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AMALA INSTITUTE OF MEDICAL SCIENCES, THRISSUR

Affiliated to Kerala University of Health Sciences (KUHS)

SYLLABUS FOR PG PROGRAMME

DOCTOR OF MEDICINE(MD)/

MASTER OF SURGERY(MS)

INDEX

Sl No	Courses	Page Number	
		From	To
1	Anaesthesiology (MD)	1	24
2	Biochemistry (MD)	25	51
3	Community Medicine (MD)	52	67
4	Dermatology & Venereology (MD)	68	86
5	Emergency Medicine (MD)	87	122
6	Oto-Rhinolaryngology (MS)	123	136
7	General Medicine (MD)	137	164
8	General Surgery (MS)	165	180
9	Obstetrics & Gynaecology (MS)	181	198
10	Ophthalmology (MS)	199	216
11	Orthopaedics (MS)	217	247
12	Paediatrics (MD)	248	286
13	Pathology (MD)	287	353
14	Physiology (MD)	354	381
15	Psychiatry (MD)	382	400
16	Respiratory Medicine (MD)	401	415
17	Radiodiagnosis (MD)	416	426
18	Radiotherapy (MD)	427	460

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 anesthesiology 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 anesthesiologist with broad range of skills that will enable him/her to practice anesthesiology 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 Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. 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 behavior, 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 (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.

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

- Demonstrate knowledge of Anatomy related to;
  - ❖ Diaphragm, upper and lower airway, heart and coronary circulation ,
  - ❖ Regional anaesthesia - field block, central neuraxial, blockade, block for acute pain states
  - ❖ Procedures like -Intramuscular injections, arterial and venous cannulations and
  - ❖ Patient Positioning under anaesthesia

- Demonstrate knowledge of Physiology of various systems (respiratory, cardiovascular, 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) in detail and translate its application in a problem solving manner.
- Demonstrate 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) - general principles, concepts of

pharmacokinetics and pharmacodynamics, drug interactions with the other drugs taken concomitantly by the patient and anaphylactoid reactions.

- Demonstrate knowledge of gas laws, medical gas supply system, fluidics, electricity, diathermy and oxygen therapy.
- Demonstrate knowledge of 'principles of physics' that govern functions of basic anaesthesia delivery equipment, airway devices – (laryngoscopes, airways etc), breathing systems and monitors, fiber optics, Lasers, Pacemakers and defibrillators, monitoring equipments (used for assessment of 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.
- Demonstrate 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.
- 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. Immune response and anaesthesia.
- Describe the development and history of anaesthesia as a specialty with knowledge of important personalities who have contributed towards it.
- 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.
- Demonstrate knowledge of research methodology and basics of biostatistics relevant to data collection, analysis, record keeping in anaesthesia, comparison and estimation of significance.

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- 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:
    - ❖ Outpatient anaesthesia, hypotensive anaesthesia, anaesthesia in abnormal environments including rural area and calamitous situations
    - ❖ Associated medical disorders in surgical patients
    - ❖ Geriatric and pediatric anaesthesia, Emergency, ENT, orthopedic, ophthalmology, obstetrics, dental, radio-diagnosis and radiotherapy.
    - ❖ Induced hypothermia, incidental, environmental safety of patient.
    - ❖ Malignant hyperthermia, myasthenia gravis, GB syndrome and other neuromuscular diseases, obesity, COPD, Diabetes mellitus, bronchial asthma and hypertensive crises..
    - ❖ Principles of anaesthetic management of neuro/cardiac/thoracic/vascular/ transplantation/burns and plastic surgery.
    - ❖ Anaesthesia for patients with severe cardiac, respiratory, renal and hepatobiliary disorder posted for unrelated surgery
    - ❖ 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, Hospices management, Do not resuscitate orders.
- Demonstrate knowledge of general principles of medical audit and Critical incident reporting.
- Demonstrate knowledge of Ethics and clinical trial.
- Demonstrate knowledge of Hospital, ICU and OT design and planning.
- Demonstrate knowledge of Medical education including evidence based medical education.
- Demonstrate knowledge of principles of human resources and material management.

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 other 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.

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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.

