

**Guidelines**  
**For**  
**Competency Based Training Programme**  
**Diploma – Anaesthesiology**  
**2022**



**NATIONAL BOARD OF EXAMINATIONS IN MEDICAL SCIENCES**

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## **I. GOAL OF THE PROGRAMME:**

To enable the candidate to function as an independent specialist anaesthesiologist, well trained in practice of anaesthesia for patients with common medical conditions scheduled for routine as well as emergency surgery, cardiopulmonary resuscitation, critical care and pain management. He should also be a trainer to impart such knowledge to the undergraduate doctors, interns and subordinate paramedical staff. He should possess diagnostic skills as well as ability to interpret the laboratory reports of relevant procedures, and current technologic tools, their judicious use and logical and scientific interpretation in various clinical settings. He should also possess an in-depth knowledge of basic sciences and all disciplines of medicine. He should uphold the interests of the patients under his care, and be able to work as a member of the team with surgeons, nursing staff, and hospital administration and with other clinicians, understanding their needs and strike a balance with a cool mind and leadership qualities.

### **1. Objectives of the Programme:**

- i. A good working knowledge of the pharmacokinetics and pharmacodynamics of the anaesthetic drugs and adjuncts.
- ii. Basic knowledge and skills in airway management.
- iii. Basic knowledge of relevant anatomy, physiology, biochemistry, pharmacology and physics in relation to anaesthesia.
- iv. Knowledge and skills to perform the commonly used techniques in general, regional and local anesthesia, and their applications for routine and emergency surgery.
- v. Basic understanding of the relevant physical principles and functioning of equipment used in anaesthesia and monitoring.
- vi. Knowledge of cardiovascular, respiratory, neurological, hepatobiliary, renal physiology and endocrine homeostasis.



- vii. Adequate knowledge of postoperative acute pain as well as chronic pain and its management.
- viii. Working knowledge of the fundamentals of management of patients in ICU.
- ix. Working knowledge of research methodology, medical statistics, medical audit and maintenance of records.
- x. Knowledge and skills in cardiopulmonary resuscitation; both basic and advanced.



## II. TEACHING AND TRAINING ACTIVITIES:

The fundamental components of the teaching programme should include:

Case presentations and discussion:	Once a week
Seminar:	Once a week
Journal club:	Once a week
Grand round presentation (By rotation all departments and subspecialties)	Once a week
Faculty lecture teaching:	Once a month
Clinical Audit:	Once a Month
One poster presentation and one oral presentation in a state or National conference: At least once during the training period.	

The training program would focus on acquiring knowledge, skills and attitudes which are essential components of education and delivery of high quality patient care. The training can be theoretical, clinical and practical in all aspects of the delivery of rehabilitative care, including methodology of research and teaching.

1. **Theoretical:** The theoretical knowledge would be imparted through faculty lectures, discussions, journal clubs, symposia and seminars. The students will be exposed to recent advances through discussion in journal clubs. These are necessary in view of an inadequate exposure to the subject in the undergraduate curriculum.
2. **Symposia:** Trainees would be required to present a minimum of 12 topics based on the curriculum in a period of two years to the combined class of teachers and students. A free discussion would be encouraged in these symposia. The topics of the symposia would be given to the trainees with the dates for presentation by the teacher.
3. **Clinical:** The trainee would be attached to a faculty member to be able to learn methods of history taking, examination, making a diagnosis and anaesthetic management.
4. **Bedside:** The trainee would work up cases, learn management of cases by discussion with faculty members in the department.



5. **Journal Clubs:** This would be once a week academic exercise. A list of suggested Journals is given towards the end of this document. The candidate would summarize and discuss the scientific article critically. A faculty member will suggest the article and moderate the discussion, with participation by other faculty members and residents. The contributions made by the article in furthering the scientific knowledge, its clinical implications and limitations, if any, will be highlighted.



### III. SYLLABUS:

During the course, the candidate should be exposed to the following areas of clinical anaesthesia practice:

1. Pre anesthesia clinic
2. Pain clinic
3. Recovery/Post anaesthesia care unit (PACU)
4. Intensive Care Units
5. All specialty theatres
6. Day care anaesthesia
7. Anesthesia outside the OT and in remote locations
8. Robotic surgery
9. Monitored anesthesia care

The course content shall include the following:

**i. 1st year: Theory to cover the following:**

- a. Anatomy – Larynx, upper and lower airway; cranial nerves; relevant anatomy for regional anesthesia. Special anatomical area of interest to the anaesthesiologist e.g., orbit, base of skull, vertebral column, Spinal cord and meninges, Intercostal space, nerves and plexuses e.g. Brachial, coeliac and superior hypogastric.

