

The Draft CBME Curriculum for PG Clinical is being Circulated for Comments and Suggestions. The Suggestions are to be sent to RGUHS by mail to dcd.rguhs@gmail.com and copy to be mailed to Chairman BOS PG Clinical ravikdoc@gmail.com

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DRAFT
GUIDELINES
FOR
COMPETENCY BASED POSTGRADUATE TRAINING
PROGRAMME FOR MD
IN
ANAESTHESIOLOGY

Preamble

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

A post graduate specialist having undergone the required training in anaesthesiology should be able to recognize the health needs of the community. He or she should be competent to handle effectively medical problems and should be aware of the recent advances pertaining to his/her specialty. She/he should be highly competent anaesthesiologist with broad range of skills that will enable him/her to practice anaesthesiology independently. The PG student should also acquire the basic skills in teaching of medical/para-medical students. She/he is also expected to know the principles of research methodology and modes of consulting library. She/he should attend conferences, workshops and CMEs regularly to upgrade his/her knowledge.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Board of Studies (PG – Clinical) expert group on Anaesthesiology, RGUHS, has utilized the guidelines of the National Medical Council maintaining uniformity without compromise to purpose and content of the document, with additional considerations and inputs added, with some being mandatory for practical training and some to gain knowledge. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

SUBJECT SPECIFIC LEARNING OBJECTIVES

The training should have clear objective, is competency based, is well planned & evaluated, is supervised and delivered by well trained teachers. It will have special emphasis on attitude and behaviour, safety, communication, presentation, audit, teaching, ethics and law and management.

No limit can be fixed and on the number of topics that can be prescribed as course contents. The student is expected to know his/her subject in depth from various text books and journals; however more emphasis should be on the diseases/health problems most prevalent in that area. Knowledge of recent advances and basic sciences as applicable to his/her specialty should get high priority. Competency in anaesthesia skills commensurate with the specialty (simulation lab based and actual hand on training) must be ensured.

Specific learning objectives:

1. Theoretical knowledge: The student should have fair knowledge of basic sciences (Anatomy, Physiology, Biochemistry, Microbiology, Pathology, Pharmacology, Statistics and Physics) as applied to Anaesthesia. The student should acquire in-depth knowledge including recent advances. He/she should be fully conversant with the bedside procedures (diagnostic and therapeutic) and have knowledge of latest diagnostics and therapeutics procedures available including radiological methods. He /she should have knowledge of aseptic principles, care and sterilisation of anaesthesia machine, workstation, monitors and devices, occupational hazards (fire and explosions, electrical, etc), disposal of biomedical waste, personal-protection from infections including personal protective equipment (PPE).

2. Teaching: The student should learn the basic methodology of teaching and develop competence in teaching medical/paramedical students. The student should be familiar with the latest teaching (computer and power point presentation) modes including simulators training and evidence based medical education.

3. Attitude development: The student should develop attitude that leads to appropriate communication with colleagues to function in a group in Operating Room /Intensive Care Unit, and develop the ability to function as a leader in the operating room.

SUBJECT SPECIFIC COMPETENCIES

The student during the training programme, should acquire the following competencies:

A. Cognitive domain

- Knowledge of anatomy related to;
 - ⊖ Diaphragm, upper and lower airway, heart and coronary circulation,
 - ⊖ Regional anaesthesia - Surface, myofascial and sonoanatomy for central neuraxial, regional nerve blocks
 - ⊖ Vascular procedures -Intramuscular injections, arterial, venous cannulations
 - ⊖ Patient Positioning under anaesthesia
- Knowledge of physiology of various systems (respiratory, cardiovascular, neurologic, hepatobiliary, renal, endocrine, pregnancy, haematological, neuromuscular, regulation of temperature and metabolism, stress response, cerebral blood flow and ICP, central, autonomic and peripheral nervous systems, metabolic response to stress and trauma) and also for paediatric and geriatric age groups, in detail
- Knowledge of biochemistry relevant to fluid balance and blood transfusion, perioperative fluid therapy, acid base homeostasis in health and diseases.
- Demonstrate knowledge of commonly used drugs in anaesthesia practice (premedication, induction agents - intra-venous and inhalational, neuromuscular blocking agents and reversal of muscle relaxants, drugs for emergencies and for co morbidities) - general principles, concepts of pharmacokinetics and pharmacodynamics, drug interactions with the other drugs taken concomitantly by the patient and anaphylactoid reactions.
- Knowledge of gas laws, medical gas supply system, fluidics, electricity, diathermy and oxygen therapy.
- Knowledge of 'principles of physics' that govern functions of basic anaesthesia delivery equipment, airway devices, fiberoptics, LASERS, Pacemakers and defibrillators, monitoring equipments (for cardiac functions, temperature, respiratory functions, blood gases, intracranial pressure, depth of anaesthesia and neuromuscular block), Sterilization of equipments, manufacture, filling and transport of gases and liquid oxygen. etc.
- Knowledge of importance of pre-anaesthetic assessment and optimization of a patient; consisting of evaluation, interpretation of laboratory investigation as applied to the care of the patients in planning and conduct of general anaesthesia.

- Knowledge of perioperative fasting guidelines published by the national societies (Indian Society of Anaesthesiologists-ISA)
- Learn and demonstrate the anaesthesia and resuscitation management in a dedicated skill lab
- Demonstrate knowledge of basic life support, advanced cardiac, trauma life support, and neonatal resuscitation according to latest guidelines.
- Demonstrate knowledge of principles of sterilization and universal precautions, selection, maintenance and sterilization of anaesthesia and related equipment, infection control, cross contamination in OT and ICU, disposal of biomedical waste, fire and explosion prevention and care, personal protection from infections including personal protective equipment (PPE).
- Describe the development and history of anaesthesia as a specialty with knowledge of important personalities who have contributed towards it including in India.
- Demonstrate knowledge of principles of artificial ventilation, management of unconscious patients, oxygen therapy, shock- (pathophysiology and management) and various protocols related to Intensive Care Unit.
- Demonstrate knowledge of post-operative care in the post-anaesthesia recovery room, in terms of management of

⊗ Post-operative pain: various modalities

⊗ Nausea and vomiting

⊗ Identified emergencies and postoperative complications.

⊗ Special precautions to be taken in specific surgical patients.

- Demonstrate knowledge of acute pain management, chronic pain therapy & therapeutic nerve blocks, acupuncture, acupressure and other non-conventional methods of treatment.
- Describe documentation, medico-legal aspects of anaesthesia and concept of informed consent.
- Describe research methodology with regards to literature search using appropriate keywords in databases, classify studies, evidence pyramid, identifying sample population, hypothesis generation, sample size calculation and critical appraisal of a published study.
- Demonstrate ability to interpret blood gas analysis and other relevant biochemical values, various function tests and basics of measurement techniques, ECG.
- Explain blood coagulation mechanism, and their disturbances, rational use of blood and blood components.
- Demonstrate knowledge pertaining to special anaesthetic techniques as relevant to:
 1. Outpatient anaesthesia, anaesthesia in abnormal environments including rural area and calamitous situations.
 2. Geriatric and paediatric anaesthesia, Emergency, ENT, orthopaedic, ophthalmology, obstetrics, dental, radio-diagnosis and radiotherapy.
 3. Induced hypothermia, incidental, environmental safety of patient.
 4. Principles of anaesthetic management of neuro/cardiac/thoracic/vascular/transplantation/burns and plastic surgery.
 5. Anaesthesia for patients with severe cardiac, respiratory, renal and hepatobiliary disorder posted for unrelated surgery

6. Basic anatomy and physiology of the nervous system, ICP, intraoperative intracranial hypertension, cerebral blood flow, cerebral oxygen delivery and consumption, effects of ventilation, drugs, fluids, positioning considerations for neuro-anaesthesia, principles of intraoperative neuromonitoring in cranial and spinal surgeries
 7. Shock, types, pathogenesis and management of patients in shock, renal failure critically ill and/or on ventilator, multiple organ failure
- Demonstrate knowledge pertaining to care of terminally ill; do not resuscitate orders.
 - Demonstrate ability to analyze data and write a thesis, present scientific data,

participate in anaesthesia audit.

1. Describe basics of biostatistics in terms of data collection, classification of data, analysis of data using descriptive statistics, inferential statistics, significance of the data, data presentation formats etc.
 2. Logbook regularly, present the data entered. Participate in regular audits held within the department.
- Demonstrate knowledge of general principles Critical incident reporting.
 - Demonstrate knowledge of Ethics and clinical trials.
 - Demonstrate knowledge of Hospital, ICU and OT design and planning.
 - Demonstrate knowledge of principles of human resources and material management
 - Demonstrate importance of documentation; pre-anaesthesia check-up (PAC) notes, pre-operative consent, patient information sheet, case record maintenance etc,
 - Anesthesia procedural documentation, intra-operative& post-operative record maintenance
 - Knowledge about major medico-legal issues and their consequences on medical professionals
 - Knowledge about the importance of communication and its documentation, both technical and non-technical groups.
 - Broad knowledge about the laws and rules pertaining to medical registration act & rules, their amendments and respective implementation into clinical practice.
 - Obstetric Anaesthesia:
 1. A thorough knowledge of the normal physiological changes and it's anaesthetic implications, methods of evaluation and treatment of the maternal disorders and pregnancy complications (GDM, maternal diseases complicating pregnancy,etc) with pregnancy contributing to high fetal risk and early newborn problems.
 2. Should be well versed with guidelines pertaining to preoperative fasting, postoperative feeding, cardiovascular collapse.
 3. Modalities of providing safe anaesthetic both in emergency and elective situations to a parturient.
 4. Competence in the management of all acute and chronic problems within the domain of anaesthesia / high risk parturient.
 5. Management of the sick and high-risk obstetric patient, including Obstetric High Dependency Unit experience
 6. Maternal and neonatal resuscitation

B. Affective Domain:

1. Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or surgical and other speciality colleagues to provide the best possible diagnosis or opinion.
2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.
4. Work effectively as a member or leader of a health care team in establishing anaesthesia, critical care, acute and chronic pain services
5. Work effectively in various health care delivery settings, coordinate patient care within the health care system
6. Incorporate considerations of cost awareness and risk-benefit analysis in patient care as appropriate
7. Should be able to explain and take informed consent about anaesthesia
8. Should be able to effectively instruct a patient and relatives preoperative instructions.
9. Should be able to seek help in complicated situations.

