

Delhi University Curriculum for M.D. (Anesthesiology)

Preamble:

The full course is divided into five parts: -

- I. The course Contents
- II. The development of skills as an expert Anesthesiologist
- III. The methods of evaluation
- IV. Thesis and Research
- V. Log Book

COURSE CONTENT: M.D. ANESTHESIOLOGY

In general, it aims to impart: -

- A thorough knowledge of the pharmacokinetics and pharmacodynamics of anesthetic drugs and adjuncts.
- Knowledge of cardiovascular, respiratory, neurological, hepatobiliary, renal physiology and endocrine homeostasis and related drugs as relevant to patients undergoing anesthesia.
- Relevant anatomy, physiology, biochemistry, pharmacology and physics.
- A basic idea of the relevant physical principles involved in the construction and functioning of equipment used in anesthesia and monitoring.
- Knowledge to attain expertise of the commonly used techniques in general, regional and local anesthesia, and their applications for routine and emergency anesthesia.
- A clear cut concept of unconsciousness and its implications.
- Relevant knowledge of acute pain and its management.
- Relevant knowledge about chronic intractable pain and its management.
- Relevant knowledge to manage patients in intensive care unit.
- Relevant knowledge of research methodology and medical statistics, medical audit and record maintenance.
- Knowledge & Expertise in cardiopulmonary resuscitation i.e. both BLS & ACLS.

1st year Theory covers the following:

- a) *Anatomy* – Diaphragm, larynx, upper and lower airway; cranial nerves; relevant anatomy for regional anesthesia, arterial and venous. Special anatomical area of interest to the anesthesiologist e.g., Orbit of the eyes, Base of Skull, Vertebral Column, Spinal Cord and meninges, Axilla, 1st rib, Intercostals Space, Nerves, Plexus e.g., Brachial, Coeliac, Sup. Hypogastric etc.
- b) *Physiology* - Theories of mechanism of production of Anesthesia. Respiratory, Cardiovascular, Central Nervous System, Hepatobiliary, renal and endocrine System, Pediatric and Geriatric Physiology, Pregnancy, Blood Groups and Blood Transfusion, Muscle and N M Junction, ECG, Regulation of temperature & Metabolism, Stress response, Cerebral blood flow, CSF physiology and ICP, Acid-Base Homeostasis, Fluid and Electrolytes, Shock, Pulmonary function tests.

c) *Biochemistry* –

- i) Biochemistry relevant to fluid balance & blood transfusion, artificial blood and perioperative fluid therapy.
- ii) Acid base homeostasis in health and diseases.
- iii) 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* –

- i) General pharmacological principles.
 - ii) Concepts of pharmacokinetics and pharmacodynamics.
 - iii) Uptake and distribution of inhaled anesthetics agents.
 - iv) Drug interaction in Anesthesiology.
 - v) Drugs used in Anesthesia and treatment of common medical disorder like DM, HT and IHD, Emergency drugs, e.g., Adrenaline; Atropine, Inotropes, Diuretics, prokinetics etc.
 - vi) Theoretical background of the commonly used anesthetic techniques of general and regional anesthesia viz.
- a) GA –Intravenous, Inhalational, Endotracheal etc., using spontaneous and controlled mode of ventilation.
 - b) RA –Spinal, epidural, CSE and local.
 - c) MAC (Monitored Anesthesia Care)

Medicine related to:

- I) Cardiovascular System.
- II) Respiratory System.
- III) Hepatobiliary System.
- IV) Genitourinary System.
- V) Endocrine system, Pregnancy.

e) *Involved principles of physics and use of equipment in anesthesia*

- i) Anesthesia machine – checking the machine and assembly of necessary items.
 - ii) Airway equipment including Tracheostomy / Equipments for airway management mask, LMA, fiberoptic laryngoscopes; other devices like Combitube etc.
 - iii) Breathing system continuous flow systems, draw over system - Assembly and checking, vaporizers, Gas laws.
 - iv) Monitoring in Anesthesia with concepts of minimal monitoring.
 - v) Safety in Anesthesia equipments.
 - vi) Medical gases – storage and central pipeline system.
 - vii) Introduction to research methodology, Randomised Controlled trials etc., Basics of biostatistics.
 - viii) Documentation and medico –legal aspects of anesthesia.
 - ix) Stress the importance of accurate documentation.
- Cardiopulmonary Resuscitation; both BLS & ACLS, theories of cardiac pump, thoracic pump, Recent Advances

- Defibrillation
- Resuscitation of a patient with overdose of drug/ poisons/ management of unconscious patients. Resuscitation of a severely injured patient.
- Neonatal Resuscitation.
- 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, 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.

2nd year Theory

- a) Relevant anatomy of each system.
- b) Physics of equipments used in anesthesia.
Medical gases –gas plant, central pipeline, scavenging system.
 - ↳ Reducing valves.
 - ↳ Anesthesia machine, Humidifiers.
 - ↳ Flow meters

Vaporizers –characteristics and functional specifications.

Breathing systems-Assembly, functional analysis, flow.

Minimum monitoring standards.

Requirements of APL and flow directional valves.

- c) Sterilization of equipment
- d) Computers, Utility, Computer assisted learning and data storage. Computerized anesthesia records.
- e) Pharmacology of drugs used in cardiovascular, respiratory, endocrine, renal diseases and CNS disorders.
- f) Principles of monitoring equipment used for assessment of:
 - i) Cardiac function viz. Rhythm, pulse, venous and arterial pressures, and cardiac output.
 - ii) Temperature.
 - iii) Respiratory function viz. Rate, volumes, compliances, resistance, blood gases.
 - iv) Intracranial pressure, depth of anesthesia and
 - v) Neuromuscular block.
- g) Working principles of ventilators.
- h) Special anesthesia techniques as relevant to outpatient anesthesia, hypotensive anesthesia, anesthesia in abnormal environments and calamitous situations.

- i) Anesthetic management in special situations – Emergency, ENT, Ophthalmology, Obstetric, Obstetrics analgesia, Plastic, Dental, Radio-diagnosis and Radio therapeutic procedures and patients with systemic diseases.
- j) Medical statistics relevant to data collection, analysis, comparison and estimation of significance.

Principles of pediatric anesthesia. Management of neonatal surgical emergencies, RA in infants. Pediatrics – Prematurity, Physiology, anatomy of neonate in comparison with adult.

Associated Medical disorders in surgical patient – Anesthetic implications and management.

Basics of orthopedic anesthesia.

Day care anesthesia.

Rural anesthesia – anesthesia for camp surgery.

