M.D. ANAESTHESIOLOGY

[Syllabus Approved by Board of Studies, Medical & Health Sciences]

Programme Code	HLTH09A02
Programme Details	MD ANAESTHESIOLOGY
Programme Learning Outcomes (PLOs / PSOs)	ANNEXED IN THE BELOW FORMAT
Eligibility Criteria	**AS PER NMC NORMS**
Duration of the Course	3 YEARS
Programme Structure (Credit-Based)	NA
Detailed Course Syllabus	ANNEXED IN THE BELOW FORMAT
Teaching–Learning Methodologies	3 YEARS RESIDENCY PROGRAM
Examination & Evaluation System	ANNUAL APPRAISALS FOLLOWED BY FINAL YEAR EXAMINATION AS PER NMC NORMS
Internship / Project / Dissertation Guidelines	1 YEAR MANDATORY BOND
Program In Charge	HEAD, DEPT OF ANAESTHESIOLOGY Academic Coordinator. Dr Swapnil Parab, swapnil.parab@tmc.gov.in
Annexure (Books / Journals etc)	ANNEXUED

M.D. (ANESTHESIA)

Programme Code: HLTH09A02

Programme Outcome:

- To train the candidate in skills and knowledge in various aspects of Anaesthesia – service, training & research
- This will also enable the individual to practice anaesthesia discipline
- To be able to participate in the holistic management, including preoperative assessment, risk stratification, preoperative optimization for the anesthesia, post anaesthesia and postsurgery care, care of the critically ill patient in the intensive care unit.
- To Be able to manage acute post-operative pain, chronic pain management, be a part of the multidisciplinary team delivering treatment and follow-up of a patient receiving anaesthesia. The candidate should be able to implement these skills and deliver the service to patients in all age groups including paediatric, geriatric patients.
- He/ she should be able to train other anaesthesia technicians, anesthesia assistants and junior fellow colleagues.
- Candidate should also be well versed in giving life support efficiently in cardiac arrest situations
- The candidate should engage in effective, meaningful research
- The candidate should complete the training programme as per prespecified norms
- All the necessary training and mandatory theory are specified in the syllabus of the MD Anesthesia Course
- The student is expected to participate in the regular academic programmers (Case discussions, students' seminars, CMEs) conducted in the Institute.
- The purpose would be to acquire an understanding of the subject of anesthesia
- The candidate's progress through the 3 years will be assessed by appraisal examinations.

DETAILED SYLLABUS

The course content should encompass a collection of acquired knowledge and the strategy developed for gaining that knowledge. It should include the most useful information, considering the time constraints. The content must ensure that the candidate gains fundamental skills and attitudes in the subject. It should also foster a disciplined approach to thinking for problem-solving and the discovery of new knowledge in the field.

To this Extent the Course Content should Include Certain Facts

- A thorough knowledge of the pharmacokinetics and pharmacodynamics of anaesthetic drugs and adjuncts.
- Knowledge of cardiovascular, respiratory neurological, hepatobiliary, renal and endocrine homeostasis and related drugs as relevant to patients undergoing anaesthesia.
- Relevant anatomy, physiology and biochemistry.
- A basic idea of the relevant physical principles involved in the construction and functioning of equipment used in anaesthesia and monitoring.
- Knowledge to attain expertise of the commonly used techniques in general, regional and local anaesthesia.
- A clear-cut concept of unconsciousness and its implications.
- Relevant knowledge about chronic intractable pain and its management.
- Relevant knowledge to manage patients in the intensive therapy unit.
- Relevant knowledge of medical Statistics
- Knowledge amp; Expertise in Cardiopulmonary resuscitation.

The course content should also cover methods to stimulate candidates' thinking processes and ensure they can critically acquire new information from books, journals, lectures, seminars, and discussions. It should include ways of developing reflective thinking and problem-solving skills through critically analysing events during anaesthesia. The interpretation of these data and the application of logical reasoning should lead to the practical use of facts and principles.

It is unnecessary to emphasise that the course content should ensure that the candidate acquires the essential aptitude and motor skills to become a competent anaesthesiologist, learn the art of teaching students, nurses, and paramedical staff, and carry out a simple research project.

A. 1st Year Theory

- Anatomy of the diaphragm, larynx, and upper and lower airways; learn relevant anatomy for regional anaesthesia and venous cannulations. Some anatomical areas of interest to the anaesthetist include the orbit of the eye, base of the skull, vertebral column, spinal cord and meninges, axilla, first rib, and intercostal space.

- Principles of physics and use of equipment in anaesthesia
  - Anaesthesia machine - checking the machine and assembly of necessary items.
  - Airway equipment, including Tracheostomy Equipment for airway management - mask. LMA. fibreoptic laryngoscopes: other devices like Combi tube etc.
  - Breathing systems, continuous flow systems, draw over system - Assembly and checking.
  - Monitoring in Anaesthesia with concepts of minimal monitoring.
  - Safety in Anaesthesia Equipment.
  - Medical gases storage and central pipeline system.

- Physiology
  - Respiratory, cardiovascular, hepatobiliary, renal, and endocrine systems.
  - Pregnancy, blood groups. Muscle and N M junction, ECG, regulation of temperature and metabolism, stress response, cerebral blood flow, and ICP.

- Pharmacology
  - General pharmacological principles.
  - Concepts of pharmacokinetics and pharmacodynamics
    - Uptake and distribution of inhaled anaesthesia agents.
    - Drug interaction in Anaesthesiology.
    - Drugs used in Anaesthesia.
    - Drugs used for the treatment of diseases and their interactions.

- Theoretical background of the commonly used anaesthetic techniques of general and regional anaesthesia viz.
  - GA- Intravenous. Inhalational, Endotracheal, etc., using spontaneous and controlled modes of ventilation.
  - RA-Spinal, epidural and peripheral nerve blocks.

- Biochemistry relevant to fluid and blood Transfusions.
  - Blood components
  - Perioperative fluid therapy,
  - Acid-base homeostasis in health and disease.

- Documentation and medico-legal aspects of anaesthesia. Stress the importance of accurate documentation.

- Theoretical background on disorders of:
  - Cardiovascular system.
  - Respiratory system
  - Hepatobiliary system.
  - Urinary system.
  - Endocrine system.
  - Pregnancy.

- Cardiopulmonary Resuscitation
  - Theories of the cardiac pump and defibrillation,
  - Resuscitation of a patient with an overdose of drug poisons,
  - Management of unconscious patients,
  - Resuscitation of a severely injured patient.

- Neonatal resuscitation.

- Introduction to Research methodology.

- Preoperative assessments and medication - general principles.

- Introduction to anatomical, physiological, pharmacological and biochemical aspects of pain and pain management.

- Introduction to artificial ventilation.

- Oxygen therapy

- Introduction to the operation theatre, recovery rooms (concepts of PACU). ICU.

- Recovery from anaesthesia.

- Shock-pathophysiology, clinical diagnosis and management.

- Pulmonary function tests - principles and applications.

- Effect of positioning.

B. 2nd Year Theory

- Relevant anatomy of each system
- Physics of equipment used in anaesthesia
  - Medical gases - gas plant. central pipeline Scavenging system.
  - Pressure Reducing valves
  - Anaesthesia machine, Humidifiers
  - Flow meters
  - Vaporizers - Characteristics and functional specifications.
  - Breathing systems-Assembly, functional analysis,
  - Minimum monitoring standards requirements. APL and flow directional valves.
- Sterilisation of equipment.
- Computers, Utility, computer-assisted learning and data storage, Computerised anaesthesia records.
- Pharmacology of drugs used in cardiovascular, respiratory, endocrine, renal diseases and CNS disorders.
- Acid-base and electrolyte balance,
- Interpretation of blood gases and other relevant biochemical values, various function tests and basics of measurement techniques
- Principles of monitoring equipment used for the assessment of
  - Cardiac function viz. Rhythm, pulse, venous and arterial pressures. cardiac output.
  - Temperature
  - Respiratory function, viz., Rate volumes, compliance, resistance, blood gases,
  - Intracranial pressure, depth of anaesthesia, and
  - Neuromuscular block
- Working principles of ventilators.
- Special anaesthetic techniques as relevant to day-care surgeries, anaesthesia in altered environments (e.g. high altitude) and calamitous situations.
- Anaesthetic management in special situations - Emergency, ENT, Ophthalmology, Obstetrics, Obstetric analgesia, Plastic, Dental, Radio-diagnosis, Radiotherapeutic procedures and patients with systemic diseases.
- Medical statistics relevant to data collection, analysis, comparison and estimation of significance.
- Research Methodology Classes

B1. Second Year Experience

- Principles of paediatric anaesthesia. management of neonatal surgical emergencies. Regional Anaesthesia in Infants/ children.

- Associated medical disorders in surgical patients - anaesthesia implications and management.
- Basics of orthopaedic anaesthesia.
- Day care anaesthesia.
- Anaesthesia for otorhinolaryngology with special emphasis on difficult airway management.
- Blood and blood component therapy. Anaesthetic implications in coagulation disorders.
- Monitored anaesthesia care.
- Anaesthetic implications in Diabetic mellitus, thyroid and parathyroid disorders, phaeochromocytoma, Cushing's disease, etc.
- Management of acid-base disorders
- Principles of geriatric anaesthesia
- Anaesthesia outside the OR and in special situations,
- Principle of management in Trauma, disorders and mass casualties

C. 3rd Year Theory

- Anaesthesia for patients with severe cardiac, respiratory, renal and hepatobiliary disorders posted for unrelated surgery.
- Management of patients in shock, renal failure, critically ill and/or on a ventilator.
- Chronic pain therapy and therapeutic nerve blocks.
- Selection, maintenance and sterilisation of anaesthesia and related equipment.
- Principles of anaesthetic management of neuro/ cardiac/ thoracic/ vascular/ Transplantation/ burn and plastic surgery.
- Principles of neonatal ventilation and critical care.
- Principles of human resources and material management.
- General principles of medical audit
- Principles of one-lung anaesthesia

ATTITUDE AND SKILL DEVELOPMENT

▪ ATTITUDE DEVELOPMENT

The student should develop attitudes that lead to:

- Life-long learning and updating
- Sympathetic Communication with relatives
- Sympathetic Communication with patients.
- Appropriate communication with colleagues to function in a group in the OR/ICU
- Become a teacher for Technicians, Nurses, and paramedical staff. And teach undergraduates.
- Ability to discuss. Participate in case discussions and scientific presentations.
- Ability to function as a leader in the Operating room

▪ SKIL DEVELOPMENT

Requirement of Practical Training by Junior Resident

At the end of a 3-year training course, a candidate should have the knowledge and ability to:

- Plan and conduct anaesthesia, recovery, and postoperative pain relief for elective and emergency surgery related to all surgical specialities.
- Carry out basic life support (BLS) and advanced life support (ALS) and train medical and paramedical staff in BLS and ALS.
- Manage unconscious patients: Airway management and long-term management of unconscious patients.
- Manage patients admitted to an intensive care unit.
- Manage patients suffering from chronic intractable pain.