C. Psychomotor domain

At the end of the course, the student should acquire skills in the following broad areas and be able to:

- **Demonstrate ability as a perioperative physician, in terms of**
 1. Acquiring mastery in careful and relevant history taking, physical examination in clinical evaluation of the patient preoperatively.
 2. Synthesizing preoperative data to plan for anaesthesia and to develop a rational strategy for the peri-operative care of the patient.
 3. Develop skills of monitoring and acquire working knowledge of equipment used
 4. Acquire skills in managing patients with comorbidities and superspeciality surgeries
 5. Interacting with preoperative patients, developing effective counselling techniques, explaining risk of procedure and taking informed consent.
 6. Acquiring practical knowledge of Anaesthesia information management systems (AIMS)
 7. Acquiring communicative skills including knowledge of anaesthesia non-technical skills - ANTS(situation awareness, decision-making, team work, leadership, and the management of stress and fatigue)
 8. Acquiring practical knowledge of the protocols, ethics of the field and administration

- Assessment of patient fitness for surgery, assessment of perioperative risks and Planning, Optimization of patient before elective surgery, Understand department protocol (elective and emergency surgeries), system centric approach, Basic monitoring of patient in the perioperative period, Discharge criteria after surgery, Management of common problems during/subsequent to surgery (pain, PONV etc) (*Mandatory I Year*)
- Understand patient expectations and communication regarding decision making, Acquire knowledge/skills necessary for advanced monitoring of patient in the perioperative period, acquire knowledge/skills on Perioperative complications- Detection, Analyses and Management, Understand Enhanced Recovery After Surgery Pathways, Same day Surgeries (*Mandatory II Year*)
- Knowledge about outcome measures, Development of individualized patient management plan, patient centric approach (*Mandatory III Year*)
- Prediction of long-term postoperative outcome, Multidisciplinary and integrated care from decision of surgery until functional recovery-e.g., Prehabilitation, postoperative rehabilitation, Knowledge/Feedback about patient experiences, Post Anaesthesia Clinic, Team leadership, coordination and communication (Desirable)
- **Demonstrate ability in performing**
 1. Pre-operative equipment checks
 2. Selection of drugs
 3. Preparation of work table etc.
- Identify conditions like difficult airway by following difficult airway algorithms
- Demonstrate ability to establish topical airway anaesthesia for awake intubation
- Demonstrate management of a failed intubation drill on a manikin according to latest guidelines
- Demonstrate ability to monitor and assess depth of anaesthesia
- Demonstrate abilities to manage body fluid composition; volume status; replacement of fluid and blood loss; use of whole blood and blood components.
- Demonstrate abilities to manage electrolyte and acid base derangements; osmolarity and osmolality.
- Demonstrate acquisition of skills to initiate mechanical ventilation; select appropriate type and mode of ventilator; and monitor proper functioning of ventilator.
- Identify the need to perform intra-operative laboratory tests, blood gases, coagulation profile and interpret the results with clinical co relation
- Demonstrate ability to manage co-morbid conditions and anaesthesia
- Demonstrate ability in using and interpreting the following routine non-invasive and invasive monitors intra-operatively:
 - a. Electrocardiogram with ST-segment analysis
 - b. Non-invasive blood pressure
 - c. Capnograph: values and changes in values and waveform.
 - d. Pulse oximetry: values and changes in values
 - e. Neuromuscular blockade monitor
 - f. Invasive arterial pressure: waveform and changes in the waveform
 - g. Central venous pressure: values and waveform

- h. Pulmonary artery pressure: Values and waveforms, pulmonary capillary wedge tracing, cardiac output, mixed venous oxygen saturation
 - i. Evoked potential
 - j. Transthoracic and transoesophageal echocardiography: basic understanding
- Demonstrate skills in providing basic life support, advanced cardiac life support, trauma life support and paediatric-neonatal life support, train medical and paramedical staff in BLS and ALS.
 - Demonstrate mastery in common procedures like vascular access, use of latest invasive and non-invasive monitoring equipment, lumbar puncture, management of appropriate mechanical ventilation and total care of Intensive Care Patient.
 - Demonstrate ability to administer general anaesthesia and regional anaesthesia for ASA I to V
 - Demonstrate ability to give extradural block (EDB) lumbar and thoracic, Spinal Block, and Peripheral Nerve Blocks
 - Demonstrate ability to use ultrasound machine for giving blocks and venous cannulation.
 - Demonstrate ability to plan and administer anaesthesia to all emergency patients under supervision including patients for Cardiac, Neurosurgery, Pediatric surgery, and for all major surgeries, able to manage critically ill patients and treat intractable pain.
- Demonstrate following abilities in **Emergency Anaesthesia, Trauma and Resuscitation:**
 1. Trauma epidemiology, mechanisms of injury, and prehospital care
 2. Organize resources in case of mass casualty, self-protection, triage
 3. Assessment, Primary and secondary Survey - Basic Cardiac Life Support and
 4. Advanced Cardiac Life Support, and Cerebral preservation.
 - a) Airway management algorithms, including those with actual or potential C-spine damage and extubation considerations; rapid sequence induction (RSI)
 - b) Supraglottic, glottic and infra-glottic airway access, control and intubation, including percutaneous and surgical tracheostomy
 - c) Full stomach; nasogastric tube insertion
 - d) Management of tension pneumothorax, insertion of chest drains
 - e) Assessment of patients with brain injury including the use of GCS
 5. Transport of critically ill patient(inter and intra hospital)
 6. Describe the special features in emergency patients like anxiety, pain and physiological dysfunction
 7. Pre-operative assessment and resuscitation/optimisation of acutely ill patients: Vascular cannulation (including the intraosseous route), fluid and blood therapy, damage control surgery and damage control resuscitation, knowledge and management of trauma coagulopathy
 8. Investigations, radio imaging, MRI, ultrasound & echocardiography
 9. Demonstrate peri-operative management of patients requiring emergency surgery of different organs / systems esp. airway (croup, angio-oedema, foreign body, etc.), lung, liver, spine, cardiac, brain, orthopaedic, abdominal, etc.

10. Management of burn injury including thermal airway injury and smoke inhalation, electrical, chemical
11. Management of acute intra-operative events (bronchospasm, embolism, cardiac arrest (knowledge of reversible causes)
12. Postoperative care of the trauma patient
13. Demonstrate ability to document medico-legal aspects of the cases.

Demonstrate ability to provide special sedation /anaesthesia requirements outside operating room

1. Radiology: X ray, CT, MRI, Gastroenterology: Endoscopy, Colonoscopy, Endoscopic retrograde cholangio-pancreatography (ERCP), Cardio radiology, ECT, etc.
 2. Delivery options of peri procedural Sedation/ Anaesthesia outside operation theatre
 3. Indications / contraindications of sedation for patients in the non-theatre environment
 4. Knowledge of monitoring needs with limitations of space, magnetic field and patient access
 5. Management directed towards keeping patient immobile
 6. Knowledge of levels of sedation and grading
 7. List commonly used sedative drugs and describe their pharmacology (single, multiple drug and inhalational techniques)
 8. Personnel requirement and communication for safe management in remote location.
 9. Intravenous access and tubings considerations
 10. Describe the considerations of consent, fasting, transport and safe post-anaesthetic care for patients in the out of theatre environment
 11. MRI suite considerations related to anaesthesia personnel, monitors and delivery system
 12. Non-invasive neuro-radiologic procedures and interventional neuroradiology
 13. Knowledge of considerations of onco-radiotherapy especially general anaesthesia in paediatric patients
 14. Knowledge of considerations of endovascular procedures in cardiac cathlab
 15. Airway management in prone or lateral position and fasting considerations.
 16. Adverse effects /complications:
 - Dye allergies/ Anaphylaxis, Embolization
 - Safety precautions/equipment required in each, particularly MRI
 - Radiation hazard esp. during CT procedures
 17. Electroconvulsive shock therapy (modified ECT)
 18. Preoperative Evaluation of patient with psychiatric disorder, Physical and physiological Effects of ECT and anaesthetic techniques& drugs used for EC
 19. Knowledge of drug interactions of antipsychotic and antidepressant drugs with anaesthetic drugs
- **Demonstrate ability to analyse data and write a thesis, present scientific data, participate in anaesthesia audit.**
1. Ability of a student to analyze data for the thesis
 2. Knowledge of sample population, appropriate sample size and how to calculate them
 3. Ability to describe hypothesis for research

4. Basic knowledge of statistics: Descriptive statistics on software such as Microsoft Excel, SPSS etc.
5. Data collection, cleaning; display methods and representation of different types of data.
6. Knowledge and involvement in anaesthesia audits.