Anesthesia for otorhinolaryngology with special emphasis on difficult airway management.

Blood and blood component therapy. Anesthetic implications on coagulation disorders.

Monitored anesthesia care (MAC).

Anesthetic implications in diabetes mellitus, thyroid and parathyroid disorders.

Phaeochromocytoma, cushings disease etc.

Management of acid base disorders.

Principles of geriatric anesthesia.

Anesthesia outside the OR and in special situations.

Principles of management in Trauma and mass casualties.

ACADEMIC TRAINING PROGRAMMES:

Seminars, Journal Club, Case presentations, Morbidity & Mortality meetings.

3rd year Theory

Anesthesia 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 anesthesia and related equipment.

Principles of anesthetic 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.

Principle of one lung anesthesia.

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 OR/ ICU.
- ⇒ Become a teacher for Technicians, Nurses, Paramedical Staff and undergraduates.
- ⇒ Ability to discuss. Participate in case discussion and scientific presentations.
- ⇒ Ability to function as a leader in the operating room / ICU.

Ability to cope up with stress of long working hours, night rosters and grave emergency situation.

SKILL DEVELOPMENT:

Requirement of practical training by Junior Resident (3 years training course)

Plan and conduct anesthesia, recovery and postoperative pain relief for elective and emergency surgery related to all surgical specialties.

Carry out basic life support (BLS) and advanced life support (ALS) and train medical and emergency staff in BLS and ALS.

Manage unconscious patients: Airway management and long term management of unconscious patient.

Manage patients admitted to an intensive care unit.

Manage patients suffering from chronic intractable pain.

Organize the Hospital environment to manage mass casualty situations.

Critically review and acquire relevant knowledge from the journals about the new development in the specialty.

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, out patient department and peripheral anesthesia facilities. The recommended period of stay in each area is as follows:

Specialty	Months
General Surgery	05
Urology	01
Eye	02
ENT	02
Dental	01
Orthopedic / Trauma	04
Gynecology	02
Obstetrics/ Labour Room	02
Pediatrics	02
Burns /Plastic Surgery	01
CTVS	02
Neurosurgery	03
ICU	04
Pain Clinic	01

Specialty	Months
Recovery area (PACU)	01
Organ Transplant	01
Peripheral Theatre / Family Planning OT (Radiology, Radiotherapy, ECT, Cardiac Cath, Lab)	01

The student is instructed for preoperative preparation of the patients and discussion of the intra-operative problems of cases being conducted on the day. During these postings the students initially observe and then perform various procedures and conduct the anesthetic procedure as listed. 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:

Orientation- At the beginning of three years training, each student should be given an orientation to the hospital operation theatre, intensive care and pain clinic, and subject of anesthesia. The candidates are assigned thesis guides so as to help them prepare protocols.

Introductory Lectures are aimed to familiarize the student with the:

- a) Basic anesthesia delivery equipment, monitors and important principles of physics that govern the function of these equipments.
- b) Intravenous Anesthesia drugs and Inhalation agents, NMB's
- c) 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.
- d) Students are taught basic and advanced cardiac life support.
- e) The students are familiarized about the principle of the sterilization and universal precautions.
- f) The students are encouraged and taught to search literature to be able to write a thesis protocol.

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 student should be able to analyze data and write a thesis. They should be able to present scientific data.

3rd year Objectives:

The student should be able to plan and administer to all patients under graded supervision including patients for Cardiac surgery, Neurosurgery, and Pediatric Surgery and for all major surgeries. The aim at the end is to be competent and independent soon after the third year of junior residency in providing anesthesia to elective and emergency cases. They should also know how to organize mass casualty.

Minimum Procedures / Cases to be entered in logbook

I. Regional

Subarachnoid (SAB)	=	50 SAB
Lumbar epidural (EDB)	=	50 including continuous EDB
Caudal epidural block	=	30
CSE	=	20
Sciatic / Femoral nerve blocks	=	5 + 5
Bier block	=	5
Ankle block	=	5
Stellate Ganglion	=	5 (observe)
Brachial Plexus	=	5 (observe) 10 (do)
Coeliac Plexus Block	=	3 (observe)
Trigger Point Injection	=	5
Other peripheral N. Block	=	10
Ophthalmic Blocks	=	5 (observe)
Field Block	=	5

II. Anesthesia for:

Open Heart	=	3-5 (observe)
Closed Heart	=	5 (observe)
Craniotomy	=	10 (observe)
Spine Surgery	=	10 (observe)
Joint replacement	=	10 (observe)

III. Procedures:

Internal Jugular Cannulation	=	5 +5 do/ observe
External Jugular Cannulation	=	5
Subclavian Vein Cannulation	=	5 + 5 do/ observe
Peripheral Central Line	=	15
Arterial Line Cannulation	=	10

IV. Conduct of Cases:

ASA I	=	100 (as independent)
ASA II	=	50 (as independent / Observation)

ASA III	=	30 (observation/ supervision)
ASA IV	=	10 (observation/ supervision)
Labour Analgesia	=	10 (observation)
Organ Transplant	=	5 (observation)
Ext. Cardiac compression	=	30
Cardiac defibrillation	=	20
O ₂ failure drill	=	once a while
Cardiac arrest drill	=	once a while
Mass casualty drill	=	once a while

Detailed Curriculum for Postings

I. General Goals of all Postings

II. Objectives:

(A) Learn to perform preoperative evaluation

- Learn to collect and synthesize preoperative data and to develop a rational strategy for the perioperative care of the patient.
- Learn a thorough and systematic approach to preoperative evaluation of patients with systemic diseases. Perform preoperative medical evaluations of patients undergoing many different types of operations, both of inpatients 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.
- Learn to prioritize problems and to present cases clearly and systematically to attending consultants.
- Develop working relationships with consultants in other specialties to assist in preoperative evaluation. Learn to get a good consultation.
- Learn to interact with preoperative patients and develop effective counseling techniques for different anesthetic techniques and preoperative procedures. Learn to assess and explain risk of procedure and take informed consent.

(B) Learn anesthetic techniques & skills:

- Understand operation of different equipment used by anesthetist; develop optimum plans depending on patients' condition.
- Know the special considerations and techniques required to anesthetize patient in location inside and outside of the operating room, for example, the Cardiac Catheterization laboratory, Electroconvulsive Therapy, Genitourinary Clinic, Magnetic Resonance Imager, Radiology & Radiotherapy.
- Perform the anesthesia machine check and prepare basic equipment necessary for all anesthetic cases.
- Prepare drug table: select appropriate drugs for a case and develop a good system for arranging the drug and work tables.