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
  - ❖ Acquiring mastery in careful and relevant history taking, physical examination in clinical evaluation of the patient preoperatively.
  - ❖ Collecting and synthesizing preoperative data from parent hospital and other sources and to develop a rational strategy for the peri-operative care of the patient.
  - ❖ Thorough and systematic approach to preoperative evaluation of patients with and without systemic diseases, undergoing different types of operations.
  - ❖ Prioritizing problems, present cases clearly and systematically to attending consultants.
  - ❖ Developing working relationships with consultants in other specialties to assist in preoperative evaluation and get a good consultation.
  - ❖ Interacting with preoperative patients and developing effective counseling techniques for different anaesthetic techniques and peri-operative procedures.
  - ❖ Assessing and explaining risk of procedure and taking informed consent.
  - ❖ Managing information in preoperative evaluation and outcome enhancement and communication skill to patients and relatives.
  - ❖ Ability to choose and order the required investigations to be done in a particular patient peri operatively

- Demonstrate ability in performing
  - ❖ Pre-operative equipment check
  - ❖ selection of drugs
  - ❖ 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 Mannequin 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.

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- 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 to perform cannulation of arteries, central and peripheral veins.
- Demonstrate ability in using and interpreting the following routine non-invasive and invasive monitors intra-operatively:
    a. Electrocardiogram with ST-segment analysis
    b. Noninvasive 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.
        i) Cardiac output
        ii) Mixed venous oxygen saturation
        iii) Evoked potential
        iv) Transesophageal 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, lumber 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, under supervision.
- Demonstrate ability to give extradural block (EDB) lumbar and thoracic, Spinal Block, and Peripheral Nerve Blocks under supervision.
- 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,

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and for all major surgeries, able to manage critically ill patients and treat intractable pain.

- Demonstrate following abilities in **Emergency Anaesthesia, Trauma and Resuscitation:**
  - ❖ Organize resources in case of mass casualty.
  - ❖ Perform triage.
  - ❖ Assess, transport and manage mass casualties / disaster management and camp anaesthesia.
  - ❖ Manage massive haemorrhage and massive blood transfusion.
  - ❖ Transport critically ill patient.
  - ❖ Perform anaesthetic management of geriatric patients with fracture neck of femur
  - ❖ Manage severe burns patients, rapidly progressing spinal compression, massive haemoptysis and lobectomy, peritonitis from various suspected causes, preparation and management of bowel obstruction, septicaemic shock, acute upper airway obstruction such as foreign body, epiglottitis, infections, cardiac tamponade from examples post cardiac surgery, malignant pericardial effusion, peri-operative management of rupture aneurysm of abdominal aorta
  - ❖ Basic Cardiac Life Support and Advanced Cardiac Life Support, Basic Trauma Life Support, Advanced Trauma Life Support, and Cerebral preservation.
  - ❖ Management of intra-operative cardiac arrest
  - ❖ Management of intra-operative bronchospasm

- Demonstrate ability to document a Medico-legal aspect.
- Demonstrate ability to provide special sedation /**anaesthesia requirements outside operating Room,** eg **Radiology**: for CT, MRI (especially in relation to dye allergy and embolization, **Oncho radiotherapy**, **Electroconvulsive shock therapy** (modified ECT. **Non-invasive cardio-radiologic procedures** including balloon angioplasty and cardiac catheterization, **Non-invasive neuro-radiologic procedures, lithotripsy** etc **.**
- Demonstrate ability to analyze data and write a thesis, present scientific data, participate in anaesthesia audit.
- Demonstrate ability to critically review and acquire relevant knowledge from the journals about the new development in the specialty
- Demonstrate following abilities in the **Post Anaesthesia Care Unit (PACU)**
  - ❖ Assess the patient's recovery and condition for a safe discharge or transfer.
  - ❖ Observe, recognize and treat the commonly occurring problems likely to arise in the Post-anaesthsia Care Unit (PACU) especially those in relation to cardio-respiratory systems:
    1. Airway integrity and compromise.

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2. Arrhythmia
3. Hypertension
4. Hypotension
5. Pain prevention and pain relief
6. Nausea and vomiting
7. Decreased urine output
8. Emergence delirium
9. Delayed emergence from anaesthesia
10. Shivering
11. Post-obstructive pulmonary edema.

- ❖ Assess patient recovery and the parameters for transfer from the PACU to the ward, ICU, home.
- ❖ Score the patient's condition according to the Aldrete system, including fast tracking after out-patient surgery.