First 6 m

1. Should be able to understand the principle behind null hypothesis, calculation of the sample size and power of a study for randomised controlled trials and observational trials.
2. Desirable to have knowledge about the common software available to calculate the sample size, power of a study. (www.openepi.com, www.powerandsamplesize.com etc)
3. Should be able to differentiate between types of data
4. Should be able to devise a data collection tool.
5. Should start entering the cases in a logbook, manual or digital.

Subsequent 18 months

1. Should be able to collect data, should be able to do interim analysis using an Microsoft Excel sheet with the consultation of a statistician.
2. Should be able to recognise normal and skewed distribution of data.
3. Should be able to recognise the common tests applied to analyse data with normal distribution and skewed distribution. For e.g. students t-test, paired t-test, ANOVA, Mann-Whitney U test, Chi square test, Kruskal Wallis test.
4. Should have an understanding of univariate and multivariate analysis methods.
5. Should learn about various methods of representing data. For eg. text representation, graphical representation etc.
6. Should learn to generate a 6-month wise report in his logbook- manual/ digital and present it with the help of a mentor.

Last 12 months

1. Desirable to know how to obtain basic graphs such as bar diagram, pie chart, line graph with standard deviation etc on Microsoft Excel sheet.
 2. Should have knowledge of descriptive statistics, measures of central tendency, measures of dispersion.
 3. Desirable to have knowledge of correlation tests and regression analysis.
 4. Should be able to audit his logbook and present the findings. Discuss on shortcomings and come up with ideas how to improve.
- Demonstrate ability to **critically review and acquire relevant knowledge from the journals** about the new development in the specialty

First 6 months

1. Should be able to describe a literature search based on keywords, describe the

studies and classify them into types, place them according to the evidence pyramid.

2. Identify the primary outcome in each study, identify the inclusion and exclusion criteria and describe randomization and allocation concealment methods.
3. Should understand the concept of hypothesis, calculation of sample size based, devise a data collection tool, collect data (electronically or in printed proformas) and classify the type of data.

Subsequent 18 m

1. Should be able to maintain regular entries of the data identify missing data, clean the data, classify and present this data as an interim report.
2. Should be able to discuss the appropriate statistical tests used (descriptive, regression, multivariate, univariate etc) and the appropriateness of the representation of this data in studies discussed in journal clubs.
3. Should generate a report of the logbook.

Last 12 months

1. Should be able to critically review a published body of work.
 2. Participate in audits and be able to describe purposes of audits
- **Demonstrate following abilities in the Post Anaesthesia Care Unit (PACU)**
 1. Knowledge of drugs, equipments and monitors necessary for PACU
 2. Patient transport, recovery, hand over – safe discharge.
 3. Knowledge of position (recovery or based on surgery)
 4. Observe, recognize and treat the commonly occurring problems likely to arise in the Post-anaesthesia Care Unit (PACU) especially those in relation to airway and cardio-respiratory systems
 5. Resuscitation measures (basic and advanced life considerations of CPR)
 6. Oxygen and drug delivery systems (epidural, infusion pumps, PCA systems, etc.,)
 7. Management of co-existing diseases
 8. Knowledge of multimodal analgesia for pain, sedation and post-operative nausea and vomiting, post-operative cognitive dysfunction, post dural puncture headache.
 9. Management of fluid status, temperature, urinary retention post-operative bleeding and cross reference for consultants
 10. Use of assessment tools and data management in the PACU including software

Demonstration of following abilities in Intensive Care Unit

Understanding the spectrum of critical illnesses requiring admission to ICU.

- Recognizing the critically ill patient who needs intensive care -trauma, burns, all types of shock, sepsis, SIRS and ARDS, infectious diseases (HIV, Hepatitis, COVID-19 and others), poisoning, snake bite envenomation (and others), drug overdose and toxicity and patients with metabolic disturbances.
- Demonstrate detailed knowledge of differential diagnosis and management of acute and chronic respiratory failure
- Monitoring progress of patients by physiological scoring systems
- Fluid, electrolyte and acid base disorder management
- Inserting central venous lines, arterial lines using ultrasound and interpreting the data.
- Managing cardiovascular instability, respiratory failure and postoperative pulmonary complications
- Understanding of the operation of mechanical ventilators including different ventilatory modalities non-invasive ventilation, complications and modes of weaning.
- Principles and application of oxygen therapy
- Investigation, diagnosis and management of cardiac events
- Management of cardiac failure with fluids, vasopressors, inotropic therapy and mechanical therapy
 1. DVT and Pulmonary embolism
 2. Acute coronary syndromes
 3. Arrhythmias including cardioversion and temporary pacing
 4. Management of patients with permanent pacemaker and/or implantable cardioverter defibrillator
- Hypertensive crises
- Acute renal failure: diagnosis, prevention and management
- Acute and chronic hepatic failure diagnosis and management
- Acute GI insults: Upper and lower gastrointestinal bleeding, Acute pancreatitis, Gut ischaemia
- Management of CNS insults (head trauma, raised intracranial pressure, cerebro-vascular accidents, traumatic and non-traumatic coma)
- Intracranial ischemia and bleeding
- Decreased level of consciousness and coma (Traumatic and non-traumatic coma)
- Epilepsy and status epilepticus
- Acute polyneuropathy
- Agitation and delirium
- Coagulopathies in ICU
- Endocrine emergencies, including hypothyroidism, diabetic ketoacidosis, acute hypo and hyperthyroid states, hypo- and hypercalcemia, adrenal insufficiency, diabetes insipidus, and syndrome of inappropriate anti-diuretic hormone (SIADH)
- Poisoning including insecticides, sedatives and toxic bites (venomous snakes, scorpions, etc)

- Glycaemic control in the critically ill patient
- Practice of hypothermia and prevention of cerebral injury after cardiac arrest
- Delivering appropriate nutritional support - enteral and parenteral
- Extracorporeal Life Support
- Analgesia, Anxiolysis and sedation in ICU
- Neuromuscular blockade in ICU
- Point of care testing in ICU
- Management of immunocompromised patients
- Obstetrical critical care
- Malignant hyperthermia, neuroleptic malignant syndrome
- Evaluation and management of the patient with a thermal injury (Burns and smoke inhalation)
- Near-drowning
- Brain death and brain stem death, Management of the organ donor
- Practicing ethical and legal aspects of critical care
- Good communication skills with patient and relatives.
- Practicing infection control practices and control of nosocomial infections.
- Proper Sterilization of ICU equipment
- Structure, staffing (Multidisciplinary approach) and safety in ICU
- Demonstration of following abilities in **Acute and Chronic Pain Management**
 - ❖ Assessment of patients with pain: history taking, physical examination with pain specific assessment/examination tools/tests, and interpretation of investigations.
 - ❖ Types of pain - acute chronic, traumatic, cancer pain, etc. with the knowledge of Pain pathways
 - ❖ Various pain syndromes and Physiological changes secondary to pain
 - ❖ Understanding pathophysiology of pain and its impact on patient in holistic aspect including physical, psychological, spiritual and social domains.
 - ❖ Practice the different modalities of physical therapy that may relieve both acute and chronic pain
 - ❖ Understanding the pain management guidelines including WHO ladder of analgesia
 - ❖ Understanding various pharmacological and non-pharmacological therapies for acute pain management including preventive and adjuvant analgesia techniques.
 - ❖ Pharmacodynamics and Pharmacokinetics of analgesics and adjuvant drugs.
 - ❖ Understanding route (intravenous, intramuscular, transdermal, intrathecal, oral) and modalities (patient based, nurse based, physician based) of administration of the analgesic drugs and adverse effects
 - ❖ Pharmacology and side effects of epidural/intra-thecal opioid.
 - ❖ Identification of patients with drug abuse potential; drug dependency and addiction and identify the parameters for referral to a pain medicine specialist.
- Organization of **acute pain** service, role of acute pain nurse for pain assessment, physiological changes secondary to Pain, practice different modalities of pain control. Pharmacology and side effects of opioid analgesia and non-opioid analgesia, principle of patient-controlled analgesia and assessment of its efficacy

Neurological assessment of epidural blockade and management of failed block.
Management of regional blockade – brachial plexus, para-vertebral and intra-pleural block.

Pain control in concurrent medical diseases – COAD, IHD, bleeding tendency, geriatric.

Pain control in burns patients and trauma (including multiple rib fractures).