- Place standard monitors, for example, electrocardiogram, noninvasive blood pressure device, precordial stethoscope, neuromuscular blockade monitor, pulse oximeter and capnograph.
- Learn proper techniques of preoxygenation.
- Learn how to induce anesthesia, 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:

They should know how to use/ do

- ↗ Oropharyngeal/ nasopharyngeal airway.
 - ↗ Direct laryngoscopy using curve and straight blade.
 - ↗ Laryngeal mask airway (classic LMA, ILMA, Proseal LMA, flexible LMA, Ambu LMA)
 - ↗ Combitube
 - ↗ Fiberoptic techniques
 - ↗ Light wand techniques
 - ↗ Blind techniques
 - ↗ Laryngeal Tube Insertion
- 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.
 - Awake Intubation
 - a. Topical / Local anesthesia for airway.
 - b. Airway nerve blocks, e.g., superior laryngeal nerve and glossopharyngeal nerve block.
 - Learn anesthesia maintenance: appropriate choice and use of anesthetic 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.
 - Effect of different types of surgical procedures on anesthetic management, e.g., 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.
 - 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.
 - 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
- Pulmonary artery pressure : values and waveforms, Pulmonary capillary wedge (PCW) tracing
 - a. Cardiac output.
 - b. Mixed venous oxygen saturation
- Evoked potential: Brainstem Auditory, visual and somatosensory evoked potential
- Transesophageal echocardiography (TEE): basic understanding
- Temperature monitoring

Become skilled in techniques for regional anesthesia

- a. Brachial plexus blockade: interscalene, supraclavicular, axillary, infraclavicular, techniques with and without nerve stimulator for localization with ultrasound guidance.
 - b. Spinal anesthesia (including continuous spinal where appropriate)
 - c. Epidural anesthesia: lumbar, caudal and thoracic
 - d. Lower extremity blockade: femoral, sciatic, lateral femoral cutaneous nerve, post tibial and popliteal nerves
 - e. Upper extremity blockade: ulnar, median, and radial nerves
 - f. Bier's block
 - g. Cervical plexus block: superficial and deep cervical plexus
- Become skilled in discontinuing anesthesia and monitoring emergence from anesthesia
 - a. Reversal of neuromuscular blockade
 - b. Determination of appropriate time for extubation
 - c. Monitoring of airway function during and after emergence
 - Become familiar with skills in preoperative pain management
 - a. Postoperative epidural infusion (opiates. Local anesthesia)
 - b. Postoperative
 - c. Patient – controlled analgesia (PAC)
 - d. Adjunctive nerve blockade
 - 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. Recognition of when conscious sedation has become unconscious sedation

- 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.

ANESTHESIA OUTSIDE OPERATING ROOM

- 1. Radiology and interventional neuroradiology: know special anesthetic considerations in these setting:**
 - a. Dye allergies/ Anaphylaxis
 - b. Embolization
 - c. Examination for magnetic resonance imaging (MRI)
 - I. Monitoring
 - II. Equipment options in the MRI suite
 - III. General anesthetic / sedation techniques

- 2. Electroconvulsive shock therapy (ECT)**
 - I. Preoperative
 - II. Anesthetic techniques and drug effects on seizure duration
 - III. Hemodynamic responses and appropriate treatment

- 3. Urology Service**

Become skilled in anesthetic techniques applicable to the genitourinary clinic

 - a. Transurethral resection of the prostate: recognize and treat hyponatremia; know different anesthetic options; their advantages and disadvantages
 - b. Irrigation fluid options: know advantages and disadvantages of each
 - c. Anesthetic techniques for extracorporeal shock wave lithotripsy
 - d. Anesthetic considerations for percutaneous placement of nephrostomy

III. Evaluation to Determine Goal Achievement

- a. The resident will be evaluated every 3 months end posting 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.

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 / TRAUMATISED 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
 1. Evaluation
 2. Placement of intravascular catheters
 3. Airway intubation
 4. Choose among anesthetic options, induce and maintain anesthesia safely
- B. Perform a thorough preoperative evaluation and documentation
- C. Postoperative Management

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 care there for the following purposes:

1. To create a care plan
2. To score the patient's condition according to the Aldrete scoring system
3. To assess the patient's recovery and condition for a safe discharge or transfer

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:

1. Home
2. Inpatient Ward
3. Intensive care Unit

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

1. Airway integrity and compromise
2. Arrhythmia
3. Hypertension
4. Hypotension
5. Pain prevention and relief
6. Nausea and vomiting
7. Decreased urine output
8. Emergence delirium

9. Delayed emergence from anesthesia
10. Shivering
11. Post obstructive pulmonary edema

III. Evaluation to Determine Goal Achievement (End posting Summative)

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 such care

PRINCIPLES OF MANAGING A CRITICALLY ILL MEDICAL PATIENT

Cardiovascular

Recognition and acute management of shock (all forms), Cardiac arrhythmias, Cardiogenic pulmonary edema, Acute cardiomyopathies, Hypertensive emergencies, myocardial infarction.

Respiratory

Recognition and acute 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 Spirometer.

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.

Central Nervous System Recognition and acute management of Coma, Drug overdose
Know Glasgow coma scale (GCS)

Metabolic and Endocrine, emergencies like Diabetic ketoacidosis Hypo adrenal crisis, pheochromocytoma, Thyroid storm, myxedema coma

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.

Hematological disorders

- ⇒ Recognition and acute management of defects in hemostasis & hemolytic 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.

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.
 1. Radial arterial catheters and other sites as necessary
 2. Central venous catheters
 - a. Subclavian route
 - b. Internal or external jugular route
 - Pulmonary artery (PA) catheters (observe only)
- B. Understand and interpret the following PA catheters variables, initiate appropriate therapy in response to change in them:
 1. PA waveform
 - a. Normal
 - b. Pathologic
 - c. PA wedge
 2. Mixed venous oxygen saturation
 3. Right ventricular ejection fraction
 4. Thermodilution Cardiac output
 - a. Technological basis for cardiac output measurement
 - b. Factors producing errors in cardiac output measurements
- C. Manage cardiovascular instability
 1. Know different fluid therapy option and when to use them
 2. Know the different inotropic drugs and when to use them
 3. Know how to use invasive monitoring devices to guide therapeutic use of fluids and inotropic drugs
- D. Manage respiratory failure and postoperative pulmonary complications
 1. Know how to use arterial blood gas and ventilatory variables to evaluate postoperative patients with respiratory failure.
 2. 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.
 3. Principles and applications of oxygen therapy.