- Organize the Hospital environment to manage a mass casualty situation
- Critically review and acquire relevant knowledge from the journals about the new developments in the speciality.

- Should be able to participate in the anaesthesia audit.

Major stress will be on practical training. The goals of postings, including both general objectives and those specific to sub-speciality postings, will be achieved by rotating the junior resident through various operating theatres, as well as the Intensive Care Unit, Pain Clinic, Emergency Room (Casualty), Outpatient Department, and Peripheral Anaesthesia Facilities.

The recommended period of stay in each area is as follows:

Speciality	Months
General Surgery (cancer surgeries + general surgeries)	3 + 1
Uro-surgery (including cancer and transplant surgeries)	3 + 1
ENT (including cancer and trauma surgeries)	3 + 1
Orthopaedic (cancer surgeries and Trauma)	3 + 1
Gynaecology and Obstetrics	3 + 1
Paediatric Surgery (general paediatric surgeries + cancer surgeries)	1 + 1
Burns and Plastic Surgery	1
Cardiovascular Thoracic Surgery (cancer and non-cancer)	2 +1
Neurosurgery (cancer and non-cancer)	2 +1
ICU (medical and surgical ICU)	3
Recovery	3
Acute Pain Management	1

The student will be instructed in preoperative patient preparation and discussions of intraoperative issues related to cases performed on the day. During these postings, students will first observe and then carry out various procedures, including the listed anaesthetic procedures. Each observed and performed procedure will be recorded in the logbook, which will be signed by the attending faculty.

The trainee will undergo a graded training in the following manner:

Orientation: At the start of the three years, each student should receive an introduction to the hospital operating theatre and the subject of anaesthesia. The candidate shall be assigned thesis guides to assist them in preparing protocols.

Introductory lectures should aim to familiarise students with-

- Basic anaesthesia delivery equipment and monitors, along with essential principles of physics that affect how these devices operate.

- Intravenous anaesthetic drugs and inhalation agents.
- Patient assessment, interpretation of laboratory investigations as they relate to patient care, planning and conducting general anaesthesia, and postoperative management.

Students should be taught basic and advanced cardiac life support. They should also become familiar with the principles of sterilisation and universal precautions. Moreover, they should be able to request a consultation when necessary. Students are encouraged and instructed to research the literature to develop a thesis protocol.

First Year Objectives-

- First-year students will be trained to handle ASA I or II cases. Initially, they will observe and gradually take independent responsibility for administering general and spinal anaesthesia to ASA I and II cases, for both minor and major procedures, under appropriate supervision.
- During their first year, students will rotate through the following specialties: General surgery, orthopaedics, ENT, gynaecology, urology, and recovery room.

Second Year Objectives-

- The student will be taught to administer general and regional anaesthesia to ASA I, II, III, and IV cases under supervision.
- The student will learn to administer epidural analgesia, spinal blocks, and peripheral nerve blocks under supervision.
- The students will acquire skills in basic and advanced cardiac life support, as well as paediatric and trauma life support.
- It is advised that students be posted in the following specialities: Obstetrics, ENT, ICU, Pain Clinic, and peripheral theatres (Non-operating Room Anaesthesia).

- The students should be able to analyse the data and write a thesis. The students should also be able to present the scientific data.

Third Year Objectives-

- Students should be able to plan and administer anaesthesia to all patients under graded supervision, including those undergoing cardiac, neurosurgery, paediatric surgery, and other major operations.

- The aim is to make the student competent and independent enough to handle both elective and emergency cases. The student should also be capable of caring for critically ill patients and managing intractable pain.

- Additionally, the student should understand how to respond to a mass casualty situation.

- **Minimal number of procedures/ case management to be done or observed-**

Open Heart Surgery	3-5 cases
Closed Heart surgeries	5 cases
Craniotomy	5-10 cases

Spine surgeries	5 cases
Joint replacement	5 cases
Organ Transplant surgeries	5 cases
Labour analgesia	5 cases
Central Line insertion (IJV/Subclavian/ femoral)	10
Arterial Line canulation	10
USG guided Fascial plane blocks	10
USG guided peripheral nerve blocks	10- Upper limb, 10- Lower limb
Subarachnoid block	30
Epidural block	30 (including continuous epidural analgesia)
Caudal block	10
Ophthalmic blocks	5
ASA I cases	100
ASA II cases	50
ASA III cases	30
ASA I,I and III Emergency cases	30

DETAILED CURRICULUM FOR POSTINGS

I. OBJECTIVES:

A. Preoperative evaluation

- Learn to gather and synthesise preoperative data and to develop a rational strategy for the perioperative care of the patient. Outpatients: Develop skills in obtaining medical information from sources outside our institution, that is, other hospital and private physicians.
- Learn a comprehensive and systematic approach to preoperative evaluation of patients with systemic diseases. Conduct preoperative medical assessments of patients undergoing various types of surgeries, including both inpatients and outpatients, but especially elderly patients with complex medical conditions such as alcoholism, chronic obstructive pulmonary disease, congestive heart failure, coronary artery disease, hepatic failure, hypertension, myocardial infarction, renal failure, and stroke.
- Learn to identify key problems and present cases in a clear and systematic manner to attending consultants.
- Establish professional relationships with consultants in other specialties to support preoperative assessment.
- Learn to communicate with preoperative patients and develop effective counselling techniques for various anaesthesia procedures. Learn to evaluate and explain the risks of the procedure and obtain informed consent.

B. Anaesthetic Techniques

Learn anaesthetic techniques and skills, and understand how to operate various equipment used by anaesthetists. Develop optimal plans based on the patient's condition. Understand the special considerations and techniques needed to anaesthetise patients in settings both inside and outside the operating theatre. For example, the Cardiac Catheterisation Laboratory, Electroconvulsive Therapy, Genitourinary Clinic, Magnetic Resonance Imager, Radiology, and Radiotherapy.

The students should learn to-

- Perform the anaesthesia machine check and prepare the basic equipment necessary for all anaesthetic cases.
- Prepare a drug table: select appropriate drugs for a case and develop a clear system for organising the drugs and work tables.
- Place standard monitors. for example. electrocardiogram. noninvasive blood pressure device, precordial stethoscope, and neuromuscular blockade monitor. pulse oximeter. and capnograph.
- Learn proper techniques of preoxygenation.

- Learn how to induce anaesthesia, both routine induction and rapid sequence induction. and the pertinent mechanical skills and choice of drugs

- Perform airway management by knowing various procedures and equipment:
  - Direct laryngoscopes using curve and straight blade
  - Use of Videolaryngoscopes
  - Supraglottic devices
  - Fiberoptic Bronchoscope-guided Intubation techniques,

- Manage the 'Failed Intubation' scenario or exercise the 'difficult airway algorithm'
  - All techniques for endotracheal intubation (use of stylet/ bougie)
  - Additional techniques such as retrograde intubation and surgical cricothyroidotomy (both of which will be learned on a mannequin).
  - Use of supraglottic devices

- Awake intubation
  - Topical/Local anaesthesia for the airway
  - Airway nerve block. for example. superior laryngeal nerve and glossopharyngeal nerve block
  - Technique of fibreoptic bronchoscope guided intubation.

- Learn Anaesthesia maintenance:
  - Appropriate choice and use of anaesthetic drugs and adjuvant drugs such as muscle relaxants, and how to monitor their effects.
  - Assessment of Anaesthetic Depth
  - Assessment of Volume Status
  - Replacement of intraoperative fluid losses
  - Appropriate use of blood and blood products,
  - Effect of different types of surgical procedures on anaesthetic management, for example, effects of aortic cross-clamping
  - Appropriate use of intraoperative laboratory tests (blood gas, coagulation tests etc.)

- Become skilled in catheterizing or cannulating the following vessels for sampling blood, measuring concentrations or pressures, or administering drugs or fluids:
  - Veins: all ages and all sizes
  - Arteries: radial, femoral and dorsalis paedis
  - Central vessels: internal jugular, subclavian, femoral, and midline catheters

- Become skilled in using and interpreting the following routine noninvasive and invasive monitors intraoperatively-
  - Electrocardiogram with ST-segment analysis
  - Noninvasive blood pressure
  - Capnograph: values and changes in values and waveform.
  - Pulse oximetry: values and changes in values
  - Neuromuscular blockade monitor
  - Invasive arterial pressure: waveform and changes in the waveform
  - Central venous pressure: values and waveform

- Transesophageal echocardiography: basic understanding
- Transthoracic Echocardiography
- Point of Care Ultrasound Examination

- Become skilled in techniques for regional anaesthesia, such as-
  - Brachial plexus blockade: interscalene, supraclavicular, axillary techniques with and without nerve stimulator for localization.
  - Spinal Anaesthesia
  - Epidural Anaesthesia: lumbar, caudal, and thoracic.
  - Lower extremity blockade: femoral, sciatic, and lateral femoral cutaneous nerves
  - Upper extremity blockade: ulnar, median, and radial nerves
  - Ultrasound-guided fascial plane blocks.

- Become skilled in discontinuing Anaesthesia and monitoring emergence from anaesthesia
  - Reversal of neuromuscular blockade
  - Determination of the appropriate time for extubation
  - Monitoring of airway function during and after emergence

- Become familiar with/skilled in perioperative pain management
  - Postoperative epidural infusion (opioids, local Anaesthetics)
  - Patient-controlled analgesia
  - Adjunctive nerve blockade

- Become skilled in the use of techniques for conscious sedation and monitored anaesthesia care
  - Selection of patients for conscious sedation
  - Selection of drugs for use in conscious sedation
  - Monitoring techniques that are helpful in controlling the depth of sedation
  - Recognition of when conscious sedation has become unconscious sedation

- Know how to successfully resuscitate and develop skills in Basic Life Support and Advanced Cardiac Life Support

- Work with other members of the OR team, including surgeons and nurses, to provide optimal care for surgical patients, with a focus on developing communication skills.