- **Demonstration of abilities to manage Chronic Pain**
 - ❖ Know the multidisciplinary approach to chronic pain management including cancer pain management, treatment based on WHO treatment ladder
 - a. Drugs: Analgesic, Opioids, Sedatives and Stimulants
 - b. Nerve block
 - c. Neurolytic Block
 - d. Palliative Care
 - ❖ Practice different modalities of chronic pain management - physical therapy, psychotherapy, (including cognitive behavioural approaches), neuro- ablation, neuro-augmentation, spinal opioid, interventional neuro-blockade, non-opioid analgesia.
 - ❖ Anatomy, indication, technique and complication of chemical sympathectomy (lumbar sympathectomy, stellate ganglion block, celiac plexus block).
 - ❖ Practice principles of management of cancer pain, principle of management of non-cancer neuropathic pain - phantom limb pain, post-herpetic neuralgia, complex regional pain syndrome(TYPE 1 & TYPE 2), trigeminal neuralgia.
 - ❖ Principle of management of non-cancer nociceptive pain - myofascial pain, lower back pain, intractable angina, burns, chronicpancreatitis, PVD.
 - ❖ Practice Epidural steroid injection (all levels) and long-term epidural catheterization.
 - ❖ Use of ultrasound and peripheral nerve stimulator for nerve and plexus blocks
 - ❖ Role and practice management of the various modalitiesof infusion pumps for acute and chronic permanent, including physician/nurse controlled and patients controlled analgesic technique.
 - ❖ Management and planning of block failure and complications
 - ❖ Recognition and management of local anaesthetic toxicity and emergency management.
 - ❖ Mechanisms and side effects of adjuvants and other therapiesused for treating pain.
 - ❖ The principles of pain management in special patient groups including the elderly, children, disabled, intellectually handicapped and those unable to communicate.
 - ❖ Understanding basics of Fluoroscopy and its role in pain interventions
- **Demonstrate practice of Regional Anaesthesia**
 - ❖ Applying general principles of pharmacology of local anaesthetics and various adjuvants.

- ❖ Familiarizing with the relevant surface- and sonoanatomy for regional techniques.
 - ❖ Application of indications and contraindications to regional anaesthetic technique including centralneuraxial blocks, peripheral nerve blocks and sympathetic nerve blocks.
 - ❖ Assessing adequacy of regional anaesthesia, and learn techniques of supplementation of inadequate blocks.
 - ❖ Providing effective anxiolytics and sedation of patients by both pharmacologic and interpersonal technique.
 - ❖ Performing the following regional anaesthesia techniques:
 Brachial plexus (supraclavicular, infraclavicular, axillary), cervical plexus, stellate ganglion block, Radial, Median and Ulnar nerve blocks at elbow, Wrist block, Upper limb IVRA/ Bier's block Intercostal block, Paravertebral block, PECS block, Paravertebral block, ESP block, Retro bulbar blocks, Trigeminal nerve block, Airway Blocks, Lumbar plexus, lumbar sympathetic, Sciatic nerve block, Femoralnerve block, 3 in 1 block, Popliteal Nerve block, Ankle block, Subarachnoid block, Epidural block/Catheter (lumbar, thoracic), Caudal block – adult and paediatric. Abdominal- Fascia iliaca block, Inguinal block, TAP and QL blocks, Psoas block
- The case-based assessment and management of acute and chronic pain need to be emphasized

⊗ Log book for number of cases of each block needs to be maintained

The following minimum number of cases performed under supervision or observed needs to be ascertained:

- Subarachnoid (SAB) = 50 SAB
- Lumbar epidural (EDB) /Caudal Epidural = 50 including continuous EDB
- Paediatric caudal epidural block = 20
- CSE = 20
- Lower Limb Nerve blocks:
 Sciatic / Femoral nerve /Ankle block/ others = 20
- Upper Bier block (desirable) = 5
- Stellate Ganglion = 5 (observe)
- Brachial Plexus = 5 (observe) 10 (do)
- Coeliac Plexus Block = 3 (desirable)
- Trigger Point Injection = 3(desirable)
- Other peripheral N. Block = 10
- Ophthalmic Blocks = 5 (observe)
- Truncal,Field Block & Other peripheral nerve blocks= 20

(Note: The use of peripheral nerve stimulator and ultrasound in addition to anatomical land work needs to be emphasized for the above-mentioned blocks).

Demonstrate practice of Thoracic Anaesthesia

□□□□□□ Demonstrate ability to manage thoracic cases in different surgical areas and emergency

room-general surgery, cardio-thoracic surgery, onco-surgery, paediatric surgery, simulation lab).

□□□□□□ Application of the knowledge of Anatomy of lung and broncho-pulmonary segments. *Margin of safety* in relation to trachea bronchial tree and isolation of lungs

□□□□□□ Essential knowledge of physiology of respiratory system and pulmonary circulation

□□□□□□ Pre-operative assessment of patients undergoing thoracotomy (lung resection), thoracoscopy, video assisted thoracoscopy and mediastinoscopy

The “three-legged” stool of pre-thoracotomy respiratory assessment- i. Respiratory mechanics (PFT), ii. Lung parenchymal function (DLCO), iii. Cardiopulmonary interaction (VO₂ Max, stair climb, 6min walk test, Exercise SPO₂)

□ Preoperative pulmonary function tests and optimization of patient posted for thoracic surgery, broncho dilator therapy, Pulmonary infection control, Postural drainage, Physiotherapy of lungs

□□□□□□ Induction and maintenance of anaesthesia for minor and other thoracic procedures, in

particular, Use of Ventilating rigid bronchoscope in various procedures(Diagnostic, therapeutic: tracheal stenting, foreign body removal) and the use of the jet injector devices(Manujet or automated jet ventilator/ Sanders injector in manikin, simulation, and in patients, with ventilating rigid bronchoscopy (Optional).

□□□□□□ Anaesthetic management for intra thoracic surgery (open, video-assisted, robotic assisted]

□□□□□□ Various approaches and relevant equipments for lung isolation; double lumen tubes and their placement.

□□□□□□ Physiology of lateral decubitus position, open chest, one lung ventilation[OLV] Indications, contraindications, management of OLV.

□□□□□□ Hypoxia management and trouble-shooting during ventilation

□□□□□□ Application of Principle of chest drain and management

□□□□□□ Local and general anaesthesia for bronchoscopy including techniques of ventilation.

□□□□□□ Demonstrate ability to use FOB and rigid bronchoscopy including ventilatory rigid Bronchoscopy; confirmation of tube position

□ Post-operative management of patients after lung surgery: Post thoracotomy complications: Post-operative respiratory failure and management

Pain management after thoracic surgery[Pharmacological management] Anatomy technique and management of various blocks(thoracic epidural, intercostal nerve block, interpleural

block, paravertebral block, serratus anterior block, pectoral nerve block, quadratus lumborum block, erector spinae block)

- Prevention and management of Chronic post thoracotomy pain
- Diagnostic and therapeutic procedures of the mediastinum (retrosternal goitre, mediastinal mass and thymic surgery) and peri-operative management of patients with myasthenia gravis.
- Anaesthetic management of mediastinoscopy, major airway stenting.
- Video assisted thoracoscopic surgery (VATS) in adult and children.
- Trouble shooting during ventilations, lung volume reduction surgery and problems.
- Knowledge of anaesthesia management for surgical procedures for End stage lung diseases
- Hand on training Skill in simulator/ Manikin and patients for thoracic anaesthesia*
 1. Demonstration of PFT
 2. Demonstration of postural drainage of different lobes /segments of lungs, Lung physiotherapy
 3. Lung Imaging: CXR, Lung USG, CT/MRI interpretation of neck and thorax
 4. FOB and rigid bronchoscopy including ventilatory rigid bronchoscopy
 5. Various Methods of isolation
 6. Video demonstration and Orientations of open Thoracotomy and VATS

Demonstrate practice of Cardiovascular Anaesthesia:

⊗ Application of the knowledge of Anatomy and physiology of valvular disease, coronary arteries and their territories, conducting system. Pulmonary circulation, coronary circulation, cerebral circulation, visceral circulation.

⊗ Application of the knowledge of distribution of blood volume to different organs and systems and their control. Microcirculation. Venous system, venous pressure, its influence on various functions.

⊗ Regulation of blood pressure, hypotensive anaesthesia.

⊗ Anatomy and physiology of all operable congenital heart disease like ASD, VSD, PDA, TOF, transposition of great vessels.

⊗ Application of the knowledge of anatomy and physiology of vascular heart disease like coarctation of aorta.

⊗ Assessment of cardiac patient with ischaemic heart, valvular heart disease and other diseases listed above. Understanding of cardiac catheterization,

echocardiography, stress testing, and radio-nuclide imaging.

- ⊗ Application of Principle and complication of cardiopulmonary bypass
- ⊗ Application of Principle of trans-esophageal echocardiography
- ⊗ Application of Principle of circulatory support: inotropes, IABP, pacing
- ⊗ Off pump bypass
- ⊗ Intra-operative management of aortic surgery and major peripheral vascular surgery, aneurysm grafts, recanalization procedures.
- ⊗ Understanding of the adult patient with congenital heart disease and their management during anaesthesia.
- ⊗ Postoperative cardiac critical care, including cardiovascular problems, analgesia.
- ⊗ Insertion of invasive monitoring for arterial monitoring, central venous pressure monitoring, pulmonary artery catheter insertion and interpretation.
- ⊗ Robotic cardiac surgery
- ⊗ Knowledge and skill-sets mainly with respect to cardio-respiratory systems

Cardiovascular System: Training Year Wise (Major)

- ⊗ Management of abnormal blood pressure (> 30% change - increase or decrease, in otherwise non-compromised cardiovascular system and > 20% change in patients with pre-existing cardiovascular issues) patients during the perioperative period (I YEAR)
- ⊗ The postgraduate should be able to perform, monitor and interpret haemodynamics using non-invasive (I YEAR) and invasive technique (II YEAR), dynamic and static cardiac indices (III YEAR).
- ⊗ He should be familiar and competent in use of pharmacological management of hypo- and hypertension in the perioperative period. (I-II YEAR)
- ⊗ He should be competent in assessment and management of peri-operative cardiac arrest using Basic and Advanced Cardiac Life Support (I YEAR)
- ⊗ He should gain competency in assessment and management of cardiac failure, and arrhythmias. (II and III YEAR)

Desirable- Basic knowledge and skill in perioperative cardiac evaluation using TTE and TEE

Respiratory system: Mandatory

⊖ The postgraduate trainee in Anaesthesia should be familiar with respiratory physiology, pathophysiology and assessment of respiratory system (I YEAR)

⊖ He should be competent to identify common perioperative respiratory adverse events such as broncho/laryngospasm, airway obstruction, exacerbation of asthma, pulmonary hypertension and right heart failure from respiratory pathology (IIYEAR)

⊖ He should be able to manage complications arising during the perioperative period (III YEAR)

Desirable-

⊖ Knowledge and skill in assessment of Pulmonary Function Test and Imaging of chest

- **Demonstrate practice of Obstetric Anaesthesia**

⊖ Should be able to list and describe the major anatomic and physiologic changes associated with pregnancy and correlate with the conduct of anaesthesia during pregnancy

⊖ Should be able to elicit history from a pregnant patient coming for labour analgesia or caesarean section.