- 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, Poisoning, infectious patient (HIV, Hepatitis) and patients with metabolic disturbances.
  - ❖ Monitoring progress of patients by physiological scoring systems
  - ❖ Practicing infection control practices and control of nosocomial infections.
  - ❖ 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
  - ❖ Glycemic control in the critically ill patient
  - ❖ Practice of Hypothermia and prevention of cerebral injury after cardiac arrest
  - ❖ Delivering appropriate nutritional support - enteral and parenteral.
  - ❖ Proper use of sedative/hypnotic drugs in the ICU.
  - ❖ Practicing ethical and legal aspects of critical care
  - ❖ Good communication skills with patient and relatives.
  - ❖ Proper Sterilization of ICU equipment.

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- Demonstration of following abilities in **Acute and Chronic Pain Management**
  - ❖ Assessment of patients with pain including: history taking, physical examination, and interpretation of investigations.
  - ❖ Classify types of pain - acute chronic, traumatic, cancer pain, etc. with the knowledge of Pain pathways in detail.
  - ❖ Practice the different modalities of physical therapy that may relieve both acute and chronic pain
  - ❖ Practice the acute pain, cancer pain guidelines and WHO treatment ladder.
  - ❖ Practice routes of administration and risk/benefits of drugs used for acute and chronic pain relief, patient controlled analgesia and treat the common pain syndromes.
  - ❖ Demonstrate practice of pain management in patients with problem drug use, drug dependency and addiction and identify the parameters for referral to a pain medicine specialist.
- Demonstrate Organization of acute pain service and role of acute pain nurse for pain assessment in various groups of patients, 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, Pharmacology and side effects of epidural/intra-thecal opioid. Neurological assessment of epidural blockade and management of failed block. Management of regional blockade – brachial plexus, para-vertebral and intra-pleural block. Management of epidural abscess. Substance abuse and acute pain control. Pain control in concurrent medical diseases – COAD, IHD, bleeding tendency, geriatric. Pain control in burns patients. Pain control in trauma patients included multiple rib fracture
- Demonstration of abilities to manage **Chronic Pain**
  - ❖ 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, trigeminal neuralgia. Principle of management of non-cancer nociceptive pain - myofascial pain, lower back pain, intractable angina, burns, chronic pancreatitis, PVD.
  - ❖ Practice Epidural steroid injection (all levels) and long-term epidural catheterization.
  - ❖ Observe and practice following blocks: Infra-orbital nerve, Intercostal nerve

- ❖ Recognize complications associated with each blocks and know appropriate treatment of each
- ❖ Know the indications for stimulation techniques such as transcutaneous electrical nerve stimulation (TENS), dorsal column stimulation, and deep brain stimulation.
- ❖ Mechanisms and side effects of other therapies used for treating pain.
- ❖ The principles of pain management in special patient groups including the elderly, children, disabled, intellectually handicapped and those unable to communicate.
- ❖ Awareness of the principles for insertion and management of implantable drug delivery pumps.
- ❖ Awareness of the basic principles of palliative care.

- **Demonstrate practice of Regional Anaesthesia**
  - ❖ Applying general principles of pharmacology of local anaesthetics and various adjuvants.
  - ❖ Familiarizing with the relevant anatomy for regional techniques.
  - ❖ Application of indications and contraindications to regional anesthetic technique including central neuraxial 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:
    - o Brachial plexus, cervical plexus, stellate ganglion block, lumbar plexus, lumbar sympathetic, Sciatic nerve block, Femoral nerve block, 3 in 1 block, Wrist block, Popliteal Nerve block, Trigeminal nerve block, Retro bulbar blocks, Paravertebral blocks, Intercostal blocks, Caudal block – adult and pediatric, Ankle block, Epidural block/Catheter, Subarachnoid block, Bier's block, All peripheral nerves of the upper and lower limbs.

- **Demonstrate practice of Thoracic Anaesthesia**
  - ❖ Pre-operative assessment of patients undergoing Thoracotomy (lung resection), thoracoscopy, video assisted thoracoscopy and mediastinoscopy
  - ❖ Various approaches and their relevant equipments for lung isolation.
  - ❖ Various double lumen tubes and their placement.
  - ❖ Application of Principle of chest drain.
  - ❖ Respiratory Physiology and management of one lung ventilation (OLV). Indications, contraindications and hazards of OLV.