TRAINING AND EVALUATION OF RESIDENTS IN VARIOUS SUBSPECIALITIES OF ANAESTHESIA

▪ NON-OPERATING ROOM ANAESTHESIA

Course Details:

- **Radiology Suites**
  - Know the management of general anaesthesia for patients requiring imaging under general anaesthesia.
  - Know the management of dye allergy
- **Magnetic resonance imaging (MRI)**
  - Monitoring
  - Equipment options in the MRI suite
  - General Anaesthetic/sedation techniques
- **Electroconvulsive shock therapy (ECT)**
  - Preoperative assessment
  - Anesthetic techniques and drug effects on seizure duration
  - Hemodynamic responses and appropriate treatment
- **Cardiac Catheterisation Laboratory**
  - Preoperative evaluation
  - Anaesthetic consideration
  - Procedures in Children
  - Electrophysiologic tests/radiofrequency ablation Cardioversion
- **Urology service**
  - Transurethral resection of the prostate: recognize and treat hyponatermia: know different Anaesthetic options and advantages and disadvantages of each
  - Irrigation fluid options: know advantages and disadvantages of each
  - Anaesthetic techniques for extracorporeal shock wave lithotripsy
  - Anaesthetic considerations for percutaneous placement of nephrostomy
- **Interventional Radiology Suite**
  - To learn anaesthesia management of procedures like Radiofrequency ablation, sclerotherapy of vascular malformations, USG/ CT guided biopsy, Percutaneous biliary drainage, angioembolisation etc.

- **Evaluation to determine goal achievement**
  - The resident will be evaluated regularly at the end of the posting by all attending consultants who worked with them.
  - Residents will complete a logbook. After each posting, it will be checked and signed by the faculty concerned.
  - Yearly appraisal shall be conducted to assess the knowledge and the competency of the student in different subspecialties of anaesthesia.

▪ TRAUMA & RESUSCITATION

All residents must complete basic and advanced cardiac life support, advanced trauma life support, and pediatric life support training. They should begin with Airway, Breathing, Circulation (ABC) training, master the skills through repetitive practice, and then advance to higher levels of life support

- **Objective**
  - Acquire Improve ability to evaluate & triage the patient and formulate Anaesthetic plans especially in the trauma patient.
  - Acquire the ability to administer operative anaesthesia safely and rapidly:
  - Acquire the ability to identify, prevent and care for postoperative complications

- Skills

Manage anaesthesia for severely traumatised patients by doing the following as rapidly as possible:
  - Evaluation/documentation
  - Triage
  - Placement of intravascular catheters
  - Airway intubation/ Tracheostomy/ securing the airway
  - Ultrasound-guided assessment (POCUS)
  - Fluid resuscitation
  - Choose among anaesthetic options and induce and maintain anaesthesia safely

- Evaluation to determine goal achievement
  - The resident will be evaluated regularly at the end of the posting by all attending consultants who worked with them.
  - Residents will complete a logbook. After each posting, it will be checked and signed by the faculty concerned.
  - Yearly appraisal shall be conducted to assess the knowledge and the competency of the student in different subspecialties of anaesthesia.

Course Outcomes:

- To gain knowledge and understanding of preoperative evaluation and optimization of patients, risk stratification and provide anaesthesia for diagnostic and therapeutic procedures at CT, MRI, Intervention radiology, cardiac Cath lab, Digital Subtraction Angiography lab, Endoscopy, electroconvulsive therapy with understanding of day care anaesthesia.

▪ POST ANAESTHESIA CARE UNIT

Objective:

Understand the importance, purpose, and components of the anaesthesia record and the report from the OT anesthesiologist.
Use information about the patient that is received and observed on admission to the PACU and during care there for the following purposes:

- To create a care plan
- To score the patient's condition according to the Aldrete score
- To assess the patient's recovery and condition for a safe discharge or transfer

Course Details:

- **Skills**

Observe, recognise, and learn to manage the most common problems likely to occur in the Post-Anaesthesia Care Unit (PACU). Understand the parameters patients must meet for safe discharge from the PACU to the next stage:

- Home
- Inpatient ward
- Intensive care unit

Detection of Hypoxemia and Oxygen therapy should be learned in this posting. Students should be able to recognize:

- Airway integrity and compromise.
- Arrhythmia
- Hypertension and its management
- Hypotension and its management
- Pain prevention and relief.
- Nausea and vomiting
- Decreased urine output and its management
- Emergence delirium and its management
- Delayed emergence from Anaesthesia
- Shivering and its management
- Management of postoperative patients with endotracheal tube and tracheostomy tube in situ (check for patency, suction etc)
- Assessment of fluid responsiveness and fluid administration.

- **Evaluation to Determine Goal Achievement**

- The resident will be evaluated regularly at the end of the posting by all attending consultants who

worked with them.

- Residents will complete a logbook. After each posting, it will be checked and signed by the faculty concerned.
- Yearly appraisal shall be conducted to assess the knowledge and the competency of the student in different subspecialties of anaesthesia.

Course Outcomes:

- Candidate should be efficient in Monitoring patient's recovery in post anaesthesia care unit, Detecting and diagnosing problems peculiar to PACU such as delayed recovery due to drug overdoses, haemodynamic instability, acute pain management, issues related to airway, triaging the patients as per need – to more intense monitoring, shift to floor etc.
- Management of patients who have undergone massive blood transfusion in OT, patients requiring postoperative mechanical ventilator (MV) support, setting correct ventilator parameters, diagnosing patient ventilator desynchrony, weaning patients from MV, getting appropriate referrals such as nutritionist reference, physiotherapy etc. Mobilisation of patient in postop care unit
- Should also understand principles of haemodynamic monitoring and efficiently manage patients with haemodynamic instability

INTENSIVE CARE UNIT

Objective

Understand the spectrum of critical illnesses requiring admission to the ICU, and recognise the critically ill patient who needs intensive postoperative care from one who does not.

Course Details

Principles of managing a critically ill medical patient

- Cardiovascular

  Recognition and acute management of shock (all forms), cardiac arrhythmias, cardiogenic pulmonary oedema, acute cardiomyopathies, hypertensive emergencies, and myocardial infarction.

- Respiratory

  Recognition and acute management of respiratory failure, including acute and chronic cases, Status asthmaticus, smoke inhalation, and airway burns. Address upper airway obstruction caused by foreign bodies or infection. Manage near-drowning and adult respiratory distress syndrome. Use pulmonary function tests, such as bedside spirometry.

- Renal

  Recognition and acute management of Fluid and electrolyte disturbances.Should be able to prescribe fluids in renal failure and acid-base disorders. Should understand principles of drug dosing in renal failure. Should know when to use dialysis or haemofiltration.

- Central Nervous System

  Recognition and Acute Management of Coma: Drug overdose, Glasgow Coma Scale, metabolic and endocrine emergencies such as diabetic ketoacidosis, hypoadrenal crisis, and pheochromocytoma.

- Infectious disease

  Recognition and acute management of hospital-acquired and opportunistic infections, including acquired immunodeficiency syndrome. Should know how to protect against cross-infection, infection risks to healthcare workers.

- Hematologic disorders

  Recognition and acute management of defects in hemostasis and hemolytic disorders should include the ability to prescribe component therapy based on the results of the coagulation profile. Should be able to diagnose Deep Vein thrombosis and know the Principles of Anticoagulation and fibrinolytic therapy. Know the indications of Plasmapheresis for acute disorders, including neurologic and hematologic. diseases.

- Gastrointestinal disorders

  Should be able to recognise and manage gastrointestinal bleeding. Hepatic failure should be able

to prescribe prophylaxis against stress ulcer bleeding.

- **Procedures**

  - Should be able to do the following at the end of the posting:
    - Radial arterial catheters and other sites as necessary
    - Central venous catheters (Subclavian route/ Internal jugular vein)

  - Understand and interpret the following
    - Thermodilution cardiac output measurement and assessment of the related indices (e.g. Systemic Vascular Resistance Index, Cardiac index etc)
    - Technological basis for cardiac output measurements
    - Factors producing errors in cardiac output measurements

  - Manage cardiovascular instability
    - Know different fluid therapy options and when to use them
    - Know the different inotropic drugs and when to use them
    - Know how to use invasive monitoring devices to guide the therapeutic use of fluids and inotropic drugs
    - Assessment of fluid responsiveness.

  - Manage respiratory failure and postoperative pulmonary complications
    - Know how to use arterial blood gas and ventilatory variables to evaluate postoperative patients with respiratory failure
    - Understand the operation of mechanical ventilators, including different ventilatory modalities and how each is best used for management of respiratory failure, principles and use of noninvasive ventilation, including modes, complications and modes of weaning
    - Principles & application of Oxygen therapy, Non-invasive ventilation, High Flow Nasal Oxygen Treatment and invasive mechanical ventilation.

  - Pathophysiology and Clinical manifestation of septicemia and its treatment
    - Recognize sepsis in the postoperative patient, including all the typical hemodynamic findings Know the appropriate tests to diagnose sepsis
    - Use various monitoring devices to aid in managing sepsis: specifically focus on optimisation of oxygen delivery to tissues in the septic patient and the appropriate management of fluids and vasopressors to achieve these objectives
    - Know the different classes of antibiotics and antifungal agents and their use in treating sepsis

  - Deliver appropriate nutritional support
    - Learn about the use of enteral nutrition in the patient who cannot tolerate oral intake.
    - Learn about the use of parenteral nutrition in the critically ill surgical patient
    - Interact with nutrition support services in planning nutrition for the critically ill patient

  - Provide effective pain management and sedation postoperatively
    - Learn the appropriate use of pain management modalities in the ICU, including:
      - Patient-controlled analgesia
      - Epidural and subarachnoid narcotics/ local anaestheties.
    - Learn the use of sedative/hypnotic drugs in the ICU for Patient on Ventilator

- Principles of Transplantation
  - Care of Immunosuppression,
  - Infections in the immunocompromised patient, and
  - Identify organ rejection

- Monitoring and Biostatistics
  - Should be able to use Prognostic indices, such as the Acute Physiology and Chronic Health Evaluation (APACHE) score, the therapeutic intervention scoring system and know the concept of audit

- Ethical and legal aspects of critical care
  - Know the legal importance of documentation, record keeping and communication.
  - Should be able to take informed consents, not resuscitate orders (DNR) and withdrawal of therapy.

- Communication in the ICU
  - Should be able to communicate with distressed relatives
  - Should be able to provide an accurate picture of a critical patient. But with compassion in view of the critical nature of the illness
  - Should be able to transport a critically ill patient/ resuscitate a patient with acute traumatic injury
  - Should be able to discuss with the experts from other specialities and the nursing staff

Course Outcomes:

- To gain knowledge of physiology of respiratory and cardiovascular system in details, acid base physiology, electrolyte disturbances and arrhythmias, basics of mechanical ventilation and management of types of shock
- To gain knowledge and skills for basic and Advanced haemodynamic monitoring
- To learn the care of unconscious patient
- To gain knowledge and skills for basic and Advanced cardiopulmonary resuscitation
- To understand basics of communications and learn how to effectively communicate with patients and their care givers

Evaluation to determine goal achievement

- The resident will be evaluated regularly at the end of the posting by all attending consultants who worked with them.
- Residents will complete a logbook. After each posting, it will be checked and signed by the faculty concerned.
- Yearly appraisal shall be conducted to assess the knowledge and the competency of the student in different subspecialties of anaesthesia.