⊖ Should be able to describe and administer different modalities of labour analgesia- spinal anaesthesia, epidural anaesthesia, combined spinal epidural anaesthesia, major pharmacological methods and (knowledge of) non-pharmacological methods of labour analgesia in an obstetric patient coming for caesarean section.

⊖ Should be able to administer spinal, epidural and general anaesthesia in an obstetric patient coming for caesarean section with ASA 2 to ASA 4 physical status

⊖ Ability to perform an epidural blood patch

⊖ Should be able to managedifficult airway as per national or speciality guidelines

⊖ Should be able to recognize and treat common complications including PDPH.

⊖ Should be able to manage simulated environments for amniotic fluid embolism, cardiovascular collapse etc.

⊖ Should be able to perform neonatal resuscitation.

⊖ Should be able to plan and manage anaesthetic techniques for high-risk obstetric patients suchas eclampsia, hypertensive disorders in pregnancy.

⊖ Should be able to plan and execute postoperative pain management strategies in parturients.

- ⊗ Perform successful regional anaesthetic techniques in morbidly obese parturients
- ⊗ Manage trauma or emergency surgery during pregnancy
- ⊗ Recognize signs of pulmonary aspiration of gastric contents and implement a management plan
- ⊗ Should be able to plan and administer anaesthesia for postpartum procedures. (manual removal of placenta, tubectomy etc.)
- ⊗ Ability to perform epidurals as patient controlled epidural analgesia
- ⊗ Expertise and knowledge in the perioperative management of obstetric haemorrhage like activation of MTP and component transfusion therapy
- ⊗ Able to diagnose and treat local anaesthetic toxicity
- ⊗ Perform simulation drills in maternal collapse and obstetric haemorrhage
- ⊗ List known pharmacological agents effecting uterine tonicity and describe their indications, contraindications, and side effects
- ⊗ Function as a member of a care team with nurses, obstetricians, paediatricians and neonatologists
- ⊗ Provide expertise and leadership in the field of practice of obstetric Anaesthesiology
- ⊗ Should be well versed with perioperative fasting guidelines in pregnancy published by the national societies (ISA)
- ⊗ Effectively communicate the anaesthetic implications of obstetric and non-obstetric disease to other team members
- ⊗ Assist team leadership in the mobilization of resources in an obstetric emergency
- ⊗ Obtain informed consent for anaesthesia and labour analgesia and explain related risks including the potential anaesthetic impact the parturient and the baby
- ⊗ Discuss the relative risks to both the mother and foetus at appropriate level: patient and family

- **Demonstrate practice of Paediatric Anaesthesia**

- ⊗ Application of knowledge of anatomical changes in paediatric patient and neonates.
- ⊗ Application of knowledge of physiology and pharmacology in paediatric patient.
- ⊗ Guideline for pre-operative fasting in children as per National guidelines and pre-medication
- ⊗ Secure peripheral IV access in children
- ⊗ Management of fluid and electrolytes in children.
- ⊗ Anaesthetic equipment: laryngoscopes (including Miller blade, video laryngoscopes, fiberoptic laryngoscope) airways, endotracheal tubes, LMAs, PLMA and breathing circuit for children.

- ⊖ Proficient bag-mask management of patients of all ages and sizes; mask and airway considerations
- ⊖ Appropriate use mask ventilation, LMA or ETT and intubation using appropriate size of blades and tubes and safely secure the airway
- ⊖ Safe induction practice with inhalational induction and intravenous induction in both haemodynamically stable and unstable patients, Manage upper airway obstruction, manage laryngospasm, manage bronchospasm
- ⊖ Demonstrate ability to judge when a nonverbal patient is appropriate for extubation
- ⊖ Anaesthesia management for premature and newborn.
- ⊖ Emotional problems for parent and child and principles of premedication: Consent by parents and their presence during induction, assent by children: To become skilled in communicating with children, parents and other relatives.
- ⊖ Problems of transporting a sick paediatric patient from the ward to the operating room and back with regard to temperature maintenance, cardiovascular stability, ventilation and oxygenation.
- ⊖ Estimate preoperatively blood volume, hourly fluid requirements, fluid deficit, third space loss, acceptable blood loss and apply principles of fluid and blood replacement in the perioperative period.
- ⊖ Induce and maintain anaesthesia by inhalation, intravenous, intramuscular routes; Analgesia including inhalational and rectal routes and monitoring paediatric patients.
- ⊖ Post-operative care including analgesia, temperature, fluid and electrolyte status and Airway. Resuscitation considerations in recovery room, including airway, breathing and circulation
- ⊖ Understand the benefits, risks and techniques of regional anaesthesia in children. Anatomy and techniques of caudal, dorsal penile and inguinal regional block, spinal and epidural block. Use of ultrasound for regional block.
- ⊖ Effective management of anaesthetic emergencies in children e.g.: acute airway obstruction, croup and acute epiglottitis, inhaled foreign body, loss of airway, laryngospasm, anaphylaxis, acute resuscitation of trauma and burns
- ⊖ Learn to recognize and treat post anaesthesia complications like apnoea, laryngospasm, acid-base and electrolyte disturbances, febrile and convulsing child and bleeding child.
- ⊖ Common problems related to common congenital syndromes presenting for surgery, including cardiac (cyanotic and non-cyanotic congenital), airway, CNS, GI, etc.

- ⊖ Paediatric resuscitation: drugs, doses and defibrillation of children of all ages, from the very premature neonates to those children with complex coexisting disease.
- ⊖ Management of patients requiring paediatric intensive care, ventilatory management, and support of circulation.
- ⊖ Advanced skills such as central line insertion and arterial line cannulation
- ⊖ Knowledge of basic use of ultrasound for paediatric anaesthesia and critical care
- ⊖ Resuscitation of neonates and children of all ages. Paediatric Basic life support and advanced Life support (PALS), Neonatal resuscitation (NALS).
- ⊖ Paediatric pain management: various causes, investigations, management of acute and chronic pain management. Co-ordination with other departments including paediatrics, radiology, orthopaedics, oncology etc.
- ⊖ Assessment of a child with URTI, with a heart murmur.
- ⊖ Basic considerations of anaesthesia for Foetal Surgery
- ⊖ Sedation techniques including the selection, management and monitoring of children for diagnostic and therapeutic procedures, with particular attention to working in areas outside the theatre suite.
- **Demonstrate practice of Transplant anaesthesia**
 - ⊖ Application of knowledge of basic pathophysiology of renal, liver and heart failure: Risk stratification
 - ⊖ Principles of anaesthesia for renal/liver/heart transplant surgery.
 - ⊖ Principles of anesthetizing patient with end stage renal/liver disease and patient with organ transplantation. Perioperative management including immunosuppression considerations
 - ⊖ Management of patients undergoing live-related liver/ kidney donation\
 - ⊖ The ethical /clinical considerations of cadaveric and live-related organ donation for the donor (and relatives), recipient.
 - ⊖ Management of Brain dead/ cadaveric donor and the knowledge of the legal documentation
 - ⊖ Role of immunosuppression and other pharmacological therapy in the peri-operative and ongoing management of patients undergoing transplant.
 - ⊖ Role of intra-operative haemodynamic monitoring and point of care testing in patients during transplant surgery
 - ⊖ Role of donor-transplant team members and a multidisciplinary approach to transplantation

⊖ Anaesthetic management of patients with transplanted organs for non-transplant surgery: Principles of anesthetizing an immuno-compromised patient

- **Demonstrate practice of Neuroanaesthesia**

⊖ The trainee in anaesthesia should be able to administer anaesthesia safely to patients with neurologic disease who are undergoing neurologic or non-neurologic surgery

⊖ Basic knowledge of cerebral circulation, intra cranial pressure, cerebral perfusion pressure, implications, effects of position, anaesthetic agents, ventilation

⊖ Anaesthetic implications of the most common neurosurgical procedures, transnasal, trans-sphenoidal pituitary surgery, posterior fossa surgery, surgery for supratentorial pathology, sub arachnoid haemorrhage and vasospasm.

⊖ Differential diagnoses and treatment of intraoperative intracranial hypertension (tight brain)

⊖ Management of Head Trauma, and its anaesthetic management and various protocols

⊖ Monitoring: techniques for detection and management of air embolism.

⊖ Osmotherapy, lumbar puncture and CSF drainage.

⊖ Manage spine surgery including those cases with potential for massive transfusion

⊖ Perform awake laryngoscopy, fiberoptic laryngoscopy, utilize fast-track LMA (or similar devices) or in-line traction and understand their use in patients with spinal cord injury, with assistance.