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- Application of the knowledge of Anatomy of lung and broncho-pulmonary segments.
- Anatomy and techniques for intercostals nerve block and thoracic epidural. Management of thoracic epidural anaesthesia and analgesia
- Anatomy, techniques and placement of paravertebral block/catheter.
- Post-operative care of patients after lung surgery.
- Peri-operative management of patients with myasthenia gravis.
- Peri-operative management of patients with mediastinal mass.
- Anaesthetic management of mediastinoscopy, major airway stenting.
- Lung volume reduction surgery and problems.

- **Demonstrate practice of Cardiovascular Anaesthesia**:

  - Application of the knowledge of Anatomy and physiology of valvular disease, coronary arteries and their territories. 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 co-arctation 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-nucleide 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
  - Coagulation and management of coagulopathy.
  - Off pump bypass
  - Intra-operative management of aortic surgery and major peripheral vascular surgery, aneurysm grafts, recanalisation 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.

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- **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 and pre-medication.
  - ❖ Anaesthetic equipment: laryngoscopes, airways, endotracheal tubes, LMAs, PLMA and breathing circuit for children.
  - ❖ Anaesthesia management for premature and newborn.
  - ❖ Emotional problems for parent and child and principles of premedication. Consent by parents and their presence during induction. To become skilled in communicating with children, parents and other relatives.
  - ❖ Problems of transporting a sick pediatric 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 and rectal routes and monitor pediatric patients.
  - ❖ 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
  - ❖ Learn to recognize and treat post anaesthesia complications like apnea, laryngospasm, acid-base and electrolyte disturbances, febrile and convulsing child and bleeding child.
  - ❖ Common problems related to common congenital syndromes presenting for surgery. Anaesthetic management of a child with concurrent disease – Down's, Pierre Robin syndrome, von Willebrand's disease, Goldenhar's, Sturge-Weber, Tracher-Colin, Prune-Belly, and cyanotic and non-cyanotic congenital heart disease.
  - ❖ 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.
  - ❖ Resuscitation of neonates and children of all ages. A period of one to two months in a PICU is recommended for all post graduate students undergoing advanced training in paediatric anaesthesia.
  - ❖ Paediatric pain management
  - ❖ Assessment of a child with URTI, with a heart murmur.
  - ❖ Management of fluid and electrolytes in children.

- ❖ Anaesthetic management of a malignant hyperthermia susceptible child.
- ❖ Anaesthetic management of FB bronchus, oesophagus, Wilm's tumour, congenital diaphragmatic hernia, tracheo-oesophagus fistula, thoracotomy.
- ❖ Anaesthesia for Fetal 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 and liver failure. Principles of anesthetizing an immuno-compromised patient.
  - ❖ Principles of anesthetizing patient with end stage renal/liver disease and patient with organ transplantation. Perioperative management.
- **Demonstrate practice of Neuroanaesthesia**
  - ❖ Application of basic knowledge of cerebral circulation and intra cranial pressure and its implications
  - ❖ Anaesthesia to patients with neurologic disease, head injury undergoing neurologic or non-neurologic surgery and for diagnostic procedures requiring anaesthesia.
  - ❖ Anesthetic implications of the most common neurosurgical procedures, transnasal, trans-sphenoidal pituitary surgery. Posterior fossa surgery. Surgery for supratentorial pathology.
  - ❖ Application of basic concepts behind electrophysiologic monitoring of the brain and spinal cord.
  - ❖ Application of knowledge of general principles of positioning the patient for surgery and the advantages and disadvantages of each position.
  - ❖ Effects of anaesthesia on the electroencephalogram (EEG) and evoked potentials.
  - ❖ Differential diagnoses and treatment alternatives of intraoperative intracranial hypertension ("tight brain")
  - ❖ Management of Head Trauma, and its anesthetic management and various protocols regarding their management and associated trauma.
  - ❖ Intracranial surgery and spinal surgery, both routine and emergency.
  - ❖ Monitoring: techniques for detection and management of air embolism.
  - ❖ Lumbar puncture and CSF drainage.
  - ❖ Non-surgical management of the head trauma patient, Systemic complications of severe brain injury.
  - ❖ Management of subarachnoid haemorrhage and vasospasm.
  - ❖ Diagnosis and management of patients with brainstem death; and dealing with patient's relatives

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- **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 Fiberoptic 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 - each
13	Cervical-Superficial and Deep, Stellate, Splanchnic - each
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 eg. BIS monitoring

- Demonstration of anesthetic abilities in the intraoperative period keeping into consideration the specific requirement of the surgical procedure – ENT, Orthopaedic, Gynaecology – Obstetrics, General surgery, Onchosurgery, replacement surgeries, urosurgery, vascular, plastic, Thoracic, Dental etc

Suggested 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 and II cases). To start with, the student will observe and slowly become independent in giving general anaesthesia and spinal aneasthesia to ASA I and II 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,

perioperative 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.