CARDIOVASCULAR ANAESTHESIA

Objectives

- Understand cardiac physiology. Develop knowledge of cardiovascular anaesthesia (anaesthesia for patients with cardiovascular disease). Select suitable anaesthetic techniques for patients with various types of cardiovascular disease and acquire the skills for lifelong continuing education.
- Develop technical and monitoring skills necessary for cardiovascular anaesthesia.
- Administer anaesthesia for a wide variety of cardiothoracic cases and develop an interest in further learning
- Conduct a comprehensive preoperative assessment of the patient undergoing cardiothoracic and vascular surgery.

- Understand intraoperative anaesthetic management for patients undergoing cardiopulmonary bypass. Know how cardiopulmonary bypass is established and discontinued. Comprehend cardiopulmonary bypass and discuss its mechanical aspects as follows:

  - Different types of pumps - pulsatile and nonpulsatile
  - Physiology of hypothermia and cardiac and cerebral protection
  - Effects of bypass on volumes of distribution and clearance of Anaesthetic drugs and Anaesthetic maintenance, including amnesia.

- Know how and why to use inotropic support and vasodilators. and antiarrhythmic drugs that may be necessary before, but are especially necessary after cardiopulmonary bypass.
- Develop an understanding of the key issues involved in the perioperative care of children with congenital heart disease.

Procedures

Insert vascular catheters or cannulas for adult and paediatric patients and take measurements from them as follows:

- Arteries (radial, femoral and dorsalis paedis)
- The internal jugular vein and the subclavian vein
- Thermodilution cardiac output
- Observe/know about a Transesophageal echocardiograpy (TEE) probe and interpret TEE images
- Manage care during cardiac surgery as follows:
  - Blood replacement
  - Monitoring the effect of heparin
  - Post-cardiopulmonary bypass coagulopathy
  - Rationale for various therapies, such as aprotinin, designed to prevent coagulopathy
  - Use of point-of-care coagulation tests e.g thromboelastography

- Know the following procedures and anaesthetic implications
  - Aortic repairs
  - Congenital repairs - pediatric

- Coronary artery bypass grafting and valves - adults
- Thoracic surgery- One lung ventilation, post-thoracotomy pain management
- Transplantation - heart and lungs

- Work as a team member with fellow anaesthesiologists. surgeons, perfusionists, and nurses.
- Maintain good clinical judgment under stress and act quickly and accurately in diagnosis and interpretation. and treatment of intraoperative problems

Course Outcomes:

- To gain thorough understanding of cardiovascular and intrathoracic physiology and pathophysiology, preoperative evaluation and optimization of patients, risk stratification. Acquire skills and knowledge to provide anaesthesia for surgery for CABG, valvular heart diseases repair, congenital heart diseases and vascular repairs

- **Evaluation to Determine Goal Achievement**
  - The resident will be evaluated regularly at the end of the posting by all attending consultants who worked with them.
  - Residents will complete a logbook. After each posting, it will be checked and signed by the faculty concerned.
  - Yearly appraisal shall be conducted to assess the knowledge and the competency of the student in different subspecialties of anaesthesia

NEUROANAESTHESIA

Course Details:

- **Goals**
  - Safely administer anaesthesia to patients with neurological conditions undergoing neurological or non-neurological surgery, diagnostic procedures requiring anaesthesia, or nonsurgical interventions that need anaesthesia.
  - Understand the basic concepts of central nervous system (CNS) physiology as they relate to neuroanaesthesia. Specifically, master the autoregulation of blood flow, the blood flow response to CO_2, the blood flow response to cerebral oxygen ($CMRO_2$) and glucose (CMRglu) metabolic rates, and cerebrospinal fluid physiology.
  - Understand the effects of commonly used anaesthetic agents and adjuvant agents, such as antihypertensives, on cerebral physiology.
  - Understand the anaesthetic implications of the most common neurosurgical procedures, that is, what is likely to occur during neurosurgery that will influence anaesthetic management.
  - Understand the fundamental principles underlying electrophysiological monitoring of the brain and spinal cord.
  - Understand how concurrent medical illnesses impact anaesthesia during neurological surgery.

- **Objectives**

  Review the medical history and physical examination of patients; assess their major neurosurgical issues. Evaluate the patient's Glasgow Coma Scale as well as other medical factors that may affect anaesthetic care; and understand what information about nervous system function and pathology is important to the anaesthetist.

  - Recognize both the adult and pediatric patient with increased intracranial pressure (ICP).
  - Differentiate between radiculopathy and myelopathy and understand the anaesthetic implications of each, that is, which patients require awake intubation and positioning.

  - Understand the basic differences between various types of brain, spinal cord, and metastatic tumours of the CNS and their links with oedema and intraoperative blood loss. Be aware of the anaesthetic implications of:
  - Acoustic neuroma, ependymoma, gliomas, meningioma, and pituitary tumours. Understand the different types of spinal operations and their anaesthetic implications.
  - Anterior cervical discectomy and fusions, anterior cervical corpectomies, posterior cervical fusions, laminectomies, and foraminotomies; laminectomies for excision of spinal cord tumours, both intramedullary and extramedullary; lumbar laminectomies, microdiscectomies, corpectomies, and fusions with instrumentation; thoracic laminectomies and discectomies.
  - Anticipate premedication for and anaesthetic considerations during electrocorticography
  - Anticipate airway and sedation needs for stereotactic neurosurgical procedures performed with

either general anaesthesia or monitored anaesthesia care.

Perform the specific procedures and monitoring techniques required to care for the neurosurgical patient.

- Choose appropriate premedication and agents for Anaesthetic induction and maintenance based on a knowledge of their effects on cerebral physiology and on neuropathology
- Choose and place the following monitors and monitoring devices for use during spinal and intracranial surgery: Arterial line, central venous (CVP) or pulmonary artery (PA) pressure catheters by all approaches, especially the basilic or cephalic veins.
- Perform techniques for awake intubation and positioning of the neurosurgical patient with either an unstable neck or myelopathic signs and symptoms.
  - Assess when awake intubation and positioning are needed
  - Intubate an awake patient such that coughing or movement are minimal
  - Master Anaesthesia for awake intubation, including but not limited to, superior laryngeal and glossopharyngeal nerve blocks and transtracheal injection of lidocaine

- Detect and treat air embolism during neurosurgery:
  - Know the use of monitors to detect air embolism and what monitoring patterns are associated with air embolism.
  - Recognize the relative risks of different procedures and positions for air embolism.

- Know general principles of positioning the patient for neurologic surgery and the advantages and disadvantages of each position:
  - Lateral
  - Prone
  - Supine-head turned
  - Sitting - theoretical knowledge only, because this position is no longer used at our institution

- Know Anaesthetic effects on the electroencephalogram (EEG) and evoked potentials and basic implications of and appropriate responses to changes in each.
- Understand the basic indications and techniques, and, if possible, perform the following special procedures used during neuroanaesthesia:
- Know the differential diagnoses and treatment alternatives of intraoperative intracranial hypertension (“tight brain”).

- Reverse general anaesthesia rapidly with a minimum of hemodynamic change to allow early postoperative assessment of the patient and recognize when failure to emerge from Anaesthesia is not likely an Anaesthetic effect.
- Know the management of Head Trauma, and its anaesthetic management

- **Evaluation to Determine Goal Achievement**
  - The resident will be evaluated regularly at the end of the posting by all attending consultants who worked with them.
  - Residents will complete a logbook. After each posting, it will be checked and signed by the faculty concerned.
  - Yearly appraisal shall be conducted to assess the knowledge and the competency of the student in

different subspecialties of anaesthesia.

Course Outcomes:

- To gain thorough understanding of central nervous system physiology and pathophysiology, preoperative evaluation and optimization of patients, risk stratification and provide anaesthesia for elective and emergency surgeries of brain and spine in adult and children.
- To understand triaging of polytrauma patient, their neuroassessment and emergency management
- To understand basics of intracranial pressure monitoring

▪ ACUTE AND CHRONIC PAIN MANAGEMENT

Course Details:

▪ **Goals**

- Differentiate among the different chronic pain states, for example, reflex sympathetic dystrophy and neuropathic or myofascial pain, and know what treatments are effective for each.
- Know the types of drugs that relieve pain and their efficacy, indications, side effects and contraindications and use.
- Know the laboratory tests, radiologic studies, and psychological tests used to help differentiate chronic pain syndromes.
- Learn to perform a thorough, directed history and physical examination, which will emphasize and facilitate the diagnosis of different pain states.
- Know the multidisciplinary approach to acute and chronic pain management.
- Know when it is appropriate to refer patients to different specialists for definitive or adjunctive therapy, for example, neurosurgery, orthopaedic surgery, and neurology.
- Manage acute and perioperative pain syndromes proficiently.

▪ **Objectives**

- Learn the systematic multimodal management of postoperative pain for various surgeries.
- Learn the anatomy of the sympathetic nervous systems, specifically, the anatomy of the epidural and subarachnoid spaces and the location of sympathetic and parasympathetic ganglia
- Perform blocks and techniques in administering them that are commonly used to manage acute and chronic pain as follows (Please note: Some of these blocks may not be performed in a given month because of the patient population available during that month):
  - Epidural steroid injection (all levels)
  - Blocks
    - Celiac plexus
    - Infraorbital nerve.
    - Intercostal nerve
    - Stellate ganglion.

- Complications associated with each block and the appropriate treatment of each
- Know the different modalities of physical therapy that may relieve both acute and chronic pain,

and learn how to obtain such therapy

- Know the indications for stimulation techniques such as transcutaneous electrical nerve stimulation (TENS), dorsal column stimulation, and deep brain stimulation
- Know the acute pain and cancer pain guidelines:
- Treatments as per the WHO Treatment Ladder
  - Drugs: analgesics, opiates, sedatives, and stimulants
  - Nerve blocks
  - Neurolysis, surgical and chemical

- Routes of administration and risks and benefits of each- Epidural, Intramuscular, Intravenous, Oral, Patient-controlled analgesia, Subcutaneous
- Diagnose and know how to treat the following pain syndromes:
  - Diabetic neuropathy
  - Inflammatory states such as bursitis, carpal tunnel syndrome, skeletal pain, and tendonitis
  - Phantom limb pain
  - Post-herpetic neuralgia
  - Reflex sympathetic dystrophy
  - Trigeminal neuralgia
  - Low back pain

- **Evaluation to Determine Goal Achievement**
  - The resident will be evaluated regularly at the end of the posting by all attending consultants who worked with them.
  - Residents will complete a logbook. After each posting, it will be checked and signed by the faculty concerned.
  - Yearly appraisal shall be conducted to assess the knowledge and the competency of the student in different subspecialties of anaesthesia

Course Outcomes:

- To gain thorough understanding and knowledge of intraoperative and acute postoperative pain management.
- To acquire skills to perform techniques needed for regional pain management
- To gain thorough understanding and knowledge of pathophysiology of chronic pain and its management in brief

PEDIATRIC

Course Details:

- **Goals**
  - Administer Anaesthesia safely for routine surgical, diagnostic, and therapeutic procedures.
  - Recognize and treat post-anaesthesia problems
  - Recognize when you or your institution cannot provide adequate care for a particular problem

- **Objectives**
  - Preoperative

    Neonatal anatomy and physiology applied to conduct of anaesthesia.
    - Review the chart, take an adequate history, assess the major systemic problems, identify special problems such as latex allergy or apnea related to prematurity, and develop a plan of care.
    - Recognise and cope with the emotional problems of parents and children, and attempt to alleviate them.
    - Know the principles of and medications used for preoperative sedation. Induce anaesthesia in a distraught or uncooperative child.
    - Recall and state the anatomic, physiologic, and pharmacologic differences and similarities in the major organ systems between children and adults.
    - Transport safely a sick paediatric patient to the operating room and be able to state and perform the solutions to any problems which may arise in the following areas:
      - Heat maintenance
      - Cardiovascular stability
      - Ventilation
      - Oxygenation

    - Record and estimate blood volume, hourly fluid requirements, and estimated fluid deficit preoperatively. third space loss, red cell mass at the patient's hematocrit, acceptable red cell mass loss, and acceptable blood loss.