- b. Physiology: Theories of mechanism of production of anaesthesia.

Respiratory, Cardiovascular, Central Nervous System, Hepatobiliary, Renal and Endocrine System, Pediatric and Geriatric Physiology, Pregnancy, Blood Groups and Blood transfusion, Muscle and Neuromuscular Junction, Regulation of temperature and metabolism, Stress response, Acid-Base Homeostasis, Fluid and Electrolytes imbalance.



c. Biochemistry:

- Biochemistry relevant to fluid balance and blood transfusion and perioperative fluid therapy.
- Acid base homeostasis. Interpretation of blood gases, electrolytes and other relevant biochemical values. Various function tests related to systems e.g. LFT, KFT and basics of measurement techniques.

d. Pharmacology:

- General pharmacological principles. Concepts of pharmacokinetics and pharmacodynamics of various drugs used during anaesthesia and relevant to anaesthesia practice.
- Documentation, various aspects of medicolegal care, informed consent and recordkeeping
- Uptake and distribution of inhaled anaesthetics agents.
- Drug interaction in anaesthesiology. Drugs used in anaesthesia and treatment of common medical disorder like DM,
- Hypertension and IHD, Emergency drugs, e.g. Adrenaline; Atropine, Inotropes, Diuretics, pro-kinetics etc.
- Theoretical background of the commonly used anaesthetic techniques of general and regional anaesthesia viz.
  - ❖ GA – Intravenous, Inhalational, Endotracheal etc. using spontaneous and controlled mode of ventilation.
  - ❖ RA – Spinal, epidural, combined spinal and epidural and Nerve blocks
  - ❖ Monitored Anesthesia Care (MAC)
- Medicine related to:
  - ❖ Cardiovascular system.
  - ❖ Respiratory system.
  - ❖ Hepatobiliary system.
  - ❖ Genitourinary system.
  - ❖ Endocrine system, Pregnancy.





e. Equipment in anesthesia

- Anesthesia machine – checking the machine and assembly of necessary items.
- Airway equipment including Tracheostomy / Equipment for airway management: Mask, LMA, fiberoptic laryngoscopes; other devices like Combitube.
- Breathing system continuous flow systems, draw over system - Assembly and checking, vaporizers, Gas laws.
- Monitoring in Anesthesia with concepts of minimal monitoring.
- Safety in Anesthesia equipments.
- Medical gases – storage and central pipeline system.
- Introduction to research methodology, Randomized Controlled trials etc.,

Basics of biostatistics.

- Documentation and medico –legal aspects of anesthesia.
- Stress the importance of accurate documentation.
  - ❖ Cardiopulmonary Resuscitation; both Basic and advanced, theories of cardiac pump, thoracic pump, recent advances
  - ❖ Defibrillation
  - ❖ Resuscitation of a patient with drug overdose/ poisons/ management of unconscious patients.
  - ❖ Resuscitation of a severely injured patient.
  - ❖ Paediatric and Neonatal resuscitation.
  - ❖ Preoperative assessments and medication –general principles.
  - ❖ Introduction to anatomical, physiological, pharmacological and biochemical aspects of pain and pain management both acute and chronic
  - ❖ Introduction to mechanical ventilation.
  - ❖ Oxygen therapy.
  - ❖ Introduction to the operation theatre, recovery rooms (concepts of PACU), ICU, Pain clinic, Pre-anesthetic check-up (PAC) room
  - ❖ Recovery from anesthesia.



- ❖ Shock – pathophysiology, clinical diagnosis and management.
- ❖ Pulmonary function tests – Principles and application.
- ❖ Effects of positioning on the OT table and ICU bed.
- ❖ General ICU Care

ii. **2nd year: Theory**

- a. Relevant anatomy of each system.
- b. Physics of equipment used in anesthesia.
- c. Medical gases: Gas plant, central pipeline, scavenging system.
  - Pressure Reducing valves.
  - Anaesthesia machine, Humidifiers.
  - Flow meters
  - Safety features related to anesthesia equipment
- d. Vaporizers –characteristics and functional specifications. Breathing systems - Assembly, functional analysis, flow. Minimum monitoring standards.
- e. Requirements of APL and flow directional valves.
  - Sterilization of equipment
  - Computers, Utility, Computer assisted learning and data storage. Computerized anesthesia records.
  - Pharmacology of drugs used in cardiovascular, respiratory, endocrine, renal diseases and CNS disorders.
  - Principles of monitoring equipment used for assessment of:
    - ❖ Cardiac function viz. rhythm, pulse, venous and arterial pressures, and cardiac output.
    - ❖ Temperature.
    - ❖ Respiratory function viz. Rate, volumes, compliances, resistance, and blood gases.
    - ❖ Intracranial pressure, depth of anaesthesia
    - ❖ Neuromuscular block.