⊖ Diagnosis and management of patients with brainstem death; and dealing with patient's relatives

⊖ Demonstration of knowledge of pharmacology of various drugs used in neurology and neurosurgery practice relevant to anaesthesia management

⊖ Demonstration of ability to plan rapid reversal with minimum of haemodynamic changes after craniotomy to enable postoperative neurologic function assessment quickly

⊖ Management of the postoperative care in critically ill neurosurgical patients

⊖ Knowledge and skills in preanesthetic evaluation of neurosurgical patients including basic neurological examination (II YEAR)

⊖ Ability to develop and demonstrate anaesthetic plan for perioperative management of common neurosurgical pathologies -head injury, spine surgery and brain tumours (II/III YEAR)

⊗ Trainee should have knowledgeable about positioning and its complications in Neurosurgical patients (II YEAR)

⊗ He should acquire skills in the elective and emergent airway management of patients with cervical spine instability and head injury where issues other than difficult airway (e.g., raised ICP, neurological injury) need consideration, including extubation in neurological patients. (III YEAR)

- Ability to medically manage raised intracranial pressure (III YEAR)
- Knowledge about detection and management of common neurosurgical complications (III YEAR)
- Trainee should be familiar with basic neuromonitoring techniques (ICP, CPP) (II/III YEAR)
- Desirable: Knowledge of advanced neuromonitoring (evoked potentials, electroencephalography, transcranial doppler, cerebral oxygenation, etc), awake craniotomy, Neurovascular surgery/ endovascular intervention, Functional Neurosurgery, Pediatric neurosurgery etc, assess and Manage patients with acute neurological injury, including systemic and intracranial monitoring and management

- **Demonstrate Practice of Onco-anaesthesia:**

⊗ Understanding the need for onco-anaesthesia, differences as compared to non-cancer perioperative care and effects of Anesthesia technique and risks of cancer recurrence

⊗ Understanding the concepts of preanaesthetic evaluation and optimization of patients for cancer surgeries.

⊗ Understanding basics of Role of prehabilitation and ERAS protocols in Cancer surgeries

⊗ Demonstrate clinical understanding of anaesthetic implications of chemotherapy and radiotherapy on perioperative anaesthetic management

⊗ Role of prehabilitation and rehabilitations in cancer surgeries

⊗ Demonstrate airway management in major head and neck cancer surgeries including use of special tubes (preformed / reinforced / LASER resistant, etc.)

⊗ Understanding differences in cancer vs non-cancer surgeries for thoracic (lung, mediastinum, oesophagus), abdominal (hepatobiliary, genitourinary) and head and neck.

⊗ Perioperative management of CRS and HIPEC procedure.

⊗ Anaesthetic consideration for radiotherapy procedures under anaesthesia including paediatric radiation therapy.

⊗ Overview of endoscopic, laparoscopic and robotic cancer surgeries

⊗ Basic Concepts of Onco-Critical care

- **The following are special procedures which the post graduate student must be able to perform**

Sr. No. Name of procedure

1. Blind Nasal intubation
2. Failed intubation drill (includes Fibreoptic Laryngo-/ bronchoscope)
3. Double Lumen Tube
4. Bronchial Blocker placement
5. Jet Ventilation
6. Suctioning and physiotherapy of wet lung
7. Intubation in Neonates
8. Initiation and management of ventilation
9. Combined Spinal Epidural
10. Brachial Plexus Block
11. Intravenous Regional Anaesthesia
12. Elbow, Wrist, Digital, Sciatic, Femoral, Lateral Cutaneous Nerve of thigh, Ankle block
13. Cervical-Superficial and Deep, Stellate, Splanchnic block
14. Central Venous Line by Brachial, Jugular and Subclavian veins
15. Radial and Femoral Artery cannulation
16. CVP monitoring
17. Pulmonary Capillary Wedge Pressure
18. Neuro-muscular transmission Monitoring
19. Anaesthetic Depth e.g., BIS monitoring
 - Demonstration of anaesthetic abilities in the intraoperative period keeping into consideration the specific requirement of the surgical procedure – ENT, Orthopaedic, Gynaecology – Obstetrics, General surgery, Oncosurgery, replacement surgeries, urosurgery, vascular, plastic, Thoracic, Dental etc.

Suggested OVERALL Time Frame for Training the PG Students:

The student should be taught as per the following schedule to acquire the skills:

1. First 6 months:

- During the first 6 months, the student should be taught expertise in the management of uncomplicated cases not belonging to any super specialty (ASA I cases). To start with, the student will observe and slowly become independent in giving general anaesthesia and spinal anaesthesia to ASA I cases for minor and major surgery, under graded supervision.
- The postgraduate student should learn the basic principles of safe and effective anaesthesia, resuscitation, and both the prevention and treatment of pain, operative care of the surgical patient, care of handling equipments, basic techniques in anaesthesia, and anaesthetic pharmacology, and electrical safety.
- He/she should select the thesis topic and submit the protocol for his thesis.
- Should be able to describe basic airway examination.
- Describe the fasting protocols set by the national professional bodies.
- Should be able to describe the methods of premedication and drugs used.
- Should be able to elicit a detailed relevant history in patients coming for various surgeries with and without comorbidities and perform a detailed examination
- Should be able to order investigations pertaining to the surgery/ procedure in ASA I patients.
- Should be able to plan the anaesthetic technique and intraoperative monitoring strategy for ASA I and II patients.
- Should be able to describe and perform an equipment check.
- Should be able to select the anaesthetic drugs.
- Should be able to prepare the work table.
- Should be able to recognise respiratory distress / apnoea, laryngospasm, bronchospasm and cardiac arrest
- Should be able to initiate CPR
- Should acquire basic knowledge of ultrasound, Doppler, knobology and ergonomics.
- Should be able to position mask for spontaneously breathing patients and perform mask ventilation and laryngoscopy; intubation in MP Class 1 patients.
- Should be able to use airways- oral and nasal.
- Should be able to identify and recognize intra tracheal placement of endotracheal tube.
- Should be able to administer spinal anaesthesia.
- Should be adept at securing IV access and fluid management in perioperative period.
- Should be able to manage common intraoperative complications such as hypotension, bradycardia, PDPH associated with spinal anaesthesia etc
- Should be able to understand and implement basic disinfection and sterilisation techniques and personal protection

Next 18 months

- The student should widen his experience and be able to undertake anaesthetic care of all routine cases, assist in the anaesthetic care for routine obstetric practice, understand basic principles of critical care, pain management, and participate in audit.
- The student should be trained in administration of general anaesthesia and regional anaesthesia for ASA I to V under supervision. The student should be able to give extradural block (EDB) lumbar and thoracic, Spinal Block, and Peripheral Nerve Blocks under supervision, and use of Ultrasound machine for giving blocks and venous cannulation. The student should learn paediatric and trauma life supports and maintain skills for basic and advanced cardiac life support.
- It is advised that they should be posted in the following specialties: general surgery including gastrointestinal surgery, transplant, ENT, Urology, Obstetrics, Dental Surgery, Eye, ICU, Pain Clinic and peripheral theatres like ECT, radio-diagnostic and therapeutic procedures (CT scan, MRI scan, angiography).
- The student should be able to analyse data and write a thesis. He/she should be able to present scientific data.
- Should be able to demonstrate methods to elicit a detailed relevant history in patients ASA II and III patients.
- Should be able to describe various common comorbidities such as DM, HTN, Hypo and hyperthyroidism, renal failure, liver diseases, peripheral nervous system and the anaesthetic considerations etc.
- Should be able to demonstrate a detailed examination of ASA II and III patients.
- Should be able to order investigations pertaining to the surgery/ procedure in ASA III and IV patients.
- Should be familiar with basic principles of arterial blood gas sampling and analysis.
- Should be able to plan the anaesthetic technique and intraoperative monitoring strategy for ASA II and III patients.
- Should be familiar with the drugs used to treat co-morbidities such as antihypertensives, antiarrhythmics, anti-diabetics, bronchodilators, etc
- Should be able to interact with consultants of other specialities and plan methods of pre-operative optimisation.
- Should be able to counsel patients and explain risk and the technique of anaesthesia.
- Should be able to describe difficult airway protocols and various equipment and procedures used to manage difficult airway.
- Is able to use manoeuvres to reduce the risk of aspiration in high-risk patients
- Is able to use the WHO safety checklist and is able to describe its components
- Is able to use measures to reduce the risk of infection perioperatively with full knowledge of care and sterilisation of equipments, disposal of biomedical waste.
- Is able to use safe transport techniques from the operation theatre to the PACU, ICU.
- Should be able to use the ICU ventilator with basic modes (non-invasive and invasive) independently.
- Should be able to demonstrate use of monitoring such as ECG, Pulse oximetry, NIBP, Invasive monitoring, depth of anaesthesia monitoring

- Should be able to demonstrate the use of ultrasound to perform superficial upper limb and lower limb blocks and basic truncal blocks such as TAP block.
- Should be able to initiate ACLS and teach BLS to undergraduates and paramedics.
- Should be able to plan postoperative analgesia
- Should be able to manage postoperative nausea-vomiting and shivering in the postoperative period.
- Should be able to describe intra-operative and post-operative fluid management in complicated patients
- Should describe assessment of intra-operative blood loss and indications of blood component transfusion and complications.
- Should be well versed with point of care testing.
- Should be able to recognise critical incidents.
- Should be able to administer spinal anaesthesia, epidural / caudal anaesthesia using USG
- Should be able to recognise complications of spinal anaesthesia and treat them.
- Should be able to describe and demonstrate the use of airway adjuncts and devices such as bougie, tube exchanger, stillette, LMA, iGel etc.
- Should be able to describe and demonstrate positioning of patients under anaesthesia.