  - Intraoperative
    - Know appropriate endotracheal tube sizes - cuffed and uncuffed.
    - Induce and maintain Anaesthesia by inhalation, intravenous, intramuscular, and rectal routes and know the differences in effects of various Anaesthetics between adults and paediatric patients.
    - Administer mask or laryngeal mask airway Anaesthesia when appropriate.
    - Maintain the airway of an anaesthetized paediatric patient and intubate the trachea without trauma in 98% of cases within 1 minute.
    - Recognize abnormal airways and maintain them during anaesthesia.
    - Describe the appropriate management of laryngospasm.
    - Recognise the following signs of hypoxia: bradycardia, poor colour, poor venous filling, distant heart tones, and abnormal electrocardiogram.
    - Understand the various forms of breathing circuits used in paediatric anaesthesia and use them appropriately.
    - Apply consistently and interpret data from a blood pressure cuff, an electrocardiogram, an oximeter, a capnograph or mass spectrometer, and a thermistor.

- Understand the indications for using a heat lamp and heated humidifier when suitable. Respond to questions about the importance of thermoneutrality in paediatrics by illustrating the correct and incorrect use of the following: heat lamp, heat blanket, heat humidifier, and room temperature.
- Master the techniques of halothane and isoflurane/nitrous oxide/oxygen/muscle relaxant Anaesthesia.
- Determine when deep or awake extubation is appropriate, and discuss and apply the appropriate approach.
- Understand and apply the basic concepts of neuromuscular blockade in children, know when Anaesthesia is adequately reversed, and know the differences between dose/effect in infants and children as compared to adult patients
- Apply the principles of fluid and blood replacement during Anaesthesia.
- Understand the benefits and risks of regional Anaesthesia, including spinal Anaesthesia and regional analgesia for postoperative pain.

- Postoperative
  - Transport safely and manage immediate postoperative care in the following areas: ventilation, oxygen administration. temperature control, cardiovascular monitoring. fluid balance, and pain relief.
  - Recognize postoperative croup and treat it.
  - Understand postAnaesthesia apnea, factors associated with it. the appropriate duration of monitoring. and treatment.

- Special problems
  - Manage the following in pediatric patients undergoing Anaesthesia and surgery:
    - Blood replacement
    - Drug administration and Anaesthetic requirement (minimum Anaesthetic concentration)
    - Fluid and electrolyte balance, glucose requirement, and renal maturation
    - Hypocalcemia
    - Hypoglycemia
    - Metabolism
    - Temperature control
    - Vitamin K administration

  - Care of patients in the following special circumstances:
    - Special problems
      1. Congenital heart disease
      2. Epiglottitis
      3. Malignant hyperpyrexia
      4. The child with the anatomically difficult airway (e.g. Pierre Robin syndrome)

    - Special procedures
      1. Bronchoscopy (in particular for foreign body aspiration)
      2. Tonsillectomy (in particular for the rebleeding tonsil)
      3. Computerised axial tomographic scan and magnetic resonance imaging

- Know and experience the management of a pediatric patient with a full stomach.
- Identify the following various problems in pediatric patients and handle them:
  - Diaphragmatic hernia

- Omphalocele and gastroschisis
- Pierre-Robin syndrome
- Pyloric stenosis
- Tracheoesophageal fistula

- Understand pediatric resuscitation, drugs and doses used for it, and defibrillation.

- **Evaluation to Determine Goal Achievement**
  - The resident will be evaluated regularly at the end of the posting by all attending consultants who worked with them.
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Course Outcomes:

- To gain thorough understanding of neonatal, infant and children's physiology of all systems, preoperative evaluation and optimization of patients, risk stratification.
- Acquire skills and knowledge to provide anaesthesia and perioperative care for different surgeries and diagnostic procedures and emergencies in children
- To gain knowledge and proficiency in neonatal resuscitation

▪ OBSTETRIC ANAESTHESIA

Course Details:

- **Goals**
  - Learn how the physiology of normal pregnancy alters the response to anaesthesia
  - Leam pertinent aspects of fetal and placental physiology
  - Learn what obstetricians may require from anesthesiologists
  - Learn how pregnancy creates special problems for the anaesthesiologist learn the nature of high-risk obstetrics, and how special medical problems alter the approach to obstetric anaesthesia
  - Participate in morbidity and mortality conference and ongoing research
  - Learn how to evaluate the neonate and the principles of neonatal resuscitation
  - Learn how drugs affect the neonate
  - Learn how to communicate effectively with obstetricians and with labour and delivery nurses.

- **Objectives**
  - Obtain pertinent information from the history and physical examination of the obstetric patient to assess major systemic problems
  - Understand obstetric physiology and pharmacology as follows:
    - Alteration of maternal physiology during pregnancy
    - Effects fo Anaesthesia. both general and regional, on human uteroplacental blood flow and of
    - adjunctive medications such as vasopressors and vasodilators on the uterine blood flow
    - Perinatal pharmacology and placental transfer of drugs
    - Effects of epidural and systemic medications on labour and delivery
    - Learn all Anaesthetic techniques suitable for managing normal labour pain including:
      - Epidural local Anaesthesia
      - Epidural opioid Anaesthesia
      - Inhalation analgesia
      - Intravenous analgesia

    - Understand epidural and spinal analgesia and Anaesthesia as follows:
      - Anatomy and physiology of the epidural space and spine
      - Techniques of needle placement, including midline and paramedian approaches
      - Pharmacology of local anaesthetics
      - Complications and side effects

    - Know common problems encountered in continuous epidural infusion and how to prevent and treat them.
    - Know how to use intraspinal opiates in obstetrics:
      - Physiology and pharmacology
      - Benefits for labour, delivery and postoperative pain management.
      - Side effects and risks of labour analgesia

- Understand the advantages of regional and general anaesthesia for cesarean section.
- Know the risk factors, prevention, and treatment of maternal aspiration.

- Evaluate difficult airways and know how to prevent the problems associated with them and to manage failed intubation Be familiar with recent advances in obstetric Anaesthesia
    - The effect of epidural Anaesthesia on labour and delivery
    - Drug interaction
    - The epidural test dose
    - Anaesthesia for pre-term delivery

- Recognize high-risk factors in obstetric patients and how they affect Anaesthetic management as follows:
    - Morbid obesity and Anaesthesia: Problems and management
    - Preeclampsia: Basic considerations and controversy in management
    - Neurologic disease and pregnancy

- Understand Anaesthetic choices for the pregnant patient with heart disease
- Identify and manage common medical emergencies in the post-parturient
- Know how the social problems affect anaesthetic care, such as perinatal human
- immunodeficiency virus infection and maternal substance abuse
- Manage maternal Anaesthesia and the stressed fetus
- Know current fetal monitoring techniques and how to interpret the information they provide

- **Evaluation to Determine Goal Achievement**
    - The resident will be evaluated regularly at the end of the posting by all attending consultants who worked with them.
    - Residents will complete a logbook. After each posting, it will be checked and signed by the faculty concerned.
    - Yearly appraisal shall be conducted to assess the knowledge and the competency of the student in different subspecialties of anaesthesia

Course Outcomes:

- To gain thorough understanding and knowledge of physiology and pathologies of a parturient, and acquire skills needed to provide anaesthesia for conducting caesarean section., and also managing obstetric emergencies.
- To understand and learn management of massive haemorrhage and massive transfusion protocol.

REGIONAL ANAESTHESIA

Course Details:

- **Goals**
  - To teach anaesthesia residents the art and sciences of regional anaesthesia.
  - Understand the anatomy, pathophysiology, and appropriate management of complications and side effects of regional anaesthetic techniques-
  - Total spinal, subdural blocks assessment and treatment,
  - Risks of spinal, epidural hematoma and abscess assessment and treatment,
  - Postdural puncture headache - assessment and treatment,
  - Pneumothorax- assessment and treatment,
  - Physiologic side effects: sympathectomy, phrenic nerve block,
  - Peripheral nerve injury assessment and follow-up.
  - To understand the general principles of local anaesthetic pharmacology, including the pharmacodynamics and pharmacokinetics of various local anaesthetics. This includes onset, duration, motor/sensory differentiation, toxicity profiles of different local anaesthetics, and allergy management.
  - To understand the principles and indications for various local anaesthetic adjuvants, e.g., dexamethasone.
  - To be familiar with the relevant anatomy for regional techniques, including: the spinal canal and its contents, neural plexuses of the limbs, and major autonomic ganglia.
  - Be familiar with the physiologic changes associated with spinal and epidural anaesthesia.
  - Understand the indications for and the contraindications to regional Anaesthetic techniques, including central neuraxial blocks, peripheral nerve blocks, sympathetic nerve blocks etc.

- **Cognitive Skills**

  At the completion of this rotation, residents should be able to demonstrate the following skills.
  - Rational selection of regional anaesthesia technique and choice of local Anaesthetic for the case.
  - Ability to assess adequacy of regional anaesthesia before the start of surgery and demonstrate appropriate plans for supplementation of inadequate blocks.
  - Provide effective anxiolysis and sedation of patients by both pharmacologic and interpersonal techniques.
  - Select appropriate monitors for specific patient encounters. and document the performance of regional anaesthesia adequately.

- **Evaluation To Determine Goal Achievement**
  - The resident will be evaluated regularly at the end of the posting by all attending consultants who worked with them.