- f. Working principles of ventilators.
- g. Special anaesthesia techniques as relevant to outpatient anaesthesia, hypotensive anaesthesia, anaesthesia in abnormal environments and calamitous situations.
- h. Anaesthetic management in special situations – Emergency, ENT, Ophthalmology, Obstetric, Obstetric analgesia, Plastic, Dental, Radio- diagnosis and Radio therapeutic procedures and patients with systemic diseases.
- i. Medical statistics relevant to data collection, analysis, comparison and estimation of significance.
- Principles of paediatric anaesthesia. Management of neonatal surgical emergencies, RA in infants. Paediatrics – Prematurity, Physiology, anatomy of neonate in comparison with adult.
  - Associated Medical disorders in surgical patient – Anaesthetic implications and management.
  - Basics of orthopedic anaesthesia.
  - Day care anaesthesia.
  - Rural anaesthesia – anaesthesia for camp surgery.
  - Anaesthesia for Otorhinolaryngology with special emphasis on difficult airway management.
  - Blood and blood component therapy. Anaesthetic implications on coagulation disorders.
  - Maintenance of hemostasis and fluid and fluid management
  - Monitored anaesthesia care (MAC).
  - Anaesthetic implications in diabetes mellitus, thyroid and parathyroid disorders. Pheochromocytoma, Cushing's disease etc.
  - Management of acid base disorders.
  - Principles of geriatric anaesthesia.
  - Anaesthesia outside the OR and in special situations.



- Principles of management in Trauma and mass casualties.
- Basics and principles of ICU
- 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 ventilator. Management of patients for cardiac surgery / CPB beating heart surgery. Chronic pain therapy and therapeutic nerve blocks.
- Selection, purchase, maintenance and sterilization of anaesthesia and related equipment.
- General principles of medical audit.
- Principle of one lung anaesthesia

**Biostatistics, Research Methodology and Clinical Epidemiology**

**Ethics**

**Medico legal aspects relevant to the discipline**



#### IV. COMPETENCIES:

1. Attitude Development: The student should develop attitudes that lead to:
  - i. Lifelong learning and updating.
  - ii. Sympathetic communication with relatives.
  - iii. Sympathetic communication with patients.
  - iv. Appropriate communication with colleagues to function in a group in OR/ ICU.
  - v. Become a teacher for Technicians, Nurses, Paramedical Staff and undergraduates.
  - vi. Ability to discuss. Participate in case discussion and scientific presentations. Ability to function as a leader in the operating room / ICU.
  - vii. Ability to cope up with stress; for example long working hours, night rosters and grave emergency situation.
  - viii. Decision making abilities
2. Skill Development: Requirement of practical training by Junior Resident (2 years training course)
  - i. Plan and conduct anaesthesia, recovery and postoperative pain relief for elective and emergency surgery related to all surgical specialties.
  - ii. Carry out basic life support (BLS) and advanced life support (ALS) and train medical and emergency staff in BLS and ALS.
  - iii. Manage unconscious patients: Airway management and long term management of unconscious patient.
  - iv. Manage patients admitted to an Intensive Care Unit. Manage patients suffering from chronic intractable pain.



- v. Organize the Hospital environment to manage mass casualty situations.
- vi. Critically review and acquire relevant knowledge from the journals about the new development in the specialty.
- vii. Should be able to participate in anesthesia audit.

Major stress is on practical training. The goals of postings i.e. both the general goals and of the specific sub specialty postings will be fulfilled by rotating and Junior Resident in various operating theaters, Intensive Care, Pain Clinic, Emergency Room (Casualty), Emergency / Distress calls in wards, outpatient department and peripheral anesthesia facilities. The recommended period of stay in each area is as follows:

Specialty	Months
General Surgery	04
Urology	01
Eye	01
ENT	01
Dental	01
Orthopaedic / Trauma / Emergency Medicine	04
Obstetrics & Gynecology	04
Paediatrics Surgery	01
Burns /Plastic Surgery	01
ICU	02
Pain Clinic	
Recovery area (PACU)	
Organ Transplant	
Peripheral Theatre / Family Planning OT	

The student is instructed for preoperative preparation of the patients and discussion of the intra-operative problems of cases being conducted on the day in the OT. During these



postings the students initially observe and then perform various procedures and conduct the anesthetic procedure under supervision. Each procedure observed and performed will be listed in the logbook, which is signed by attending faculty.