- E. Pathophysiology and clinical manifestation of septicemia and its treatment
 1. Recognize sepsis in the postoperative patient including all the typical hemodynamic findings.
 2. Know the appropriate tests to diagnose sepsis.
 3. 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.
 4. Know the different classes of antibiotics and antifungal agents and their use in treating sepsis.

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

- G. Provide effective pain management and sedation postoperatively
 1. Learn the appropriate use of pain management modalities in the ICU including:
 - a. Patient controlled analgesia (PCA)
 - b. Epidural and subarachnoid narcotics

 2. Learn use of sedative / hypnotic drugs in the ICU for:
 - a. For patient on ventilator.

Monitoring and Biostatistics:

Should be able to use prognostic indices such as acute physiology and chronic health evaluation (APACHE), therapeutic intervention scoring system (TISS) and know the concept of audit.

Ethical and legal aspects of critical care:

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:

Student should be able to communicate with distressed relatives

Student should be able to give the correct picture of a critical patient, but with compassion in view of critical nature of the illness

Student should be able to Transport a critically ill patient/ resuscitate patient with acute traumatic injury.

PEDIATRIC TRAINING

Student should be able to:

Recognize and management cardiovascular and respiratory failure in a critically ill child

Evaluate and manage the critically ill neonate

Prescribe appropriate dose of all drugs and fluid and electrolytes in a child.

Core procedural skills for Residents: In addition a practical training in the following procedural skills, the resident must have an understating of the indications, contraindications, complications and pitfalls of these interventions.

- **Cardioversion/ Defibrillation**
- **Pulmonary artery catheterization**
- **Trancutaneous pacing**
- **Draining of Tension Pneumothorax**
- **Insertion of chest drain**
- **Conventional and Percutaneous Tracheostomies**
- **U/S guided nerve blocks and central venous cannulation**

Special postings for a week in: General surgery, Neurosurgery, Paediatrics/NICU, Obstetrics & Gynaecology (and Labour Room), Orthopaedics.

CARDIOVASCULAR ANESTHESIA

Goals:

- A. Understand cardiac physiology, develop knowledge of cardiovascular anesthesia (anesthesia for the patient with cardiovascular disease), Choose appropriate anesthetic techniques for patients with different types of cardiovascular disease and skills for lifelong continuing education.
- B. Develop technical and monitoring skills necessary for cardiovascular anesthesia,
- C. Administer anesthesia for a wide variety of cardiothoracic cases and develop interest in further learning.
- D. Perform a thorough preoperative assessment of the patient undergoing cardiovascular surgery.
- E. Know intraoperative anesthetic management for the patient undergoing cardiopulmonary bypass. Know how cardiopulmonary bypass is instituted and discontinued. Understand cardiopulmonary bypass and discuss the mechanical aspects of it as follows:
 1. Different types of pumps – pulsatile and nonpulsatile
 2. Physiology of hypothermia, cardiac and cerebral protection
 3. Effects of bypass on volumes of distribution and clearness of anesthetic drugs and anesthetic maintenance, including amnesia
- F. Know how and why to use inotropic support, vasodilators and antiarrhythmic drugs that may be necessary before but are especially necessary after cardiopulmonary bypass.
- G. Develop understanding of the major issue involved in the preoperative care of the child with congenital heart disease.
- H. Insert vascular catheters or cannulas for adult and pediatric patients. Observe / know about a Transesophageal echocardiography (TEE) probe and interpret TEE image.

I. Manage care during cardiac surgery as follows:

- a. Blood replacement
- b. Monitoring the effect of heparin
- c. Postcardio pulmonary bypass coagulopathy

Rationale for various therapies such as aprotinin designed to prevent coagulopathy.

J. Know following procedures and anesthetic implications:

- i. Aortic repairs
- ii. Congenital repairs – pediatric
- iii. Coronary artery bypass grafting and valves – adults
- iv. Electrophysiology
- v. Thoracic surgery
- vi. Transplantation – heart and lungs

K. Work as a team member with fellow anesthesiologists, surgeons, perfusionists and nurses

L. Evaluation to Determine Goal Achievement

Neuroanesthesia

I. Goals

- a) Administer anesthesia safely to patients with neurologic disease who are undergoing neurologic or non-neurologic surgery, diagnostic procedures requiring anesthesia or nonsurgical interventions requiring anesthesia.
- b) Understand the basic concepts of central nervous system (CNS) physiology as they relate to neuroanesthesia specifically mastery of autoregulation of blood flow, blood flow response to CO₂, blood flow response to cerebral oxygen (CMRO₂) and glucose (CMR_{glu}) metabolic rates and cerebrospinal fluid physiology.
- c) Know the effect (s) of commonly used anesthetic agents and adjacent agents, for example antihypertensive on cerebral physiology.
- d) Understand the anesthetic implication of the most common neurosurgical procedures that is what is likely to happen during neurosurgery that will affect anesthetic management.
- e) Understand the basic concepts behind electrophysiologic monitoring of the brain and spinal cord.
- f) Understand how concurrent medical illnesses affect anesthesia during neurologic surgery.

II. Objectives

- A) Review the medical history and physical examination of patients; assess their major neurosurgical problem. Evaluate the patients' Glasgow Coma scale score as well as other medical problems that may affect anesthetic care; and know what information about nervous system function and pathology are important to be anesthesiologist
- 1. Recognize both the adult and pediatric patient with poor elastance of increased intracranial pressure (ICP)

2. Evaluate the patient with subarachnoid hemorrhage and intracranial aneurysm by means of the Hunt-Hess and Fischer grading systems; recognize preoperative vasospasm and anticipate which patients are likely to require special techniques such as barbiturate protection, hypotension, induced hypertension or temporary vessel occlusion.
3. Differentiate between radiculopathy and myelopathy and understand the anesthetic implications of each, that is, which patients require awake intubation and positioning.
4. Know the basic differences between the following types of brain, spinal cord and metastatic tumors of the CNS and their association with edema and intraoperative blood loss.
5. Know the anesthetic implications of:
 - a. Acoustic neuroma, Ependymoma, Gliomas, Meningioma, Pituitary tumors
 - b. Understand the following different types of spinal operations as well as their anesthetic implications:

Anterior cervical discectomy and fusion, anterior cervical corpectomies, posterior cervical fusions, laminectomies and foramenotomy, Laminectomies for excision of spinal cord tumors both intramedullary and extramedullary, Lumbar laminectomies, microdiscectomies, corpectomies and fusions with instrumentation, Thoracic laminectomies, and discectomies.