- Residents will complete a logbook. After each posting, it will be checked and signed by the faculty concerned.
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- **Skills Sheet for Residents On the Regional Anaesthesia Rotation**

  Demonstrate ability to perform/familiarity with the following regional Anaesthesia techniques:

  - Brachial plexus blockade- Axillary block/ Supraclavicular/ infraclavicular/ Interscalene block
  - Lower limb nerve block- Sciatic nerve block/ femoral nerve block/ ankle block.
  - Caudal block in pediatric/ Epidural block in adult
  - Paravertebral block/ Intercostal Nerve block/ PECS block
  - Ultrasound guided fascial plane blocks for Thoracotomy- Erector Spinae nerve block, Serratus Anterior plane block, PENG block
  - Ultrasound guided fascial plane blocks for Laparotomy- TAP block/ Quadratus Lumborum block/ Rectus sheath block/ Subcostal TAP block
  - Subarachnoid block
  - Others.

Course Outcomes:

- To gain the knowledge of anatomy needed for understanding of pain management of various parts of human body
- To acquire skills to perform techniques needed for regional anaesthesia and pain management using ultrasound and nerve stimulators.
- To practice central neuraxial blockade in adults and children.

▪ ONCO-ANAESTHESIA

Course Details:

▪ Objectives

The primary objective of onco-anaesthesia training is to develop anaesthesiologists with specialized knowledge, technical expertise, and professional competence to safely manage patients undergoing oncological surgeries and cancer-related procedures across the perioperative continuum.
Specific objectives include:

- Understanding cancer biology and treatment:
  - Gain insight into basic cancer pathophysiology, staging, and prognosis.
  - Understand the impact of chemotherapy, radiotherapy, immunotherapy, and targeted therapies on organ systems and anaesthetic management.

- Comprehensive perioperative assessment:
  - Perform detailed pre-anaesthetic evaluation in patients with malignancy, including nutritional status, organ dysfunction, and treatment-related toxicities.
  - Risk stratification and optimization of high-risk onco-surgical patients

- Safe conduct of anaesthesia for oncological surgeries:
  - Provide anaesthesia for major cancer surgeries (thoracic, abdominal, neuro, head and neck, gynecological, urological, breast, and musculoskeletal oncology).
  - Ensure hemodynamic stability, adequate analgesia, and organ protection during prolonged and complex surgeries.

- Advanced perioperative pain management
  - Implement multimodal analgesia strategies, including regional anaesthesia techniques, for acute and chronic cancer pain.
  - Integrate opioid-sparing and enhanced recovery pathways.

- Critical care and postoperative management
  - Manage cancer patients in the ICU, including ventilatory support, sepsis, bleeding, and organ failure.
  - Early recognition and management of postoperative complications.

- Ethical, palliative, and end-of-life care
  - Understand ethical principles, informed consent, and shared decision-making.
  - Participate in palliative care and end-of-life management with a compassionate, patient-centred approach.

- Research and academic development
  - Develop skills in clinical research, audit, and evidence-based practice in onco-anaesthesia.
  - Critically appraise literature and contribute to academic activities.

Skills to Be Learnt During Onco-Anaesthesia Training

▪ Clinical and Cognitive Skills

- Pre-operative assessment of patients with:
  - Chemotherapy-induced cardiomyopathy, pulmonary toxicity, renal dysfunction, and myelosuppression
  - Airway challenges in head and neck cancers
  - Cachexia, malnutrition, and paraneoplastic syndromes

- Formulation of individualized anaesthetic plans based on cancer type, surgery, and comorbidities.

- **Anaesthetic Management Skills**

  - Administration of:
    - General anaesthesia, regional anaesthesia, and combined techniques
    - Total intravenous anaesthesia (TIVA) and balanced anaesthesia

  - Management of:
    - Massive blood loss and transfusion protocols
    - Fluid therapy using goal-directed strategies
    - Prolonged surgeries and complex positioning

- **Regional Anaesthesia and Pain Techniques**

  - Ultrasound-guided regional blocks:
    - Thoracic epidural, paravertebral, ESP, TAP, rectus sheath blocks
    - Brachial plexus and lower limb blocks for onco-orthopaedic surgeries

  - Acute Pain Services (APS) involvement
  - Chronic cancer pain management, including opioid titration and adjuvant analgesics

- **Airway and Procedural Skills**

  - Advanced airway management:
    - Awake fiberoptic intubation
    - Tracheostomy management

  - Vascular access:
    - Central venous cannulation
    - Arterial line placement
    - Familiarity with implanted ports and PICC lines

- **Critical Care Skills**

  - Postoperative ICU care of oncological patients
  - Management of:
    - Sepsis and neutropenic patients
    - Acute respiratory distress
    - Thromboembolic complications

  - Mechanical ventilation and hemodynamic monitoring

- **Communication and Teamwork Skills**
  - Effective communication with surgeons, oncologists, radiotherapists, pain specialists, and palliative care teams
  - Counselling patients and families regarding perioperative risks and expectations
  - Breaking bad news and participating in goals-of-care discussions

- **Academic and Professional Skills**
  - Interpretation of oncology-related investigations and imaging
  - Conducting audits, case presentations, and journal clubs
  - Awareness of national and international guidelines related to onco-anaesthesia
  - Maintaining professionalism, empathy, and ethical practice

- **Evaluation to determine the goal achievement**
  - The resident will be evaluated regularly at the end of the posting by all attending consultants who worked with them.
  - Residents will complete a logbook. After each posting, it will be checked and signed by the faculty concerned.
  - Yearly appraisal shall be conducted to assess the knowledge and the competency of the student in different subspecialties of anaesthesia.

Course Outcomes:

- To understand the effect of cancer and its treatment modalities on the physiology of the patient.
- To understand the Anaesthesia management of major onco-surgeries (Head-neck, urological cancers, thoracic cancers, gynaecological cancers, boe and soft tissue cancers etc) and their complications during and after the surgeries.

▪ ANAESTHESIA FOR ORTHOPAEDIC PROCEDURES

Course Details:

The goal of anaesthesia training for orthopaedic surgeries is to produce anaesthesiologists with the knowledge, technical skills, and clinical judgement needed to safely care for patients undergoing elective and emergency orthopaedic procedures, with a special focus on regional anaesthesia, trauma care, and perioperative pain management.
Specific objectives include:

- Perioperative evaluation and optimization:
  - To perform comprehensive pre-anaesthetic assessment of patients with orthopaedic conditions, including trauma, degenerative disorders, and malignancies.
  - To optimize patients with associated comorbidities such as advanced age, polytrauma, anaemia, and metabolic disorders.

- Safe conduct of anaesthesia for orthopaedic procedures
  - To provide appropriate anaesthesia for upper limb, lower limb, spine, and pelvic surgeries.
  - To select and administer general, regional, or combined anaesthetic techniques based on surgical requirements and patient factors.

- Trauma and emergency management
  - To manage anaesthesia for orthopaedic trauma, including fractures, polytrauma, and crush injuries.

  - To participate in damage control resuscitation and emergency surgical care.

- Advanced regional anaesthesia and analgesia
  - To develop expertise in neuraxial and peripheral nerve blocks for intraoperative anaesthesia and postoperative analgesia.
  - To promote opioid-sparing strategies and enhanced recovery protocols.

- Intraoperative physiological management
  - To maintain hemodynamic stability, normothermia, and adequate tissue perfusion during prolonged surgeries.
  - To manage blood loss and transfusion requirements (including massive blood loss and massive blood transfusion management).

- Postoperative care and rehabilitation
  - To ensure effective pain relief, early mobilization, and prevention of complications such as thromboembolism and delirium.

- Patient safety and multidisciplinary collaboration
  - To practice safe anaesthesia with adherence to checklists and guidelines.
  - To work effectively with orthopaedic surgeons, trauma teams, physiotherapists, and pain

specialists.

Skills to Be Learnt During Anaesthesia Training for Orthopaedic Surgeries

- **Pre-operative Assessment Skills**
  - Evaluation of:
    - Trauma patients and polytrauma assessment (ATLS principles)
    - Elderly patients with hip fractures
    - Patients with coexisting medical illnesses
  - Risk stratification and optimization.

- **Airway and Anaesthetic Management Skills**
  - Airway management including:
    - Rapid sequence induction in trauma
    - Difficult airway management in immobilized cervical spine
  - Administration of:
    - General anaesthesia
    - Combined general and regional techniques

- **Regional Anaesthesia Skills**
  - Neuraxial blocks:
    - Spinal anaesthesia
    - Epidural anaesthesia
    - Combined spinal–epidural techniques
  - Peripheral nerve blocks (landmark and ultrasound-guided):
    - Brachial plexus blocks (interscalene, supraclavicular, infraclavicular, axillary)
    - Femoral, adductor canal, sciatic, popliteal blocks
    - Fascia iliaca block
  - Continuous catheter techniques.

- **Intraoperative Management Skills**
  - Monitoring and management of:
    - Tourniquet application and release
    - Bone cement implantation syndrome
    - Fat embolism syndrome
  - Fluid and blood management, including massive transfusion protocols.
  - Positioning for orthopaedic and spine surgeries

- **Postoperative Analgesia and Care Skills**
  - Multimodal analgesia techniques.
  - Management of postoperative complications:

  - Pain, nausea, hypotension
  - Neurovascular compromise

- Acute pain service involvement.

- **Trauma and Critical Care Skills**
  - Resuscitation and stabilization of trauma patients.
  - ICU management of orthopaedic trauma patients.
  - Thromboprophylaxis and prevention of postoperative complications.

- **Communication and Professional Skills**
  - Effective communication with surgical and trauma teams.
  - Informed consent and patient counselling.
  - Ethical practice and professionalism.

- **Evaluation to determine goal achievement-**
  - The resident will be evaluated regularly at the end of the posting by all attending consultants who worked with them.
  - Residents will complete a logbook. After each posting, it will be checked and signed by the faculty concerned.
  - Yearly appraisal shall be conducted to assess the knowledge and the competency of the student in different subspecialties of anaesthesia

Course Outcomes:

- To understand the principles of management of anaesthesia for orthopaedic surgeries, including spinal surgeries, joint replacement surgeries, surgeries in polytrauma cases etc.
- To acquire skills to provide regional anaesthesia blocks for smooth conduct of orthopaedic surgeries.
- To learn to identify and manage the complications like major blood loss, fat embolism, bone-cement syndrome etc. which are commonly seen during orthopaedic surgeries.