2. Next 18 months

- The student should widen his experience and should 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, radiodiagnostic and therapeutic procedures (CT scan, MRI scan, angiography).
- The student should be able to analyze data and write a thesis. He/she should be able to present scientific data.

3. 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 and treat intractable pain. They should also 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 (2 months during initial years under supervision and 2 months independently in the last six months).

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 specialties.

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- 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.

Overall the student should acquire skills in the following practical competencies:

- ❖ 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 with 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.

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- 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-anesthetic 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,
   - fibroptics.
   - 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

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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 pediatric anaesthesia
7. Emergency, ENT, orthopedic, 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. Postures 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. Third world anaesthesia.
14. 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.
7. Concept of cytokines, and other enzymes.
8. Selection, maintenance and sterilization of anaesthesia and related equipment
9. Chronic pain therapy and therapeutic nerve blocks.
10. Acupuncture, acupressure and other non-conventional methods of treatment.
11. Principles of neonatal resuscitation, ventilation and critical care.
12. Principles of human resources and material management.

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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

Didactic lectures are of least importance.

- Teaching should include seminars, journal clubs, symposia, tutorials, case discussions, and research presentations.
- Reviews and guest lectures should get priority for theoretical knowledge.
- Bedside teaching, grand rounds, interactive group discussions and clinical demonstrations should be the hallmark of clinical/practical learning.
- Student should have hands-on training in performing various procedures (medical/surgical concerning his specialty) and ability to interpret various tests/investigations.
- Exposure to newer specialized diagnostic/therapeutic procedures concerning his/her subject should be given.
- 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.
- Department should encourage e-learning activities.

Thesis: Supervision

- The postgraduate is responsible to a Faculty member and the latter should be available to advise and assist the student in his clinical assignments
- 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

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 medical colleges is mandatory.

Simulators:

Simulators should be used for the events of high importance but infrequent occurrence and where there may be high risks to the patients. The simulators can also be used for assessment purposes.

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. Intensive Care Units
5. Dialysis and transplant
6. All specialty theatres
7. Peripheral areas: Radiology, MRI, ECT and other interventional laboratories

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

Operation theatre	**Months**
General Surgery	6
Urology	1
Ophthalmology	1
Otorhinology	2
Dental	1
Orthopedics/Trauma/casualty	3
Gynecology	3
Obstetrics	3
Pediatrics surgery	2
Burns/Plastic	1
CTVS	2
Neurosurgery	2

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ICU	4
Pain	1
Recovery	1
Organ Transplant posting in the other areas. ECT, Cardiac Cath)	(Radiology,Radiotherapy)

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.

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 ie., assessment at the end of training

The summative examination would be carried out as per the Rules given in **POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.**

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.

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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/superspecialties

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 Bocks (skeleton) .

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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, 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. Anaesthesia for neonates and infants by Smith
7. Pharmacology and Physiology for Anaesthetists by Stoelting
8. Principles of Obstetric Anaesthesia by Craford
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. ECG by Shamroth/Goldman
18. Anatomy for Anaesthetists by Harold Ellis
19. Clinical Anesthesia by P.G.Barash
20. Longneckers Anaesthesiology- Mcgraw Hill

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

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Annexure I

Postgraduate Students Appraisal Form Pre / Para /Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM……TO……

Sr. No.	PARTICULARS	Not Satisfactory	Satisfactory	More Than Satisfactory	Remarks
		1 2 3	4 5 6	7 8 9	
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 CONSULTANT** **SIGNATURE OF HOD**

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GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING FOR MD IN BIOCHEMISTRY

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.