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

1. Orientation- At the beginning of two years training, each student should be given an orientation to the hospital operation theatre, intensive care and pain clinic, and subject of anesthesia.
2. Introductory Lectures are aimed to familiarize the student with the:
  - i. Basic anesthesia delivery equipment, monitors and important principles of physics that govern the function of these equipments.
  - ii. Intravenous Anesthesia drugs and Inhalation agents, NMB's
  - iii. Patient evaluation, pre-anesthetic assessment, interpretation of laboratory investigation as applied to the care of the patients planning and conduct of general anesthesia and postoperative care and conduct of spinal and epidural anaesthesia.
  - iv. Students are taught basic and advanced cardiac life support.
  - v. The students are familiarized about the principle of the sterilization and universal precautions.

#### **1st year Objectives:**

The first year resident is taught to have expertise in the management of ASA I and II cases. To start with, they observe and slowly become independent in giving general anesthesia and spinal anesthesia to ASA I & II cases for minor and major surgery, under graded supervision. They are posted to the following specialties during the first year: Gynecology, General surgery, Orthopedic, ENT, Recovery room and Urology.



## 2nd year Objectives:

The students are taught to give general anesthesia / regional anesthesia to ASA I, II, III & IV under supervision. They should be able extradural block (EDB), spinal block and peripheral nerve blocks under supervision. Should learn pediatrics and trauma life supports and maintain skills for basic and advanced cardiac life support. They are posted in the following specialties Obstetrics, Dental Surgery, Eye, ICU, Pain Clinic and Peripheral Theatres.

The aim at the end is to be competent and independent in providing anesthesia to elective and emergency cases.

## Minimum Procedures / Cases to be entered in logbook

### A. Regional

Subarachnoid (SAB)	= 50 SAB
Lumbar epidural (EDB)	= 15 including continuous EDB
Caudal epidural block	= 10
CSE	= 10
Sciatic / Femoral nerve blocks	= 2 + 2
Bier block	= 2
Ankle block	= 4
Stellate Ganglion	= 2 (observe)
Brachial Plexus	= 3 (observe) 10 (do)
Coeliac Plexus Block	= 1 (observe)
Trigger Point Injection	= 5
Other peripheral N. Block	= 7
Ophthalmic Blocks	= 4 (observe)
Field Block	= 4
Filter block intubation	





**B. Procedures:**

Internal Jugular Cannulation	= 5+5 under supervision/ observe
External Jugular Cannulation	= 10
Subclavian Vein Cannulation	= 5+5 (do/ observe)
Peripheral Central Line	= 10
Arterial Line Cannulation	= 10+10(do/observe)

**C. Conduct of Cases:**

ASA I	= 75 (as independent)
ASA II	= 35 (as independent / Observation)
ASA III	= 20 (observation/ supervision)
ASA IV	= 05 (Under supervision)
Labour Analgesia	= 7 (Under observation)
Organ Transplant	= 2 (observation)
Ext. Cardiac compression	= 5
Cardiac defibrillation	= 5
O2 failure drill	= 2
Cardiac arrest drill	= 2
Mass casualty drill	= 1
Difficult Airway Drill	=10



## Detailed Curriculum for Postings:

### 1. OBJECTIVES:

- i. Learn to perform preoperative evaluation
  - a. To collect and synthesize preoperative data and to develop a rational strategy for the perioperative care of the patient.
  - b. A thorough and systematic approach to preoperative evaluation of patients with systemic diseases. Perform preoperative medical evaluation of patients undergoing different types of operations, both of in-patients and outpatients but especially elderly patients with complex medical illnesses such as alcoholism, chronic obstructive pulmonary diseases, congestive heart failure, coronary artery disease, hepatic failure, hypertension, myocardial infarction, renal failure and stroke.
  - c. To prioritize problems and to present cases clearly and systematically to attending consultants.
  - d. Develop working relationships with consultants in other specialties to assist in preoperative evaluation.
  - e. To interact with patients and develop effective counseling techniques for different anaesthetic techniques and preoperative procedures.
  - f. To assess and explain risk of procedure and take informed consent.
- ii. Learn anesthetic techniques and skills:
  - a. Understand operation of different equipment used by anaesthetist; develop optimum plans depending on patients' condition.
  - b. Perform the anesthesia machine check and prepare basic equipment necessary for all anesthetic cases.
  - c. Prepare drug table: select appropriate drugs for a case and develop a good system for arranging the drug and work tables.
  - d. Place standard monitors, for example, electrocardiogram, noninvasive blood pressure device, precordial stethoscope, neuromuscular blockade monitor, pulse oximeter and capnograph.
  - e. Various techniques of preoxygenation.
  - f. Induction of anaesthesia, both routine induction and rapid sequence induction, and the pertinent mechanical skills and choice of drugs.
  - g. Perform airway management by knowing various procedures and equipment.