▪ TRANSPLANT ANAESTHESIA

Course Details:

The objective of anaesthesia training for transplant surgeries is to develop anaesthesiologists with advanced knowledge, technical expertise, and clinical judgement to safely manage donors and recipients undergoing solid organ transplantation, while ensuring optimal graft function and patient survival
Specific objectives include:

- Understanding transplant physiology and immunology
  - To acquire knowledge of end-stage organ disease pathophysiology and its systemic effects.
  - To understand principles of transplant immunology, ischemia–reperfusion injury, and immunosuppressive therapy.
- Perioperative assessment and optimization
  - To perform comprehensive evaluation of transplant recipients and living donors.
  - To optimize patients with multiorgan dysfunction, malnutrition, coagulopathy, and sepsis.
- Safe conduct of anaesthesia for transplant procedures
  - To provide anaesthesia for kidney, liver, pancreas, heart, lung, and combined organ transplants.
  - To manage prolonged, high-risk surgeries with major physiological derangements.
- Hemodynamic and metabolic management
  - To maintain hemodynamic stability during critical phases such as organ reperfusion.
  - To manage acid–base, electrolyte, glucose, and coagulation abnormalities.
- Critical care and postoperative management
  - To manage transplant recipients in the immediate postoperative and ICU period.
  - To ensure optimal graft perfusion and early detection of graft dysfunction.
- Donor management and ethics
  - To provide safe anaesthesia for living donors and manage deceased donor organ retrieval.
  - To understand ethical, legal, and regulatory aspects of organ transplantation.
- Multidisciplinary coordination
  - To function as an integral member of the transplant team, coordinating with surgeons, intensivists, nephrologists/hepatologists, immunologists, and transplant coordinators.

Skills to Be Learnt During Anaesthesia Training for Transplant Surgeries

- **Pre-operative Assessment Skills**

- Evaluation of end-stage organ disease:
  - ESLD (MELD/Child-Pugh scores)
  - ESRD and dialysis optimization
  - Cardiopulmonary assessment in heart and lung transplant candidates

- Assessment of infection, nutrition, coagulation, and frailty.
- Preoperative optimization of donors and recipients.

- **Advanced Monitoring and Vascular Access**
  - Invasive monitoring**:**
    - Arterial lines
    - Central venous and large-bore venous access
  - Advanced hemodynamic monitoring:
    - Cardiac output monitoring
    - Transesophageal echocardiography (TEE)
  - Familiarity with rapid infusion systems and cell salvage.

- **Anaesthetic Management Skills**
  - Balanced anaesthesia and TIVA in high-risk patients.
  - Management of:
    - Massive blood loss and transfusion
    - Hypothermia
    - Coagulopathy using point-of-care tests (TEG/ROTEM)
  - Anesthesia for specific transplants:
    - Liver transplant (anhepatic and reperfusion phases)
    - Kidney transplant (fluid and perfusion management)
    - Heart and lung transplant (cardiopulmonary interactions**)**

- **Metabolic and Physiological Management**
  - Management of:
    - Electrolyte disturbances (hyperkalemia, hypocalcemia)
    - Acid–base abnormalities
    - Glucose control
  - Ischemia–reperfusion injury management.
  - Use of vasoactive and inotropic agents.

- **Coagulation and Blood Management Skills**
  - Goal-directed transfusion strategies.
  - Management of anticoagulation and fibrinolysis.
  - Use of blood products, coagulation factors, and antifibrinolytics.

- **Postoperative and Critical Care Skills**

- Ventilatory management and weaning.
- Hemodynamic support and graft perfusion monitoring.
- Recognition and management of:
  - Primary graft dysfunction
  - Rejection
  - Infection and sepsis

- Renal replacement therapies.

- **Donor Anaesthesia and Organ Retrieval**
  - Anaesthesia for living donor nephrectomy and hepatectomy.
  - Management of deceased donor organ retrieval surgeries.
  - Maintenance of organ perfusion and viability.

- **Ethical, Legal, and Communication Skills**
  - Knowledge of national transplant laws and protocols.
  - Counselling of donors and recipients.
  - Ethical decision-making and documentation

- **Evaluation to determine goal achievement-**
  - The resident will be evaluated regularly at the end of the posting by all attending consultants who worked with them.
  - Residents will complete a logbook. After each posting, it will be checked and signed by the faculty concerned.
  - Yearly appraisal shall be conducted to assess the knowledge and the competency of the student in different subspecialties of anaesthesia.

Course Outcomes:

- To understand the relevant anatomy and principles of management of Anaesthesia during head-Neck surgeries, including maxillofacial trauma, HN malignancies etc.
- To learn anaesthesia management of procedures like tonsillectomy, mastoidectomy, neck dissection, endoscopic sinus surgeries.
- To understand the Anaesthesia management of surgeries where the airway is shared with the surgical team.

▪ ANAESTHESIA FOR OPHTHALMOLOGY SURGERIES

Course Details:

The objective of anaesthesia training for ophthalmic surgeries is to equip anaesthesiologists with the knowledge and skills required to provide safe, precise, and patient-centred anaesthetic care for eye surgeries, with special emphasis on elderly patients, day-care procedures, and ocular-specific physiological considerations.
Specific objectives include:

- Perioperative assessment and patient preparation
  - To perform focused pre-anaesthetic evaluation of patients undergoing ophthalmic surgery, especially elderly patients with multiple comorbidities.
  - To identify conditions affecting ocular surgery such as glaucoma, raised intraocular pressure, and cardiovascular disease.

- Safe conduct of anaesthesia
  - To provide appropriate anaesthesia for ophthalmic procedures under local, regional, monitored anaesthesia care (MAC), or general anaesthesia.
  - To ensure patient immobility, comfort, and stable intraocular pressure throughout the procedure.

- Understanding ocular physiology and pharmacology
  - To understand factors influencing intraocular pressure and ocular blood flow.
  - To understand the effects of anaesthetic drugs on the eye and visual pathway.

- Management of special patient populations
  - To safely manage paediatric patients, uncooperative adults, and patients with neurological or psychiatric disorders.
  - To manage patients undergoing emergency ophthalmic surgeries.

- Day-care anaesthesia and recovery
  - To facilitate rapid recovery, minimal postoperative discomfort, and early discharge.
  - To ensure patient safety in ambulatory ophthalmic surgery.

- Patient safety and communication
  - To maintain high standards of patient safety, asepsis, and monitoring.
  - To communicate effectively with surgeons and patients to ensure smooth perioperative care.

Skills to Be Learnt During Anaesthesia Training for Ophthalmic Surgeries

- **Pre-operative Assessment Skills**

- Assessment of:
  - Elderly patients with cardiovascular and respiratory comorbidities
  - Patients with glaucoma, diabetes, and hypertension

- Preoperative medication management, including anticoagulants and antiplatelets.
- Fasting and premedication planning for day-care surgeries

- **Anaesthetic Techniques**
  - Local and regional anaesthesia:
    - Peribulbar block
    - Retrobulbar block
    - Sub-Tenon's block
    - Topical anaesthesia

  - General anaesthesia for:
    - Paediatric ophthalmic surgeries
    - Uncooperative patients
    - Trauma and emergency procedures

  - Monitored anaesthesia care (MAC) and sedation techniques.

- **Airway and Respiratory Management**
  - Oxygen delivery systems suitable for ophthalmic surgery.
  - Airway management under drapes.
  - Management of apnea and airway obstruction during sedation.

- **Intraoperative Management Skills**
  - Maintenance of:
    - Stable hemodynamics
    - Low and stable intraocular pressure

  - Management of:
    - Oculocardiac reflex
    - Patient movement, coughing, or bucking

  - Safe positioning and patient comfort.

- **Pharmacological Skills**
  - Selection and titration of sedatives and analgesics.
  - Use of anticholinergics, antiemetics, and ocular-specific drugs.
  - Avoidance of drugs that increase intraocular pressure when contraindicated.

- **Postoperative Care Skills**
  - Management of:
    - Postoperative nausea and vomiting

- Pain and agitation

- Assessment of vision and patient comfort.
- Safe discharge criteria for ambulatory surgery.

- **Emergency and Complication Management**
  - Management of:
    - Local anaesthetic systemic toxicity (LAST)
    - Retrobulbar hemorrhage
    - Globe perforation
  - Resuscitation skills in ophthalmic OT settings.

- **Communication and Professional Skills**
  - Coordination with ophthalmic surgeons and OT staff.
  - Patient counselling and reassurance, especially for awake procedures.
  - Ethical practice and documentation.

- **Evaluation to determine goal achievement-**
  - The resident will be evaluated regularly at the end of the posting by all attending consultants who worked with them.
  - Residents will complete a logbook. After each posting, it will be checked and signed by the faculty concerned.
  - Yearly appraisal shall be conducted to assess the knowledge and the competency of the student in different subspecialties of anaesthesia.

Course Outcomes:

- To understand the Anaesthesia management of surgeries like Hernia repair, appendicectomy, diabetic foot debridement, dressing of burns, incision and drainage of abscess, laparotomies for benign diseases etc.
- To learn how to carry out preoperative evaluation, optimization of comorbidities for general surgeries.
- To learn the principles of intraoperative and postoperative monitoring, postoperative pain management and management of postoperative complications following general surgeries.

▪ ANAESTHESIA FOR HEAD AND NECK SURGERIES

Course Details:

The objective of anaesthesia training for head and neck surgeries is to develop anaesthesiologists with advanced skills in airway management, perioperative care, and multidisciplinary coordination required for patients undergoing complex surgeries involving the airway, upper aerodigestive tract, and major vascular structures.

Specific objectives include:

- **Airway assessment and management**
  - To acquire expertise in assessment and management of anticipated and unanticipated difficult airways.
  - To ensure safe airway control in patients with tumors, radiation changes, infections, or trauma involving the head and neck.

- **Perioperative evaluation and optimization**
  - To perform comprehensive pre-anaesthetic evaluation of patients with head and neck pathology, including nutritional status, airway compromise, and effects of prior radiotherapy or chemotherapy.
  - To optimize comorbidities and plan perioperative care.

- **Safe conduct of anaesthesia**
  - To provide appropriate anaesthesia for major and minor head and neck procedures, ensuring patient immobility, hemodynamic stability, and surgical access.
  - To manage prolonged surgeries with shared airway and limited access**.**

- **Intraoperative physiological management**
  - To manage blood loss, fluid balance, temperature, and hemodynamic fluctuations during extensive surgeries.
  - To prevent aspiration and airway contamination.

- **Postoperative airway and critical care**
  - To anticipate and manage postoperative airway obstruction and respiratory complications.
  - To plan postoperative ventilation, tracheostomy care, and ICU management when required**.**

- **Pain management and enhanced recovery**
  - To provide effective perioperative analgesia while ensuring early recovery and airway safety.

- **Multidisciplinary coordination and patient safety**
  - To work closely with surgeons, intensivists, nursing staff, and speech and swallowing therapists.
  - To ensure patient safety through effective communication and adherence to protocols.

Skills to Be Learnt During Anaesthesia Training for Head and Neck Surgeries

- **Pre-operative Assessment Skills**
  - Detailed airway evaluation including:
    - Mouth opening, neck mobility, and anatomical distortion
    - Effects of tumor mass, infection, or prior radiotherapy
  - Assessment of nutritional status, anemia, and comorbidities.
  - Preoperative planning for difficult airway scenarios.