Last 12 months

- Thesis should be submitted minimum of 6 months before the final MD examination.
- The post graduate student should be given experience of various super-specialties like cardiothoracic and vascular surgery, neurosurgery and transplantation, and paediatric surgery. The student should be able to plan and administer anaesthesia to all emergency patients under supervision including patients for Cardiac, Neurosurgery, 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 anaesthesia to elective and emergency cases.
- The post graduate student should be able to manage critically ill patients
- Should be able to treat intractable pain.
- Post graduate should know how to organize resources in case of mass casualty. The curriculum should be able to provide 04 months of elective Intensive Care Unit posting.
- Should be able to elicit / gather detailed relevant history in patients ASA IV and V patients.
- Should be able to perform a detailed examination of ASA IV and V patients.
- Should be able to order investigations pertaining to the surgery/ procedure in ASA IV and V patients.
- Should be able to plan the anaesthetic technique and intraoperative monitoring strategy for ASA IV and V patients.
- Should be able to analyse ABG and manage based on the ABG values
- Should be able to cannulate artery under supervision.
- Should be able to interact with consultants of other specialities and plan methods of pre-operative optimisation.
- Should be able to perform difficult airway drills and failed intubation drills.
- Should be able to demonstrate and teach BLS, ACLS to undergraduates and paramedics.

- Should be able to plan strategies for reducing and managing post-operative pulmonary complications and cardiovascular events in the postoperative period
- Should be able to recognise common post-operative surgical complications.
- Should be able to interact with the nursing and technical staff, junior postgraduates, peers, consultants and postgraduates of other specialities.
- Should be able to manage intraoperative and postoperative haemodynamics.
- Should be able to demonstrate massive transfusion protocol.
- Able to recognise critical incidents and take leadership roles in managing them
- Should be able to administer thoracic epidural anaesthesia and manage accidental dural puncture, PDPH etc.
- Should be able to describe and demonstrate awake fiberoptic intubation, video-laryngoscopy.
- Should be able to describe and demonstrate airway blocks.
- Should be able to describe precautions taken during complex laparoscopic procedures, one lung ventilation, robotic surgeries, etc.
- Should be able to identify and use ultrasound, under supervision, for deep nerve blocks
- Should be able to understand and perform under supervision basic cardiac echocardiogram, FAST and lung U/S.
- Should have basic knowledge of TEE, gastric ultrasound and airway ultrasound.

4. At the end of 3 years, the post graduate student should have the skills to:

- Plan and conduct anaesthesia and provide post-operative care including pain relief for elective and emergency surgical procedures related to all surgical specialities.
- Carry out basic life support (BLS) and advanced life support (ALS) and train medical and paramedical staff in BLS and ALS.
- Manage patients admitted to an intensive care unit with the help of latest equipment.
- Manage patients suffering from acute and chronic intractable pain.
- Organize the hospital environment to manage mass casualty situation and camp anaesthesia.
- Critically review and acquire relevant knowledge from the journals about the new development in the specialty.
- Should be able to participate in anaesthesia audit.
- Information management in preoperative evaluation and outcome enhancement and communication skill to patient and relatives.

Syllabus

The course content of **1st year** should cover the following:

1. Anatomy related to:

- Diaphragm, upper and lower airway
- Regional anaesthesia, field block, central neuraxial, blockade, block for acute pain states
- Intramuscular injections, arterial and venous cannulations and positioning.

2. Physics related to:

- Anaesthesia machine - assembly of necessary items.
- Airway equipment including laryngoscopes, airway devices
- Breathing systems
- Monitoring in anaesthesia (including ultrasound) and concepts of minimum monitoring
- Gas laws, medical gas supply system
- Fluidics
- Electricity and diathermy
- Oxygen therapy

3. Physiology related to:

- Theories of anaesthesia
- Respiratory, cardiovascular, hepatobiliary, renal and endocrine system, pregnancy, blood, muscle and N-M junction, Nerve impulse transmission, ECG, regulation of temperature and metabolism, stress response, cerebral blood flow and ICP.
- Central, autonomic and peripheral nervous systems.
- Metabolic response to stress and trauma.

4. Pharmacology related to

- General principles, concepts of pharmacokinetics and pharmacodynamics
- Drug interactions in anaesthesiology, anaphylactoid reactions
- Drugs used for premedication, induction of anaesthesia, general anaesthetics- intra-venous and inhalational, neuromuscular block and reversal of muscle relaxants.

5. **Biochemistry** relevant to fluid balance and blood transfusion, perioperative fluid therapy, acid base homeostasis in health and diseases.
6. Theoretical background of the commonly used anaesthetic techniques of general and regional anaesthesia, general principles of pre-anaesthetic assessment and medication, recovery from anaesthesia and post-operative care, effects of positioning during anaesthesia.
7. Introduction to the operation theatre, post-anaesthesia care rooms
8. Introduction to acute, chronic pain and pain management.
9. Documentation and medico-legal aspects of anaesthesia. Defensive anaesthesia. Concept of informed consent.
10. Resuscitation - basic and advanced life support (cardiac and trauma life support), neonatal resuscitation.
11. Intensive care of critical patients with introduction to artificial ventilation, management of unconscious patients, oxygen therapy, shock - pathophysiology and management.
12. Introduction to Research methodology, basics of biostatistics.

The course content of **2nd year** should cover the following:
Anatomy related to blocks for chronic pain, chemical neurolysis and different organ systems.

1. **Physics related to:**

- Equipments used in anaesthesia monitors, ventilators, vaporizers,
 - Fiberoptics.
 - LASER
 - Pacemaker and defibrillator
 - Monitoring equipment used for assessment of cardiac functions, temperature, respiratory functions, blood gases, intracranial pressure, depth of anaesthesia and neuromuscular block.
 - Sterilization of equipment
 - Computers in anaesthesia
2. Pharmacology of drugs used in cardiovascular, respiratory, endocrine, renal diseases and CNS disorders.
 3. Interpretation of blood gases and other relevant biochemical values, various function tests and basics of measurement techniques, ECG.
 4. Blood coagulation mechanism, disturbances, blood components.
 5. Special anaesthetic techniques as relevant to –
 - Outpatient anaesthesia, hypotensive anaesthesia, anaesthesia in abnormal environments including rural area and calamitous situations
 - Associated medical disorders in surgical patients

6. Geriatric and paediatric anaesthesia
7. Emergency, ENT, orthopaedic, ophthalmology, obstetrics, dental, radio-diagnosis and radiotherapy.
8. Medical statistics relevant to data collection, analysis, record keeping in anaesthesia, comparison and estimation of significance.
9. Care of terminally ill, Hospices management. Do not resuscitate orders.
10. Posture and anaesthesia.
11. Induced hypothermia, incidental, environmental safety of patient.
12. Malignant hyperthermia, myasthenia gravis, GB syndrome and other neuromuscular diseases, obesity, COPD, Diabetes mellitus, bronchial asthma and hypertensive crises.
13. Inherited metabolic diseases and anaesthesia.

The course contents of **3rd year** should cover the following:

1. Principles of anaesthetic management of neuro/cardiac/thoracic/vascular/transplantation/burns and plastic surgery.
2. Anaesthesia for patients with severe cardiac, respiratory, renal and hepatobiliary disorder posted for unrelated surgery
3. Shock, types, pathogenesis and management of patients in shock, renal failure, critically ill and/or on ventilator.
4. Multiple organ failure
5. Infection control, cross contamination in OT and ICU.
6. Immune response and anaesthesia. Concept of cytokines, and other enzymes.
7. Selection, maintenance and sterilization of anaesthesia and related equipment
8. Chronic pain therapy and therapeutic nerve blocks.
9. Acupuncture, acupressure and other non-conventional methods of treatment.
10. Principles of neonatal resuscitation, ventilation and critical care.
11. Principles of human resources and material management.

13. General principles of medical audit. Critical incident reporting
14. Ethics and clinical trial.
15. Hospital, ICU and OT design and planning.
16. Medical education including evidence based medical education.