- iii. They should know how to use/ do
  - a. Oropharyngeal/ nasopharyngeal airway.
  - b. Direct laryngoscopy using curve and straight blade.
  - c. Laryngeal mask airway (classic LMA, ILMA, Proseal LMA, flexible LMA, Ambu LMA)
  - d. Combitube
  - e. Fiberoptic techniques
  - f. Light wand techniques
  - g. Blind techniques
  - h. Laryngeal Tube Insertion
- iv. Failed Intubation or difficult airway algorithms:
  - a. All techniques for endotracheal intubation
  - b. Additional techniques such as retrograde wire intubation and surgical cricothyroidotomy, both of which will be learned on a mannequin.
- v. Awake Intubation
  - a. Topical / Local anesthesia for airway.
  - b. Airway nerve blocks, e.g., superior laryngeal nerve and glossopharyngeal nerve block.
- vi. Learn anaesthesia maintenance: appropriate choice and use of anaesthetic drugs and adjuvant drugs such as muscle relaxants.
  - a. Assessment of anesthesia depth.
  - b. Assessment of volume status.
  - c. Replacement of intraoperative fluid losses.
  - d. Appropriate use of blood and blood products.
  - e. Appropriate use of intraoperative laboratory tests blood gas coagulation tests etc.
- vii. Become skilled in catheterizing or cannulating the following vessels for sampling blood, measuring concentrations or pressures, or administering drugs or fluids.
  - a. Veins: all ages and all sizes
  - b. Arteries: radial and other sites.
  - c. Central vessels: internal jugular, subclavian, external jugular, femoral vein and "long arm" routes.



- viii. Become skilled in using and interpreting the following routine noninvasive and invasive monitors intraoperatively.
- Electrocardiogram with ST segment analysis
  - Noninvasive blood pressure
  - Capnograph: value and changes in value and waveform
  - Pulse oximetry: values and changes in values
  - Neuromuscular blockade monitor
  - Invasive arterial pressure: waveform and changes in the waveform
  - Central venous pressure: value and waveform
  - Temperature monitoring
- ix. Become skilled in techniques for regional anesthesia
- Brachial plexus blockade: interscalene, supraclavicular, axillary, infraclavicular, techniques with and without nerve stimulator for localization with ultrasound guidance.
  - Spinal anesthesia (including continuous spinal where appropriate)
  - Epidural anesthesia: lumbar, caudal and thoracic
  - Lower extremity blockade: femoral, sciatic, lateral femoral cutaneous nerve, posterior tibial and popliteal nerves
  - Upper extremity blockade: ulnar, median, and radial nerves
  - Bier's block
  - Cervical plexus block: superficial and deep cervical plexus
- x. Become skilled in discontinuing anaesthesia and monitoring emergence from anaesthesia
- Reversal of neuromuscular blockade
  - Determination of appropriate time for extubation
  - Monitoring of airway function during and after emergence
- xi. Become familiar with skills in peri-operative pain management
- Postoperative epidural infusion (opiates. Local anesthesia)
  - Postoperative
  - Patient – controlled analgesia (PCA)



- xii. Become skilled in use of techniques for conscious sedation and monitored anesthesia care
  - a. Selection of patient for conscious sedation
  - b. Selection of drugs for use in conscious sedation
  - c. Monitoring techniques helpful in controlling depth of sedation
  - d. Know how to successfully resuscitate, and develop skills of Basic Life Support (BLS) and Advance Cardiac Life Support (ACLS) Work with other members of the OR team, including surgeons and nurses, to optimally care for surgical patients, especially develop communications skill.