6. Anticipate pre-medication for and anesthetic considerations during electrocorticography.
 7. Anticipate airway and sedation requirements for stereotactic neurosurgical procedures conducted with either general anesthesia or monitored anesthesia care.
- B) Perform the following specific procedures and monitoring techniques necessary to care for the neurosurgical patient.
1. Choose appropriate premeditation and agents for anesthetic induction and maintenance based on knowledge of their effects on cerebral physiology and on neuropathology.
 2. Choose and place the following monitors and monitoring devices for use during spinal and intracranial surgery:
 - a. Arterial line, central venous (CVP) or pulmonary artery (PA) pressure catheters by all approaches, especially the basilic or cephalic veins.
 - b. Observe/ know about Precordial Doppler and interpretation of sounds.
 3. Perform techniques for awake intubation and positioning of the neurosurgical patient with either an unstable neck or myelopathic signs and symptoms:
 - a. Assess when awake intubation and positioning are needed.
 - b. Intubate an awake patient such that coughing or movements are minimal.
 - c. Master anesthesia for awake intubation, including but not limited to, superior laryngeal and glossopharyngeal nerve blocks and transtracheal injection of lidocaine.

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

5. Know general principles of positioning the patient for neurologic surgery and the advantages and disadvantages of each position:
 - a. Lateral
 - b. Prone
 - c. $\frac{3}{4}$ prone
 - d. Supine – head turned
 - e. Sitting –theoretical knowledge only because this position is no longer used at our institution.

6. Know anesthetic effects on the electroencephalogram (EEG) and evoked potentials and basic implications of and appropriate responses to changes in each.

7. Understand the basic indications and techniques, and if possible perform the following special procedures used during neuroanesthesia:
 - a. Induced hypotension
 - b. Induced hypertension
 - c. Moderate Hypothermia

Barbiturate cerebral protection, Cardiopulmonary bypass and circulatory arrest: theoretical knowledge only in most instances.

8. Know the differential diagnoses and treatment alternatives of intraoperative intracranial hypertension (tight brain).

9. Reverse general anesthesia rapidly with a minimum of hemodynamic change to allow early postoperative assessment of the patient and recognize when failure to emerge from anesthesia is not likely an anesthesia effect.

10. Know the management of Head Trauma, and its anesthesia management.

III. Evaluation to Determine Goal Achievement:

- A.
 1. Preparation for case and ability to carry out plan discussed the night before
 2. Recognition of intraoperative problems and communications with the attending ability to appropriately respond to changing clinical situation; clinical judgment.
 3. Mechanical skills of placing lines and positioning the patient.
 4. Application of basic and clinical sciences knowledge and skills to the neurosurgical patient.

- B. The neuroanesthesia group will meet at the conclusion of each rotation and overall performance evaluation will be made based on the above criteria.

PAIN MANAGEMENT

I. Goals

- A. Differentiate among the different chronic pain syndromes, for example, complex regional pain syndrome (CRPS) and fibromyalgia, trigeminal neuralgia, diabetic neuropathy, etc. and know what treatment are effective for each.
- B. Know the types of drugs that relieve chronic neuropathic pain and cancer pain and their efficiency, indications, side effects and contraindications.
- C. Know the laboratory tests, radiological studies and psychological tests used to help differentiate chronic pain syndromes.
- D. Learn to perform a thorough, directed history and physical examination, which will emphasize and facilitate the diagnosis of different pain states.
- E. Know the multidisciplinary approach to chronic pain management and cancer pain management.
- F. Know when it is appropriate to refer patients to different specialists for definitive or adjunctive therapy, for example – neurosurgery, orthopedic surgery and neurology.
- G. Manage acute (Postoperative pain, Labour pain) pain syndromes proficiently.
- H. Know that pain has been declared as 5th vital sign (by WHO)

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.

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 this month):

1. Epidural steroid Injection (at different levels)
2. Long term epidural catheterization
3. Block which should be observed and know about the following blocks:
 - ↪ Infraorbital nerve, supraorbital blocks
 - ↪ Maxillary nerve block, mandibular nerve block
 - ↪ Stellate ganglion block
 - ↪ Intercostal nerve block
 - ↪ Lumbar sympathetic block
 - ↪ Facet block, nerve root blocks
 - ↪ Celiac plexus block
 - ↪ Superior hypogastric plexus block

4. Neurolytic blocks using alcohol and phenol
5. Complication associated with each block and appropriate treatment of each
 - know the cutaneous dermatomal mappings
Diagnose myofascial pain syndromes and perform trigger point injections
 - Know the different modalities of physical therapy that may relieve both acute and chronic pain and learn how to obtain such therapy.
 - Know the indication for stimulation techniques such as transcutaneous electrical nerve stimulation (TENS) spinal cord stimulation, intrathecal pumps and deep brain stimulation.
6. Know the cancer pain guidelines:
 1. Treatment based on WHO treatment ladder
 - a. Drugs: Analgesic, Opiates, Sedatives and stimulants
 - b. Nerve block
 - c. Neurolysis: surgical and chemical
 2. Route of administration and risk and benefits of each route:
 - a. Intramuscular
 - b. Intrapleural
 - c. Intravenous
 - d. Oral
 - e. Patient Controlled Analgesia (PAC)
 - f. Subcutaneous

Diagnosis & management of the following chronic pain syndromes:

- Diabetic peripheral neuropathy (DPN), headache, migraine
- Inflammatory states such as bursitis, carpal tunnel syndrome, skeletal pain, trigger finger
- Thalamic pain syndromes, osteoarthritis etc
- Fibromyalgia, chronic pelvic pain
- Phantom limb pain
- Post herpetic neuralgia and other varieties of chronic neuropathic pain
- Complex regional pain syndrome (CRPS) Type-I & II
- Trigeminal neuralgia, glossopharyngeal neuralgia
- Failed back syndrome
- Low back pain, radicular pain, sacroileitis, facet arthropathy
- Terminal cancer pain

III. Evaluation to Determine Goal Achievement:

PEDIATRIC

I. Goals:

- A. Administer anesthesia safely for routine surgical, diagnostic and therapeutic procedures.
- B. Recognize and treat postanesthesia problems.

C. Recognize when you or your institution cannot provide adequate care for a particular problem.

II. Objectives:

A. Preoperative

Neonatal anatomy and physiology applied to conduct of anesthesia.