TEACHING AND LEARNING METHODS

Postgraduate Training

Teaching methodology

- Teaching should include seminars, journal clubs, symposia, tutorials, case discussions, and research presentations.
- Didactic lectures hold importance in OT areas in anaesthesiology. Intraoperative discussion of pertinent physiologic changes and case management
- Review and discussion of preoperative evaluations and anaesthetic plans, post-anaesthetic evaluation and management: Postoperative rounds
- Journal club
- Mortality and Morbidity meets
- Interdepartmental integrated Lectures / Seminars
- Socratic methods of teaching to be encouraged for covering perioperative period
- Reviews and guest lectures should get priority for theoretical knowledge.
- Bedside teaching, interactive group discussions, Problem based learning discussion (PBLD) and clinical demonstrations should be the hallmark of clinical/practical learning.
- Hands-on training in performing various procedures
- Interpretation of investigations; exposure to newer specialized diagnostic/therapeutic procedures
- Emphasis on continuing education and self-study
- A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.
- Log books shall be maintained regularly and should be checked and assessed periodically by the faculty members imparting the training.
- The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
- Emergency drills related to airways in different situations, cardiac arrest, trauma, anaphylaxis, fire safety., etc every month
- Department should encourage e-learning activities.
- Case Scenario discussions
- Portfolio assignments

Thesis: Supervision

- ❖ The candidates are required to submit a thesis/dissertation at the end of three years of training. The basic aim of requiring the candidate to write a thesis protocol & conduct the thesis/dissertation is to familiarize him/her with research

methodology. The members of the faculty guiding the thesis/dissertation work for the candidate shall ensure that the subject matter selected for the thesis/dissertation is feasible, economical and original. The postgraduate is responsible to a Faculty member and departmental protocol / thesis committee and they should be available to advise and assist the student in his clinical assignments

- ❖ The Student must complete the teaching and training programme/schedule in research methodology within three months of joining the Course and prior to start of the protocol writing. This programme needs to be made and validated at departmental / Institutional level.
- ❖ Departmental teaching committee will be responsible for the educational activities of the department and the teaching schedule.
- ❖ This involves providing services for emergencies and it makes different demands upon the anaesthesiologist. It should be learned through experience, with reduced staff. The clinical work during emergency should have a close supervision. The standards should be maintained of the agreed competence on schedule. The emergency duties should be properly arranged with duty off. The postgraduates may have to do emergency duty as per schedule.

DRAFT

Skill Labs:

During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of skills laboratories in the department is mandatory. Student should be taught and trained on various procedures on manikins and devices in dedicated skill lab.

Mentorship

The trainee needs to be guided through the duration of training to cover not just the academic aspects but also provide motivation, emotional support, and role modelling. Mentorship system may be considered with guides and / or other faculty as the mentors for the trainees (mentees)

Rotation:**Schedule for three years of MD Anaesthesia postings:**

The post graduate student should be exposed to the following areas of clinical anaesthesia practice:

1. Pre-anaesthesia clinic
2. Pain clinic
3. Recovery and Post anaesthesia Care Unit (PACU)
4. Respiratory Intensive Care (RICU) / ICU Intensive / Critical Care Units
5. Dialysis and transplant
6. All specialty theatres
7. Peripheral areas: Radiology (USG, CT, MRI, interventions), ECT and other interventional laboratories.

The suggested schedule of the Operating Theatre and Peripheral Postings can be as follows: This may change as per availability of specialities.

Operation theatre	Months
General Surgery (including 15 days Oncosurgery)	6
Urology	1
Ophthalmology	1
Otorhinolaryngology	2
Dental & Facio-maxillary Surgery	1
Orthopaedics/Trauma/casualty	3
Gynaecology	3
Obstetrics	3
Pediatrics surgery	2
Burns/Plastic/Burns ICU	1
CTVS	1
Neurosurgery	1
ICU	4
Pain / Pain Clinic	1
Recovery/PACU	1
Organ Transplant, Peripheral Postings (Radiology, Radiotherapy, Cardiac Cath lab, ECT, GI endoscopy)	2
Others (Anatomy, Medicine, CSSD)	1

(PS: Posting to Preanaesthetic Clinic-PAC shall be during dedicated timings of a day/whole day as per institutional arrangements)

ASSESSMENT

FORMATIVE ASSESSMENT, during the training programme

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self-directed learning and ability to practice in the system.

The students should have bedside/OT/ICU Clinics based teaching as well while attending the clinical areas. 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 anaesthetic procedure as listed. Each procedure observed and performed will be listed in the logbook, which is signed by attending faculty. Thesis work is to be assessed as presentations and journal clubs related to academic, clinical and statistical aspects.

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and clinical examination. The thesis is assessed separately.

Quarterly assessment during the MD training should be based on:

1. Journal based / recent advances learning
2. Patient based /Laboratory or Skill based learning
3. Self-directed learning and teaching
4. Departmental and interdepartmental learning activity
5. External and Outreach Activities / CMEs

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I)

SUMMATIVE ASSESSMENT i.e., assessment at the end of training

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000 (MCI/NMC) and RGUHS

Post graduate Examination

The examinations shall be organised on the basis of 'Grading' or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

The final examination consists of three parts:

- 1) Thesis
- 2) Theory evaluation
- 3) Practical/Clinical and Oral evaluation

1. Thesis

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognised Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

2. Theory consists of four papers of 3 hours each having 10 short structured questions with 10 marks each:

Paper I: Basic Sciences as applied to Anaesthesiology

Paper II: Practice of Anaesthesia: Anaesthesia in relation to associated systemic and medical diseases.

Paper III: Anaesthesia in relation to subspecialties / super specialties

Paper IV: Intensive Care Medicine, Pain Medicine and Recent advances.

3. Practical/Clinical Examination: will consist of: 3 clinical cases,

Long case: One, duration 30 min (history, examination, Diagnosis and Management, Discussion)

Short cases: Two, 15 minutes each for short case. In short cases only relevant history important to anaesthesia to be taken (history, clinical examination and diagnosis, discussion).

Oral/Viva-voce should be conducted preferably on four tables with one examiner on each table:

Table one: ECG, X-rays, ABG Cards, Pulmonary function tests, Capnographs, clinical exercises card.

Table two: Anaesthetic Drugs, Emergency Drugs, IV Fluids, Nerve Blocks (skeleton).

Table three: Anaesthesia machine including circuits and Vaporizers, ETT, Supraglottic Airway devices, ICU Ventilator and oxygen therapy equipment.

Table four: Resuscitation equipments, resuscitation demonstration, Difficult Airway Equipment, monitoring equipments.

Alternatively,

1. One long case, viva voce at one station with all examiners, and: 150 marks
2. 28 OSCE station covering two stations of short cases, drugs ECG, X-rays, PFT, ABG, statistics (data distribution, types of variables, tests applied, using published examples) and type of research and broad methodology considerations, respiratory loops, Resuscitation etc.:

150 marks

Recommended Reading Books (latest edition)

1. Lee's Synopsis of Anaesthesia
2. Clinical Anesthesiology by Morgan
3. Cardiac Anaesthesia by Joel Kaplan
4. Clinical Anaesthesia by Barash, Cullen and Stoelting
5. Textbook of Anaesthesia by Aitkenhead Rowbotham and Smith
6. Pharmacology and Physiology for Anaesthetists by Stoelting
7. Pharmacology for anaesthetists – Peck and Williams
8. Principles of Obstetric Anaesthesia by Crawford
9. Miller's Anesthesia
10. Stoelting RK, Miller RD Basics of Anaesthesia
11. ICU Book, Paul Marino
12. Text Book of Critical Care, by Fink et al
13. Regional Anaesthesia, P Prithviraj
14. Practical Management of Pain, Raj
15. Stoelting and Dierdorf: Anaesthesia and Co-existing Disease
16. Dorsch and Dorsch: Understanding Anaesthesia Equipments
17. Ward's anaesthetic equipment
18. ECG by Shamroth/Goldman
19. Anatomy for Anaesthetists by Harold Ellis
20. Clinical Anesthesia by P.G.Barash

21. Longenecker's Anaesthesiology- Mcgraw Hill
22. Oxford text book of Anaesthesia (2 vol)
23. Oh's Intensive Care Manual
24. Smith's Anesthesia for Infants and Children
25. A Practice of Anesthesia for Infants and Children (editors Charles Cote, Jerrold Lerman Brian J Anderson)
26. Admir Hadzic: Textbook of Regional Anesthesia and Acute Pain Management
27. Cousins & Brodenbaugh's Neural Blockade In Clinical Anesthesia and Pain Medicine.
28. Kaye, Urman, Vadivelu, Essentials of Regional Anesthesia; Springer Verlag
29. Brendan T. Finucane: Complications of Regional Anesthesia
30. John L. Atlee: Complications in Anesthesia
31. Joseph M. Neal, James P. Rathmell: Complications in Regional Anesthesia & Pain Medicine
32. R. Hopkins, C. Pedan, S. Gandhi. Radiology for Anaesthesia and Intensive Care.
33. Practical Ultrasound in anaesthesia for critical care and pain management (Ed. Philip M Hopkins, A R Bodenham, Scott T Reeves)
34. Brian A. Pollard. Ultrasound Guidance for Vascular Access and Regional Anesthesia.
35. Fernando L. Arbona, Babak Khabiri, John A. Norton. Ultrasound-Guided Regional Anesthesia A Practical Approach to Peripheral Nerve Blocks and Perineural Catheters

Must refer:

1. Cucchiara and Michenfelder: Clinical Neuroanaesthesia
2. Cottrell and Smith: Anaesthesia and Neurosurgery
3. Complications in Anaesthesiology by Orkin
4. Complications in Anaesthesia by Raven
5. Airway management by JL Benumof
6. Obstetric Anaesthesia by Chestnut

Journals

03-05 international Journals and 02 national (all indexed) journals

Annexure I

Postgraduate Students Appraisal Form

Anaesthesiology

Name of the Department/Unit:

Name of the PG Student:

Period of Training: FROM.....TO.....

S No	Particulars	Not Satisfactory	Satisfactory	More than Satisfactory	Remarks
1	Journal based / recent advances learning				
2	Patient based /Laboratory or Skill based learning				
3	Self-directed learning and teaching				
4	Departmental and interdepartmental learning activity				
5	External and Outreach Activities / CMEs				

6	Thesis / Research work				
7	Log Book Maintenance				

Publications

Yes/No

Remarks* _____

***REMARKS:** Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE OF ASSESSEE

SIGNATURE OF GUIDE / CONSULTANT SIGNATURE OF HOD