## 2. ANESTHESIA OUTSIDE OPERATING ROOM:

- i. Radiology and interventional neuroradiology: know special anesthetic considerations in these settings:
  - i. Dye allergies/ Anaphylaxis
  - ii. Embolization
  - iii. Examination for magnetic resonance imaging (MRI)
    - a. Monitoring in CATH Lab
    - a. Equipment options in the MRI suite
    - b. General anesthetic / sedation techniques
    - c. Radiotherapy
    - d. CT Scan and Radiological procedure
  - iv. Electroconvulsive shock therapy (ECT)
    - a. Preoperative
    - b. Anaesthetic techniques and drug effects on seizure duration
    - c. Haemodynamic responses and appropriate treatment
  - v. Evaluation to Determine Goal Achievement
    - a. The resident will be evaluated at the end of every 3 months by all attending consultants who worked with them. The attending physicians complete a Departmental Resident Evaluation Form, which is reviewed by the Clinical Competence Committee. Inform them of any problems Identified. The serious



problem will be discussed with them immediately after they occur.

- b. Residents will complete a log book. After each posting it will be checked and signed by the faculty concerned.

### 3. TRAUMA & RESUSCITATION:

All residents must achieve basic and advanced cardiac life support, advanced trauma life support, and pediatric life support training. They should start with the training of Airway breathing circulation (ABC) training and master the skills repeatedly and then proceed to advanced cardiac life support.

- i. Goals Of Trauma / Traumatized Patient And Disaster Management
  - a. Acquire improved ability to evaluate & triage the patient and formulate anesthetic plans, especially in the trauma patient
  - b. Acquire ability to administer operative anesthesia safely and rapidly
  - c. Acquire ability to identify, prevent and care for postoperative complications.
- ii. Objectives
  - a. Manage anesthesia for severely traumatized patients by doing the following as rapidly as possible
    - Evaluation
    - Placement of intravascular catheters
    - Airway intubation
    - Choose among anesthetic options, induce and maintain anesthesia safely
  - b. Perform a thorough preoperative evaluation and documentation
  - c. Postoperative Management

### 4. POST ANESTHESIA CARE UNIT (PACU)

- i. Goals: Understand the importance, purpose and components of the anesthesia record and the report from the anaesthetizing anesthesiologist. Use information about the patient that is received and observed on admission to the PACU and during the stay for the following purposes:



- a. To create a care plan
  - b. To score the patient's condition according to scoring system
  - c. To assess the patient's recovery and condition for a safe discharge or transfer
- ii. Observe, recognize and learn to treat the most commonly occurring problems likely to arise in the Post Anesthesia Care Unit (PACU). Understand the parameters patients must meet for safe discharge from the PACU to the following:
- a. Home
  - b. Inpatient Ward
  - c. Intensive care Unit
- iii. Detection of Hypoxemia and Oxygen therapy should be learned in this posting. Students should be able to recognize:
- a. Airway integrity and compromise
  - b. Arrhythmia
  - c. Hypertension
  - d. Hypotension
  - e. Pain prevention and relief
  - f. Nausea and vomiting
  - g. Decreased urine output
  - h. Emergence delirium
  - i. Delayed emergence from anesthesia
  - j. Maintenance of body temperature
  - k. Post obstructive pulmonary edema
  - l. Hypoxia
  - m. Hypercarbia

#### 5. INTENSIVE CARE UNIT:

- i. Goal: Understand the spectrum of critical illnesses requiring admission to ICU recognize the critically ill patient who needs intensive postoperative care from the patient who does not require.
- ii. Principles Of Managing A Critically Ill Medical Patient:
  - a. Airway: Recognize, and manage airway obstruction. Care of Tracheostomy



- iii. Cardiovascular: Recognition and management of shock (all forms), Cardiac arrhythmias, cardiogenic pulmonary edema, acute cardiomyopathies, Hypertensive emergencies and Myocardial infarction.
- a. Respiratory: Recognition and management of acute and chronic respiratory failure, status asthmaticus, smoke inhalation and airway burns, upper airway obstruction, including foreign bodies and infection, near drowning, adult Respiratory distress syndrome. Use of Pulmonary function tests including bedside Spirometry.
  - b. Renal: Recognition and acute management of fluid and electrolyte disturbances. Students should be able to prescribe fluids in renal failure and Acid-basis disorders and should be able to prescribe drugs based on principles of drug dosing in renal failure. They should know when to use Dialysis / hemofiltration.
  - c. Central Nervous System: Recognition and acute management of Coma, Drug overdose. Know Glasgow coma scale (GCS)
  - d. Metabolic and Endocrine, emergencies like Diabetic ketoacidosis Hypo adrenal crisis, pheochromocytoma, Thyroid storm, myxedema coma
  - e. Infectious diseases: Recognition and acute management of Hospital acquired and opportunistic infections, including acquired immunodeficiency syndrome. Students should know how to protect against cross infection risks to healthcare workers.
  - f. Hematological disorders: Recognition and acute management of defects in haemostasis and haemolytic disorders should be able to prescribe component therapy based on the result of coagulation profile in thrombotic disorders to diagnose Deep Vein thrombosis and know principle of Anticoagulation and fibrinolytic therapy. Know the indication of plasmapheresis for acute disorders, including neurologic and hematologic disease.
  - g. Gastrointestinal disorders:
    - To recognize and manage gastrointestinal bleeding (prescribe prophylaxis against stress ulcer bleeding)
    - Hepatic failure