The student who has obtained MD degree in Biochemistry should be well-versed in basic concepts and recent advances in the subject and should have acquired skills and expertise in various laboratory techniques applicable to metabolic and molecular aspects of medicine and in research methodology. Training during the course should equip the student with skills to become an effective teacher, able to plan and implement teaching programmes for students in medical and allied health science courses, set up/manage a diagnostic laboratory, generate, evaluate and interpret diagnostic laboratory data, interact with clinicians to contribute to more effective patient care and carry out a research project and publish its results.

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 Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. 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".

SPECIFIC LEARNING OBJECTIVES

At the end of the MD training programme in Biochemistry, the post graduate student should have acquired competencies in the following areas, as detailed below.

1. **Acquisition of knowledge**

The student should be able to explain clearly concepts and principles of biochemistry and cell biology, including correlations of these with cellular and molecular processes involved in health and disease.

2. **Teaching and training**

The student should be able to effectively teach undergraduate students in medicine and allied health science courses so they become competent health care professionals and able to contribute to training of postgraduate post graduate students.

3. **Diagnostic services**

The student should be able to set up/supervise/manage a diagnostic laboratory in Biochemistry in a hospital, ensuring quality control, and providing a reliable support service. The student should be able to provide clinicians with consultation services for diagnostic tests in biochemistry and in interpretation of laboratory results.

4. **Research**

The student should be able to carry out a research project from planning to publication and be able to pursue academic interests and continue life-long learning to become more experienced in all the above areas and to eventually be able to guide postgraduates in their thesis work.

SUBJECT SPECIFIC COMPETENCIES

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

A. Cognitive domain

1. Describe and apply biochemical principles to explain the normal state, abnormal disease conditions and mechanism of action used in the perception, diagnosis and treatment of diseases.
2. Explain energy transactions in a living system, and describe importance of biomolecules in sustaining the life process.
3. Describe pathways of the intermediary metabolism along with their individual and integrated regulation and apply that in understanding the functioning of the body.

4. Describe and apply the concept of nutrition in health and disease, micro- and macro-nutrition and essential nutrients, and interlinks of nutrients with metabolism and functions of a living system.
5. Apply and integrate knowledge of molecular and metabolic conditions in normal and disease states for clinical problem solving and research
6. Acquire knowledge on application of various aspects of genetic engineering in medicine
7. Acquire knowledge and apply the principle of statistics, biostatistics and epidemiology to the evaluation and interpretation of molecular and metabolic disease states.
8. Evaluate, analyze and monitor disease states by applying relevant biochemical investigations and interpreting the clinical and laboratory data.
9. Able to integrate principles of immunology in biochemistry.
10. Demonstrate knowledge of basics of research methodology, develop a research protocol, analyse data using currently available statistical software, interpret results and disseminate these results and to have the potential ability to pursue further specializations and eventually be competent to guide students.
11. Describe the principles of teaching - learning technology towards application and take interactive classroom lectures, prepare modules for PBL, organize and conduct PBLs, case discussions, small group discussions, Seminars, Journal club and research presentations
12. Demonstrate knowledge of principles of Instrumentation.
13. Demonstrate knowledge about recent advances and trends in research in the field of clinical biochemistry.

B. Affective domain

1. Effectively explain to patients from a variety of backgrounds, the molecular and metabolic basis of disease states and lifestyle modifications.
2. Communicate biochemical reasoning effectively with peers, staff and faculty, and other members of the health care team.
3. Demonstrate empathy and respect towards patients regardless of the biochemical nature of their disease.
4. Demonstrate respect in interactions with patients, families, peers, and other healthcare professionals.

5. Demonstrate ethical behavior and integrity in one's work.
6. Demonstrate effective use of nutrition, lifestyle and genetic counseling.
7. Be aware of the cost of diagnostic tests and economic status of patients.
8. Acquire skills for self-directed learning to keep up with developments in the field and to continuously build to improve on skills and expertise

C. Psychomotor domain

1. Able to select, justify, and interpret the results of clinical tests in biochemistry.
2. Develop differential diagnoses for molecular and metabolic causes of diseases.
3. Suggest preventive, curative, and/or palliative strategies for the management of disease.
4. Predict effectiveness and adverse effects associated with disease intervention.
5. Demonstrate skills for clinical diagnosis, testing, understanding of biochemical conditions and diagnostic service.
6. Perform important biochemical, immunological and molecular biology techniques.
7. Observed working of important advanced techniques.
8. Demonstrate standard operating procedures of various methods and techniques used in clinical biochemistry.
9. Determination of enzyme activity and study of enzyme kinetics. Ideally it should be accompanied by purification (partial) of the enzyme from a crude homogenate to emphasise the concepts of specific activity, yield and fold purification
10. Demonstrate and report routine investigations in hematology and microbiology
11. Demonstrate presentation skills at academic meetings and publications.