1. 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.
2. Recognize and cope with the emotional problems of parents and child and attempt to alleviate them.
3. Know the principles of and medications used for preoperative sedation.
4. Induce anesthesia in distraught or uncooperative child.
5. Recall and state the anatomic, physiology and pharmacologic differences and similarities in the major organ systems between children and adults.
6. Transport safely a sick pediatric patient to the operating room and be able to state and perform the solution to any problems which may arise in the following areas:
 - a. Heat maintenance
 - b. Cardiovascular stability
 - c. Ventilation
 - d. Oxygenation
7. Record and estimate preoperatively blood volume, hourly fluid requirements estimated fluid deficit, third space loss, red cell mass at the patient's hematocrit acceptable red cell mass loss and acceptable blood loss.

B. Intraoperative:

1. Know appropriate endotracheal tube sizes – cuffed and uncuffed
2. Induce and maintain anesthesia by inhalation, intravenous, intramuscular and rectal routes and know the differences in effects of various anesthesia between adults and pediatric patients.
3. Administer mask or laryngeal mask airway anesthesia when appropriate.
4. Maintain in the airway of an anesthetized pediatric patient and intubate the trachea without trauma in 98% of cases within 1 minute.
5. Perform awake intubation.
6. Recognize abnormal airways and maintain them during anesthesia.
7. Describe the appropriate management of laryngospasm.
8. Recognize the following signs of hypoxias: bradycardia, poor color, poor venous filling, distant heart tones and abnormal electrocardiogram.
9. Understand the various forms of breathing circuits used in pediatric anesthesia and use them appropriately.
10. Apply consistently and interpret data from a blood pressure cuff, electrocardiogram, oximeter, capnograph or mass spectrometer and thermistor.
11. Know the indication of use of a heat lamp and heated humidifier and when appropriate answer question concerning the importance of thermoneutrality in pediatric

patient by demonstrating the use and abuse of the following, Heat lamp, Heat blanket, Heat humidifier, Room temperature.

12. Master the techniques of halothane and isoflurane / nitrous oxide/ oxygen/ muscle relaxant anesthesia.

13. Determine and discuss when deep or awake extubation is appropriate and apply the proper approach.

14. Understand and apply the basic concepts of neuromuscular blockade in children; know when anesthesia is adequately reversed and know the differences between dose / effect in infants and children as compared to adult patients.

15. Apply the principles of fluid and blood replacement during anesthesia.

16. Understand the benefits and risks of regional anesthesia including spinal anesthesia and other regional analgesia techniques for postoperative pain relief.

C. 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 post anesthesia apnea factors associated with it, the appropriate duration of monitoring and treatment.

D. Special problems

1. Manage the following in pediatric patients undergoing anesthesia and surgery:

- a) 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

2. Care of patients in the following special circumstances:

a. Special problems:

- ⇒ Epiglottitis
- ⇒ Malignant hyperpyrexia
- ⇒ The child with anatomically difficult airway (e.g. Pierre Robin Syndrome, etc.)

b. Special procedures:

- ⇒ Bronchoscopy (in particular for foreign body aspiration)
- ⇒ Tonsillectomy (in particular for the re-breeding tonsil)
- ⇒ Computerized axial tomographic scan and magnetic resonance imaging

3. Know and experience management of a pediatric patient with a full stomach.

4. Identify the following special problems in pediatric patients and handle them:
 - Diaphragmatic hernia
 - Omphalocele and gastroschisis
 - Pyloric stenosis
 - Tracheoesophageal fistula

5. Understand pediatric resuscitation (recent advances), drug and doses used for it, and defibrillation

III. Evaluation to Determine Goal Achievement

OBSTETRIC

I. Goals:

- A. Learn how the physiology of normal pregnancy alters the response to anesthesia.
- B. Learn pertinent aspects of fetal and placental physiology.
- C. Learn what obstetricians may expect from anesthesiologists.
- D. Learn how pregnancy creates special problems for the anesthesiologist. Learn the nature of high-risk obstetrics and how special medical problems alter the approach to obstetric anesthesia.
- E. Participate in morbidity mortality conference and ongoing research.
- F. Learn how to evaluate the neonate and principles of neonatal resuscitation.
- G. Learn how drugs affect the neonate.
- H. Learn how to communicate effectively with obstetricians and with labour and delivers nurses.

II. Objectives:

- A. Obtain pertinent information from the history and physical examination of the obstetric patient to assess major systemic problems
- B. Understand obstetric physiology and pharmacology as follows:
 - ↳ Alteration of maternal physiology during pregnancy. Effects of anesthesia, both general and regional on human uteroplacental blood flow and of adjunctive medications such as vasopressors and vasodilators on uterine flow.
 - ↳ Perinatal pharmacology and placental transfer of drugs.
 - ↳ Effects of epidural and systemic medications on labour and delivery.
 - ↳ Learn all anesthetic techniques suitable for managing normal labour pain including:
 - ❖ Epidural local anesthesia (LA)
 - ❖ Epidural anesthesia with L.A. and adjuvant including opioid
 - ❖ Inhalation analgesia
 - ❖ Parenteral narcotics and other agents
- C. Understand epidural and spinal analgesia and anesthesia as follows:
 - ↳ Anatomy and physiology of the epidural space and spine in a parturient

- ↪ Techniques of needle placement including midline and paramedian approaches
 - ↪ Pharmacology of local anesthesia
 - ↪ Complications and side effects
- D. Know common problems encountered in continuous epidural infusion and how to prevent and treat them.
- E. Know how to use intraspinal opiates in obstetrics:
- ↪ Physiology and pharmacology
 - ↪ Benefits for labour delivery and postoperative pain
 - ↪ Side effects
- F. Understand the advantages of regional and general anesthesia for cesarean section.
- G. Know the risk factors, prevention and treatment of maternal aspiration.
- H. Evaluate difficult airways and know how to prevent the problems associated with them and to manage failed intubation.
- I. Be familiar with recent advances in obstetric anesthesia:
- ↪ The effect of epidural anesthesia on labour and delivery
 - ↪ Drug interaction
 - ↪ The epidural test dose
 - ↪ Anesthesia for pre-term delivery
- J. Recognize high-risk factors in obstetric patients and how they affect anesthetic management as follows:
- ↪ Morbid obesity and anesthesia :Problems and management
 - ↪ Preeclampsia :Basic considerations and controversy in management
 - ↪ Neurologic disease and pregnancy
- K. Understand anesthetic choices for the pregnant patient with heart disease.
- L. Identify and manage common medical emergencies in the post-parturient.
- M. Know how the late 20th century social problems affect anesthetic care, such as perinatal human immunodeficiency virus infection and maternal substance abuse.
- N. Manage maternal anesthesia and the stressed fetus.
- O. Know current fetal monitoring techniques and how to interpret the information they provide.