**To do the following (ideally) at the end of the posting:**

- A. Radial arterial catheters and other sites as necessary
- B. Central venous catheters
- C. Manage cardiovascular instability
  - Know different fluid therapy option and when to use them
  - Know the different inotropic drugs and when to use them
  - Know how to use invasive monitoring devices to guide therapeutic use of fluids and inotropic drugs
- D. 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 and noninvasive including modes complications and mode of weaning.

**Principles and applications of oxygen therapy.**

- A. 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 assist in managing sepsis; specifically understand the optimization of oxygen delivery to tissues in the septic patient and the appropriate management of fluids and vasopressors to accomplish these goals.
  - Know the different classes of antibiotics and antifungal agents and their use in treating sepsis.



**B. Deliver appropriate nutritional support**

- Learn about the use of enteral nutrition in the patient who cannot tolerate input per oral.
- Learn about the use of parental nutrition in the critically ill surgical / medicine patient.
- Interact with nutrition support services in planning nutrition for the critically ill patient.

**C. Provide effective pain management and sedation postoperatively**

- Learn the appropriate use of pain management modalities in the ICU including:  
Patient controlled analgesia (PCA)  
Epidural and subarachnoid narcotics
- Learn use of sedative / hypnotic drugs in the ICU for: For patient on ventilator.

**Ethical and legal aspects of critical care:**

- A. Know the legal importance of informed consents, Do not resuscitate orders; (DNAR) withdrawing of therapy: Brain dead: consent for organ retrieval explain / prepare.

**Psychosocial issues:**

- A. Student should be able to communicate with distressed relatives
- B. Student should be able to give the correct picture of a critical patient, but with compassion in view of critical nature of the illness
- C. Student should be able to Transport a critically ill patient/ resuscitate patient with acute traumatic injury.



## 1. PEDIATRIC ANESTHESIA:

- i. General principles, monitoring, fluid therapy, temperature control, painrelief in children including neonates
- ii. Emergency and elective surgery in neonates and infants
- iii. Special equipment used in pediatric anaesthesia
- iv. Ventilation strategies
- v. Skill development related to procedures performed in neonates, infants and older children

## 2. PAIN MANAGEMENT:

- i. Goals
  - a. Should understand pathophysiology of acute and chronic pain and differentiate between the two types of pain
  - b. Know the multidisciplinary approach to chronic pain management and cancer pain management.
  - c. Manage acute (Postoperative pain, Labour pain) pain syndromes proficiently.
- ii. Objectives: Know the cancer pain guidelines: Treatment based on WHO treatment ladder
  - a. Drugs: Analgesic, Opiates, Sedatives and stimulants
  - b. Nerve block
  - c. Neurolytic Block
  - d. Paliative Care
- iii. Postoperative
  - a. Transport safely and manage immediate postoperative care in the following areas:
  - b. Ventilation, Oxygen administration, temperature control, cardiovascular monitoring, fluid balance and pain relief.
  - c. Recognize postoperative croup and treat it.
  - d. Understand post anesthesia apnea factors associated with it, the appropriate



duration of monitoring and treatment.

iv. Special problems

- a. Manage the following in pediatric patients undergoing anesthesia and surgery:
  - Blood replacement
- b. Drug administration and anesthetic requirement (minimum anesthetic concentration)
- c. Fluid and electrolyte balance, glucose requirement and renal maturation
- d. Hypocalcaemia
- e. Hypoglycemia
- f. Metabolism
- g. Temperature control
- h. Vitamin K administration

**3. OBSTETRIC:**

i. Goals:

- a. Physiology of normal pregnancy alters the response to anesthesia.
- b. Pertinent aspects of fetal and placental physiology.
- c. Implications of Pregnancy on obstetric and non-obstetric surgery and emergency and elective situations
- d. Principles of labor analgesia

ii. Objectives:

- a. Principle and techniques for anesthesia for cesarean section
- b. Know the risk factor, prevention and treatment of maternal aspiration
- c. Evaluate difficult airways and manage failed intubation and aortocaval compression
- d. Recognize high-risk factors in obstetric patients and how they affect anesthetic management for example
  - Morbid obesity
  - Preeclampsia and Eclampsia
  - Concurrent medical disease
  - Neurologic disease and pregnancy



- e. Understand anesthetic choices for the pregnant patient with heart disease.
- f. Identify and manage common medical emergencies in the post-parturient.

