRUTHY. M	II nd	
11.	U15MB340	PRAVEEN. R	II nd	
12.	U15MB341	PREETHIKA. R	II nd	
13.	U15MB342	PRIYADHARSHINI .R	II nd	
14.	U15MB343	RAGHAVI .B.R	II nd	
15.	U15MB344	RAJESH .K	II nd	
16.	U15MB345	RAKESH.R	II nd	
17.	U15MB346	RAM KUMAR. S	II nd	
18.	U15MB347	RAMRAJ. D	II nd	
19.	U15MB348	RATCHAKESH. R	II nd	
20.	U15MB349	REVANTH. C	II nd	

RESOURCE PERSON

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

Dr CHANDRASEKAR

COORDINATOR

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

Dr S NITHIANANDAM

Annexure III

MCQ: ASSESMENT OF UNCONSCIOUS PATIENTS

1. What are the interpretations in the GCS

   a. Eye response

   b. Motor response

   c. Verbal response

   d. All the above

2. What are the signs that a person may become unconscious

   a. Sudden inability to respond

   b. Slurred speech

   c. Confusion

   d. All the above

3. How do you define coma in patient under GCS

   a. >8

   b. <8

   c. >9

   d. <9

4. Under which condition will you consider GCS and its interpretation

   a. Myocardial infarction

   b. Traumatic brain injury

   c. Shock

   d. All the above

5. CPR stands for

   a. Circulatory pulmonary resuscitation

   b. Cardiopulmonary resuscitation

   c. Cardiopulmonary revival

   d. Circulatory pulmonary restitution

6. Mallampatti score describes

   a. Breathing

   b. Circulation

   c. Visible airway

   d. All the above

7. Upper airways receives blood supply from

   a. Branches of external carotid artery

   b. Branches of internal carotid artery

   c. Subclavian artery

   d. None of the above

8. Under eye response in GCS eyelid remains closed with pain comes under which score

   a.3

   b.2

   c.1

   d.0

9. Nystagmus is _ seen in unconscious patients

   a. Commonly

   b. Uncommonly

   c. Frequently

   d. None of the above

10. Under GCS verbal response score 2 is interpreted as

a. No verbal response

b. Incomprehensible sound

c. Confused

d. Inappropriate words

Ramraj.D

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Padmasundari P

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Annexure V

Student Feedback Form

Course Name: **ASSESSMENT OF UNCONSCIOUS PATIENT AND AIRWAY MANAGEMENT SKILLS**
SUBJECT CODE: ANAES 03

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: **ASSESSMENT OF UNCONSCIOUS PATIENT AND AIRWAY MANAGEMENT SKILLS**
SUBJECT CODE: ANAES 03

Name of Student: RAKESH.R Roll No.: U15MB345

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: **ASSESSMENT OF UNCONSCIOUS PATIENT AND AIRWAY MANAGEMENT SKILLS**
SUBJECT CODE: ANAES 03

Name of Student: Prakash.H Roll No.: U15MB338

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: 02.12.2021

From
Dr. Nithianandam
Professor and Head,
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: ASSESSMENT OF UNCONSCIOUS PATIENT AND AIRWAY MANAGEMENT

Dear Sir,

With reference to the subject mentioned above, the department has conducted the value-added course titled: ASSESSMENT OF UNCONSCIOUS PATIENT AND AIRWAY MANAGEMENT in July- Dec 2021 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.Nithianandam

Professor & Head Dept. Anaesthesiology
Sri Lakshmi Narayana Institute of Medical Sciences
Osudu, Kudapakkam, 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 _RAGHAVI B R_____ has actively participated in the Value Added Course on Assessment of Unconscious patient and Airway management held during July - December 2021 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. CHANDRASHEKAR

RESOURCE PERSON

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Dr. NITHIANANDAM S

COORDINATOR

Head of Dept. - Anaesthesiology
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Osudu, Kudapakkam, Puducherry - 605 502.

Sri Lakshmi Narayana Institute of Medical Sciences

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CERTIFICATE OF MERIT

This is to certify that ____PRAVEEN R_____ has actively participated in the Value Added Course on Assessment of Unconscious patient and Airway management held during July - December 2021 Organized by Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry- 605 502, India.

Dr. CHANDRASHEKAR
RESOURCE PERSON

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