III. Evaluation to Determine Goal Achievement

REGIONAL ANESTHESIA

I. Goals:

- ▶▶ To teach anesthesia residents the art and sciences of regional anesthesia.
- ▶▶ Understand the anatomy, pathophysiology and appropriate management of complications and side effects of regional anesthesia techniques,- the test dose; total spinal, subdural blocks –assessment the treatment; risks of spinal, epidural hematoma and abscess – assessment and treatment; Postdural puncture headache –assessment and treatment; Pneumothorax –assessment and

- treatment; Physiology side effects: sympathectomy, phrenic nerve block, intercostals nerve block –assessment and treatment; Peripheral nerve injury- assessment and follow-up.
- ▶ To understand general principles of local anesthetic pharmacology, including the pharmacodynamics and pharmacokinetics of various local anesthesia. This includes onset duration, motor/ sensory differentiation and toxicity profile of various local anesthetics and allergy its treatment.
 - ▶ To understand the principles and indications for various local anesthetic adjuvant including: Epinephrine, phenylephrine, narcotics, sodium bicarbonate, carbonation, hyaluronidase, alpha agonists, anticholinesterases.
 - ▶ To be familiar with the relevant anatomy for regional techniques, including: spinal canal and its contents, neural plexuses of the limbs, major autonomic ganglia.
 - ▶ Be familiar with the physiology changes associated with spinal and epidural anesthesia.
 - ▶ Understand the indications for and the contraindications to regional anesthetic techniques including central neuraxis blocks, peripheral nerve blocks, and sympathetic blocks.

B. Cognitive Skills: At the completion of this rotation, resident should be able to demonstrate the following skills.

- Rational selection of regional anesthesia technique and choice of local anesthetic for particular patient encounters.
- Ability to assess adequacy of regional anesthesia 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 performance of regional anesthetic adequately.

III. Evaluation to determine Goal Achievement

SKILLS SHEET FOR RESIDENTS ON THE REGIONAL ANESTHESIA ROTATION:

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

1. Stellate Ganglion Block
2. Brachial plexus blockade, interscalene block
3. Cervical Epidural; superficial and deep cervical plexus block
4. Bier's block
5. Thoracic Epidural/ catheter placement
6. Intercostal block
7. Interpleural analgesia
8. Lumbar Epidural / Catheter
9. Caudal block-adult and pediatric
10. Spinal – (subarachnoid) block
11. Femoral nerve block 3- in -1 block
12. Sciatic nerve block

13. Popliteal nerve block
14. Ankle block
15. Walking Epidural
16. Pudendal nerve block
17. Trigger Point Injections
18. Misc. blocks

OBJECTIVES OF DENTAL ANESTHESIA

Understand the principles of conscious sedation
 Principles of anesthesia in a Dental Chair
 Local Blocks for Dental Surgery

OBJECTIVES OF TRANSPLANT ANESTHESIA

Know the basic principles of anesthetizing an immuno compromised patient, Principles of anesthetizing patient with end stage, renal / liver disease. Warm / cold ischemic time (observe if possible)

OBJECTIVES FOR OPHTHALMOLOGY POSTING

- ⇒ Give Anesthesia for intra and extraocular surgery
- ⇒ To give monitored Anesthesia Care (MAC) / To learn to sedation patients for MAC.
- ⇒ To give Peribulbar & Retrobulbar blocks

OBJECTIVES FOR ENT POSTING

1. To give topical anesthesia for awake intubation (nasal and oral)
2. To give local blocks for Tonsillectomy.
3. Local anesthesia for tracheostomy
4. Local block for thyroid surgery
5. To give anesthesia for MLS
6. To give anesthesia for laser surgery of airway
7. To give anesthesia for vascular malformations/ tumors of nose and oral cavity
8. To give anesthesia for major / cancer surgery of upper airway including laryngectomy, maxillectomy

APPENDIX (GENERAL)

Text books include:

Miller RD, ed. Anesthesia, 6th edn.

Wylie Churchill Davidson, 7th edn.

Stoelting RK, Miller RD, eds. Basics of Anesthesia & co-existing diseases & pharmacology

Recent Advances in Anaesthesia & Intensive care No. 24, 23, 22, 21 & 20

Appendix (Cardiac)

Text Books include

- ▶▶ JA Kaplan: Cardiac Anesthesia
- ▶▶ J. Benumof: Anesthesia for Thoracic Surgery
- ▶▶ C. Lake: Pediatric Cardiac Anesthesia
- ▶▶ D. Tempe: Cardiac Anesthesia

Appendix (Neuro Anesthesia)

Text books include:

- Cucchiara and Michenfelder: Clinical Neuroanesthesia, Churchill – Livingstone
- Cottrell and Smith: Anesthesia and Neurosurgery, 3rd edn, CV Mosby
- Millelr: Anesthesia, 4th edn, Churchill- Livingstone; Chapter 21,38 and 56
- Kirby and Gravenstein: Clinical anesthesia Practice, WB Saunders; Chapter 22, 4 and 73
- Russell and Rodichok: Primer of Interoperative Neurophysiology monitoring, Butterworth and Heinemann

Appendix (Pediatric Anesthesia)

Text Books include:

- ⇒ Gregory GA: Pediatric Anesthesia, 3rd edn.
- ⇒ Steward D: Handbook of Pediatric Anesthesia, MD

Appendix (ICU)

- ↻ ICU Book by Paul Marino
- ↻ Critical Care by Joseph, Robert W. Taylor and Robert Kirby publisher Lippincott
- ↻ ECG in practice by John R Hampton

Appendix (Pain)

- Chelly JE: Peripheral Nerve Blocks
- Bonica: The Management of Pain
- Cousins and Bridenbaugh: Neural Blockade in Pain Management
- Raj: Practical Management of Pain
- Melzack & Wall: Textbook of Pain

Appendix (Physics)

- Ward
- Dorsch & Dorsch – 5th edn.

EVALUATION METHODS

There are two major components

- A) **Formative Evaluation:** Ongoing evaluation during the course – During 1st week of December for every batch
- B) **Summative Evaluation:** Final Assessment after 3 years

I. FORMATIVE ASSESSMENT / (ONGOING EVALUATION)

Formative assessment is conducted during each year for every batch. This includes the following:

TECHNICAL SKILLS COMPETENCY EVALUATIONS

Methods to be used performing anesthetic management on real patients (check lists of each skill and competency including log book evaluation)

1. Simulators
2. Objectives Structured Clinical Examination (OSCE)

The evaluation will be done either in the OT or ICU or PAC or Postoperative Wards.