#### 4. REGIONAL ANESTHESIA:

- i. Goals:
  - a. To teach anesthesia residents the art and sciences of regional anesthesia.
  - b. Anatomy, pathophysiology and appropriate management of complications and side effects of regional anesthesia techniques.
  - c. To understand general principles of local anesthetic pharmacology, including the pharmacodynamics and pharmacokinetics of various local and adjuvant anesthesia.
  - d. Understand the indications and the contraindications to regional anesthetic techniques.
- ii. Objectives: Learn the anatomy of the sympathetic nervous system, specifically the anatomy of the epidural and subarachnoid spaces and the location of sympathetic and parasympathetic ganglia.

#### 5. SPECIAL ANESTHESIA:

- i. Liver and Kidney Anesthesia
  - a. Basic Anatomy, physiology, pathophysiology
  - b. Principles, management and anesthetic consideration in a patient with hepatobiliary disease, jaundice, portal hypertension, cirrhosis and Kidney diseases
  - c. Anemia for organ transplantation – liver and kidney
- ii. Endocrine anesthesia
  - a. Knowledge of various endocrine disorders and their anesthetic management related to surgery of that endocrine disorder or with other surgical procedures – Thyroid, Adrenal, Thymus, Pancreas, Pituitary
- iii. GIT and Anesthesia
  - a. Principle of GI surgery, laparoscopic, minimal access, bariatric and robotic surgeries.



- iv. Miscellaneous
  - a. Anemia
  - b. Coagulopathies and bleeding disorders
  - c. Neuropathies
  - d. Geriatric Anaesthesia



## V. LOG BOOK:

A candidate shall maintain a log book of operations (assisted / performed) during the training period, certified by the concerned post graduate teacher / Head of the department / senior consultant.

This log book shall be made available to the examiners for their perusal at the time of the final examination. The candidate will maintain the record of all academic activities undertaken by him/her in log book.

Personal profile of the candidate Educational qualification/Professional data Record of case histories Procedures learnt Record of case Demonstration/Presentations

Every candidate, at the time of practical examination, will be required to produce performance record (log book) containing details of the work done by him/her during the entire period of training as per requirements of the log book.

It should be duly certified by the supervisor as work done by the candidate and countersigned by the administrative Head of the Institution.

In the absence of production of log book, the result will not be declared.

**Rotation:** In the two years of DA postings, the student should be rotated (3 months) in a super speciality hospital for specialty training.



## VI. RECOMMENDED TEXT BOOKS AND JOURNALS:

1. Miller RD, ed. Anesthesia,
2. Wylie Churchill Davidson, 7th edn.
3. Stoelting RK, Miller RD, eds. Basics of Anesthesia & co-existing diseases & Pharmacology
4. JA Kaplan: Cardiac Anesthesia
5. Lee's Synopsis of Anesthesia
6. ICU Book, Paul Marino
7. ECG by Shamroth/Goldman
8. Physics for Anesthesia by Sir Robert Macintosh
9. Pediatric Anesthesia by Gregory
10. Medicine for Anesthetists by Vickers

### Reference:

1. The Management of Pain, Bonica JJ
2. Hatch and Sumner's Textbook of Pediatric Anesthesia Textbook of Obstetric Anesthesia, Chestnut
3. Neuro Anesthesia, Cottrill

### List of Journals:

1. Indian Journal of Anesthesia
2. Journal of Anesthesiology and Clinical Pharmacology Anaesthesia
3. British Journal of Anesthesia Anesthesia and Analgesia Anesthesiology
4. Anesthesia and Intensive Care Canadian Anesthesia Society Journal Acta Anesthesiologica Scandinavica
5. Regional Anesthesia and Pain Medicine

### Year Books

1. Anesthesia Clinic of North America International Anesthesiology Clinics Year book of Anesthesia
2. Recent Advances in Anesthesia Review