- **Advanced Airway Management Skills**
  - Awake intubation techniques:
    - Fiberoptic bronchoscopy
    - Video laryngoscopy
  - Emergency airway management:
    - Cricothyrotomy
    - Tracheostomy
  - Management of shared airway and tube exchange techniques.
  - Use of jet ventilation and specialized airway devices (where applicable).

- **Anaesthetic Techniques**
  - Administration of:
    - General anaesthesia with endotracheal or tracheostomy tube
    - Total intravenous anaesthesia (TIVA) for shared airway surgeries
  - Use of neuromuscular blockade and controlled hypotension when indicated.

- **Intraoperative Management Skills**
  - Management of:
    - Major blood loss and transfusion
    - Airway fires and laser surgery precautions
    - Aspiration risk and airway contamination
  - Positioning and pressure point care during prolonged surgeries.

- **Regional Anaesthesia and Analgesia Skills**
  - Scalp blocks, cervical plexus blocks, Mandibular nerve blocks, maxillary nerve block (where applicable).
  - Multimodal analgesia techniques.
  - Postoperative pain control while maintaining airway reflexes.

- **Postoperative Care Skills**

- Extubation planning in difficult airway patients.
- Monitoring for:
  - Airway edema
  - Hematoma
  - Respiratory compromise

- Tracheostomy care and suctioning.

- **Emergency and Complication Management**
  - Management of:
    - Laryngospasm and bronchospasm
    - Postoperative bleeding and neck hematoma

      Introduction and objectives of the research project.
      Brief review of literature
      Suggested materials and methods. and (scheme of work)
      A statistician should be consulted at the time of selection of groups, number of cases and method of studies. He should also be consulted during the studies:
      Bibliography
  - Advanced life support in head and neck OT and ICU.

- **Communication and Professional Skills**
  - Coordination with surgeons regarding airway strategy and surgical stages.
  - Patient counselling regarding awake procedures and postoperative airway management.
  - Ethical practice, documentation, and informed consent.

- **Evaluation to determine goal achievement-**
  - The resident will be evaluated regularly at the end of the posting by all attending consultants who worked with them.
  - Residents will complete a logbook. After each posting, it will be checked and signed by the faculty concerned.
  - Yearly appraisal shall be conducted to assess the knowledge and the competency of the student in different subspecialties of anaesthesia

Course Outcomes:

- To understand the Anaesthesia management of surgeries like Hernia repair, appendicectomy, diabetic foot debridement, dressing of burns, incision and drainage of abscess, laparotomies for benign diseases etc.
- To learn how to carry out preoperative evaluation, optimization of comorbidities for general surgeries.
- To learn the principles of intraoperative and postoperative monitoring, postoperative pain management and management of postoperative complications following general surgeries.

Reference

- **Text Books:**

  - Miller's Anesthesia , 10th ed.
  - Wylie Churchill Davidson
  - Nunn and Utting
  - Stoelting RK. Miller RD, eds. Basics of Anaesthesia
  - JA Kaplan: Cardiac Anaesthesia
  - Principles and Practice of Thoracic Anesthesia, 2nd Edition.

  - Cucchiara and Michenfelder: Clinical NeuroAnaesthesia. Churchill-Livingstone
  - Cottrell and Smith: Anaesthesia and Neurosurgery.
  - Millelr: AAnaesthesia. 10th edition
  - Kirby and Gravenstein: Clinical Anaesthesia Practice. WB Saunders: chapters 22. 4. and 73
  - Russell and Rodichok: Primer of Intraoperative Neurophysiologic Monitoring. Butterworth and Heinemann
  - Smith's Anaesthesia for Infants and Children 10th Edition.
  - Litman's Basic of Paediatric Anesthesia, 3rd Edition

  - ICU Book by Paul Marino
  - Critical Care by Joseph Civetta. Robert W Taylor and Robert Kirby publisher Lippincott

  - Bonica: The Management of Pain
  - Cousins and Bridenbaugh: Neural Blockade in Pain Management
  - Raj: Practical Management of Pain

ASSESSMENT METHODS

Assessment is a vital part of any course and is the element where there is frequently considerable doubt.

There are 2 major components:

A. Formative Assessment: ongoing evaluation at the end of each speaciality posting.
B. Summative Assessment: Final assessment after 3 years, and/at the end of each year

- **FORMATIVE ASSESSMENT/(Ongoing Evaluation)**

Formative assessment will be conducted during each posting/module/unit. This will include the following:

- **TECHNICAL SKILLS COMPETENCY EVALUATIONS:**

  Methods to be used
  - Performing anaesthetic management on real patients (check lists of each skill and competency including log book evaluation)
  - Simulation

This evaluation will be done either in the OT or ICU or PAC or Postoperative wards.

- **PROBLEM SOLVING CASES:**

  Methods to be used
  - Case presentations (evaluation by Peers)
  - Simulated case discussions
  - OT discussions

- **ORAL SKILLS – Attitudinal Development:**

  Methods to be used
  - Ability to present seminars, discussion in class room (evaluation by Peers)
  - Talking to patients in pre-anaesthesia and postoperative rounds
  - Operation theatre Management

- **CARDIOPULMONARY RESUSCITATION:**

  Methods to be used
  - Mannequins demonstration
  - Check lists for evaluation

CPR evaluation will be repeated at the end of each year.

- **SUMMATIVE ASSESSMENT (FINAL ASSESSMENT) AND YEARLY ASSESSMENT**

Yearly assessments shall be carried out at the end of each year in the form of an appraisal examination. It will consist of a theory paper (10 short answer questions, each worth 10 marks, with a duration of 3 hours) and a practical viva (100 marks) conducted by an external appraiser. The logbook and thesis status will also be graded during the appraisal. The report will be discussed with the student and then submitted to the academic section.

Final Assessment shall be conducted at the end of the three years of MD Anaesthesiology curriculum. Format of the final assessment shall be as follows-

A. THEORY

Paper	Focus / Subject Area	Typical Content Covered
Paper I – Basic Sciences Applied to Anaesthesiology	Anatomy, Physiology, Pharmacology, Pathology, Physics and Equipment related to Anaesthesia	Core science as it applies to anaesthetic practice (airway anatomy, respiratory physiology, drug actions, basic monitoring)
Paper II – Medicine & Allied Subjects Related to Anaesthesia	Medicine, Cardiovascular & Respiratory systems, Endocrine, Renal, Neuro	Medical conditions relevant to peri-operative care and critical care, e.g., diabetes, heart/lung diseases, sepsis, renal failure
Paper III – Surgery & Allied Subjects in Relation to Anaesthesia	General surgery, Orthopaedics, ENT, Ophthalmology, Urology, Obstetrics & Gynaecology in an anaesthesia context	Anaesthetic implications of surgical procedures, trauma care, blood loss management, surgical positions, regional anaesthesia indications
Paper IV – Recent Advances & Critical Care / Specialist Topics	Recent advances in anaesthesia, ICU, Pain medicine, Sub-specialties	Evolving practices (e.g., TIVA, ultrasound regional anaesthesia), critical care, trauma and emergency protocols

Format of Each Paper

- Duration usually 3 hours.
- Typically two long answer questions (each of 25 marks) and five short answer questions (each of 10 marks).

B. PRACTICAL

Component	Marks	Description	Comments
Clinical Long Case- One	100	Detailed case presentation + management plan	Core clinical assessment
Short Cases (2)	2 ×50 = 100	Examination and viva on short clinical cases	Tests concise clinical skills
Table Viva	200	Viva stations covering drugs, monitors, instruments, investigations etc	Assesses theoretical and practical knowledge
Total Practical Marks	400	Combined practical component	Often equals total theory marks
Minimum Pass Criteria	Typically **≥50% overall**	Pass required in both theory and practical separately	Standard NMC guideline for PG exams

The committee recommends that two external and two internal examiners should conduct the clinical examination. A maximum of 8 candidates should be examined per day, and if there are more than 8 candidates,

the examination should be conducted on two consecutive days.

▪ THESIS

▪ Objectives

- The student would be able to demonstrate research skills by planning and conducting systematic scientific inquiry data analysis, and deriving conclusion.
- Convey scientific information for health planning.

▪ Guide for thesis

- The chief guide will be from the department of Anaesthesiology
- Co-guides will be from the department or from other disciplines related to the thesis.

▪ Submission of thesis protocol

It should be submitted at the end of six months after admission in the course.

- Introduction and objectives of the research project.
  - Brief review of literature
  - Suggested materials and methods. and (scheme of work)
  - A statistician should be consulted at the time of selection of groups, number of cases and method of studies. He should also be consulted during the studies:
  - Bibliography

- The protocol must be presented in the department of Anesthesiology before being forwarded to the Research Committee of the institute.
- Protocol will be approved by the research committee appointed by the Dean/Principal to scrutinise the thesis protocol in reference to its feasibility, statistical validity, and ethical aspects. etc

Submission of thesis

- The thesis shall relate to the candidate own work on a specific research problem or a series of clinical case studies in accordance with the approved plan.
- The thesis shall be written in English, printed or typed on white bond paper 22 • 28 cms with a margin of 3.5 cm. bearing the matter on one side of paper only and bound with cloth/rexine. with the title, author's name and the name of the College printed on the front cover
- The thesis shall contain: Introduction, review of literature, materials and methods, observations.

Discussions, conclusion, summary, and references as per Index Medicus.

Each candidate shall submit four copies of the thesis to the Dean through their respective Heads of the Departments, not later than six months prior to the date of commencement of the theory examination in the subject.

Evaluation of thesis

- The thesis shall be referred by the University evaluation to the Examiners appointed by the University. The examiners will report independently to the Controller of Examinations and recommend whether the thesis is-
  - Approved
  - Returned for improvements as suggested or
  - Rejected

- The thesis shall be deemed to have been accepted when it has been approved by at least two External examiners: if the thesis is rejected by one, it shall be referred to another external examiner (different from the initial evaluator), whose judgement shall be final regarding its acceptance or rejection.
- Where improvements have been suggested by two or more of the examiners, the candidate shall be required to resubmit the thesis after making the requisite improvements for evaluation.
- When a thesis is rejected by the examiners, it shall be returned to the candidate who shall have to re-write it. The second thesis, once submitted, shall be treated as a new thesis and processed accordingly.
- Acceptance of the thesis submitted by the candidate shall be a prerequisite for their admission to the written, oral, and practical/clinical parts of the examination.

  Provided that, under special circumstances, if the report from one or more examiners is not received by the time the post-graduate examination is due, the candidate may be permitted to sit for the examination provisionally. However, the result will be withheld until the report is received, on the condition that if the thesis is rejected, the candidate, in addition.

- A candidate whose thesis is approved by the examiners but fails in the examination shall not be required to submit a new one if he/she reappears for the examination in the same branch at a subsequent occasion.