PROBLEM SOLVING CASES:

- Method to be used:
1. Case presentations (evaluation by Peers)
 2. Simulated case cards
 3. OT discussions
 4. OSCE

ORAL SKILLS – ATTITUDINAL DEVELOPMENT

- Method to be used:
1. Ability to present seminars, case discussion in class room (evaluation by Peers)
 2. Talking to patients in pre-anesthesia rounds
 3. Operation theatre management

CARDIOPULMONARY RESUSCITATION:

- Method to be used:
1. Mannequins demonstration
 2. Check list for evaluation
 3. OSCE

II. SUMMATIVE ASSESSMENT (FINAL ASSESSMENT) and End Semester assessment

1) Theory (subject contents already outlines in curriculum)

Should consist of

- i) Structured Essay Questions (SEQs)
- ii) Short Answer Question (SAQs) minimum of 8 SAQs
- iii) Mandatory (in all four papers taken together)
- iv) Problem Solving Questions
- v) Multiple Choice Question (MCQs) MCQs of different types
- vi) Should be included at least in one of the 4 papers. The use of MCQs is recommended for formative / end semester evaluation

Final Theory Papers: 4 papers

		M. Marks
Paper 1	Basic Sciences as applied to Anesthesiology, including ethics, Statistics, Quality assurance, medicolegal aspects	100
Paper 2	Anesthesia in relation to Associated Systemic Diseases	100
Paper 3	Anesthesia in relation to sub-specialties such as Cardiac, Neuro, Obstetrics and Pediatrics etc.	100
Paper 4	Intensive Care Medicine, Pain Medicine and Recent advances in Anesthesiology	100

I. FORMATIVE EVALUATION

To be conducted in 1st week of December for each batch (total 3 in no.)

(a) **Theory evaluation:** For 3 hrs each during the 3 year period of training covering the entire syllabus over 2½ years. The theory paper should correlate with the curriculum expected to be covered during that period, which needs to be outlined right at the beginning to the student. The questions framed can be designed as follows:

1) Short structured questions (8 in no.)	80	+		=	Max. marks 100
2) OSCE (problem based questions) (2 in no.)	20				

(b) Practical examination

1) Structured assessment Long case (1), short case (2)	50+25+25	=	Max. marks = 100
2) Structured viva-voce & OSPE	50 + 50	=	Max marks = 100
X-ray ECG Drugs	50 marks		
Equipments CPBR etc.	50 marks		
Total A + B = 300			

N.B.: There should be a provision of special remuneration for every examination to be held in 1st week of December for every batch at the designated medical institution (by rotation).

II. SUMMATIVE EVALUATION

1) Theory (Paper 1-4)					
Short structured questions	8	=	Max. marks = 100 each paper		
OSCE	2		x 4 papers		
			Total Max. Marks = 400 (theory)		
2) Practical examination					
a) Structured assessment					
Long case (1), short case (2) – (100 marks) (50 marks)	100+50+50		Max marks = 200		
b) Structured viva-voce & OSCE			Max marks = 140		
X-ray ECG Drugs	60 marks	60+60+20			
Equipments CPBR	60 marks				

Problem solving situations etc. (20 marks)

3) Internal assessment (20% of formative evaluation) (and average of 3 formative evaluations)		Max marks = 60 Total 400 (practical)
Total 1+2+3		= 400
Theory (+) Practical	400 + 400	= 800

Objectified grading system for M.D. (Anaesthesiology)

Grade	Adjudged score (%)
A	75-100
B	60-74
C	50-59
D	<50

All rough papers used for markings and other university records for examination should be maintained for at least 1 year after the examination is held.

THESIS

Objectives

1. The student would be able to demonstrate capability in research by planning and conducting systematic scientific inquiry & data analysis and deriving conclusion.
2. Communicate scientific information for health planning.

Guide for thesis

Chief guide is from the department of Anesthesiology

Co-guide (s) is from the department or from other disciplines related to the thesis

Submission of thesis protocol

It is submitted at the end of six months after admission to the course

1. Protocol is essence should consist of:
 - a. Introduction and objectives of the research project
 - b. Brief review of literature
 - c. Suggested materials and methods and (scheme of work)
 - d. Statistician should be consulted at the time of selection of groups, number of cases and method of study. He should also be consulted during the study.
 - e. Bibliography

2. The protocol must be presented in the department of Anesthesiology before being forwarded to the Research Committee of the Institute.
3. Protocol will be approved by the research committee appointed by the Dean/ Principle to scrutinize the thesis protocol in reference to its feasibility, statistical validity, ethical aspects etc.

Submission of thesis

1. 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.
2. The thesis shall be written in English, printed or typed on white bond paper 22 x 28 cms with a margin of 3.5 cm and bound with cloth/rexine, with the title, author's name and the name of the college printed on the front cover.
3. The thesis shall contain: Introduction, review of literature, material and methods, observations, discussions, conclusion and summary and reference as per index medicus, and Annexures in series.

Each candidate shall submit to the University/ through the Dean/ Principle of the college four copies of thesis, to reach the Controller of Examinations not later than six months prior to the date of commencement of theory examination in the subject.

Evaluation of thesis

1. 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: -
 - a) Approved
 - b) Returned for improvement as suggested or
 - c) Rejected
2. The thesis shall be deemed to have been accepted when it has been approved by at least two external examiners and if the thesis is rejected by one of the external examiners it shall be referred to another external examiner (other than the one appointed for initial evaluation)
3. Where improvements have been suggested by two or more of the examiners, the candidate shall be required to re-submit the thesis, after making the requisite improvements, for evaluation.
4. When a thesis is rejected by the examiners, it shall be returned to the candidate who shall have to write it again. The second thesis, as and when submitted shall be treated as a fresh thesis and processed.
5. Acceptance of thesis submitted by the candidate shall be a pre-condition for his/ her admission to the written, oral and practical / clinical part 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 provisionally to sit for the examination, but the result be kept held till the receipt of the report to the condition that if the thesis is rejected then the candidate in addition to writing a fresh thesis, shall have to appear in the entire examination again.

6. A candidate whose thesis stands approved by the examiners but fails in the examination, shall not be required to submit a fresh one if he/ she appears in the examination in the same branch in a subsequent occasion.
7. After acceptance of the thesis, the Controller of Examination will retain one copy of the thesis in the University and return the three copies to the Principle Dean of the College concerned who in turn shall forward one copy each to College Library, Departmental Library and to the candidate concerned.