By the end of the course, the post graduate student should have acquired practical skills in the following:

- Performance of reactions of carbohydrates, amino acids and proteins, and lipids
- Experiments to demonstrate constituents of milk
- Experiments to demonstrate normal and abnormal constituents of urine
- Determination of iodine number and saponification number of fats
- Estimation of ammonia and amino acids by Sorenson formal titration

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- Estimation of nitrogen estimation in a given amino acid solution by micro Kjeldahl method
- Estimation of phosphorus by Fiske Subbarao method
- Estimation of ascorbic acid in lime
- Estimation of calcium content in milk
- Estimation of proteins by Folin's method and dye binding method.
- Two-dimensional paper chromatography for separation of amino acids
- Preparation and estimation of starch, glycogen, cholesterol, casein (phosphorus in casein) and hemoglobin from biological samples Determination of enzyme activity and study of enzyme kinetics, using any 2 suitable enzymes (eg, catalase from rat liver and acid phosphatase from potatoes).
- Estimation of clinical analytes as detailed below:
    - blood glucose, glycated haemoglobin; performance of glucose tolerance test
    - electrolytes, arterial blood gas analysis
    - cholesterol, triglycerides, free fatty acids, phospholipids, Lp (a), urea, creatinine, uric acid, ammonia, microalbuminuria
    - parameters of liver function tests (bilirubin, hepato-biliary enzymes such as AST, ALT, ALP, GGT, serum proteins/albumin and prothrombin time)
    - Calcium, magnesium, copper (and ceruloplasmin), serum iron, TIBC and ferritin
    - markers of myocardial damage (CK, CK MB, troponins, LDH)
    - other enzymes of diagnostic relevance (eg. phosphatases, amylase etc)
    - vitamins D and B_{12} and folate
- Electrophoresis of serum proteins
- Electrophoresis of lipoprotein *(Optional)*
- Electrophoretic separation of LDH isozymes or any other isoenzymes
- Clearance tests
- CSF analysis
- Thyroid function tests and other hormone assays by ELISA/RIA
- Preparation of buffers.

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Clinical Laboratory

- Taking any one parameter, students should prepare a Levy Jennings chart and plot inter-assay and intra-assay variation for the laboratory.
- Implementation of Westgard rules.

Optional:

- Determination of reference values for any one parameter for the clinical laborator

In addition, all efforts should be made to ensure that students at least see a demonstration of the following techniques.

- Separation of peripheral blood lymphocytes using Ficoll Hypaque
- Subcellular fractionation/marker enzymes for organelles to demonstrate fractionation
- Ultracentrifugation
- Isolation of high molecular weight DNA from tissues/blood
- Isolation of RNA; synthesis of cDNA by reverse transcription; PCR (both conventional and real-time)
- Isolation of plasmids and agarose gel electrophoresis for proteins and nucleic acids
- Basic techniques in cell culture
- High performance liquid chromatography (HPLC)

SYLLABUS

The course contents are outlined below:

Paper I

Biomolecules, cell biology, biochemical techniques, biostatistics and research methodology, basics of medical education in teaching and assessment of biochemistry.

Biomolecules:

Properties of water

Concept of an acid, a base, pH, pK, buffer and buffering capacity

Classification, structure and functions of amino acids and peptides

Structural organization of proteins and relationship with their functions

- primary, secondary, tertiary and quarternary structure of proteins
- protein folding and denaturation

Structure-function relationship of proteins

- Structure and functions of hemoglobin and myoglobin
- Structure and function of collagen
- Structure and function of immunoglobulins

Classification, functions, properties and reactions of carbohydrates

Classification, properties and importance of lipids

- Fatty acids - nomenclature, classification, properties, reactions
- Mono, di- and triacylglycerols
- Trans fats
- Cholesterol - structure, properties and functions
- Phospholipids - definition, types, properties, s and importance
- Glycolipids - definition, types, functions, examples.
- Lipoproteins - definition, structure, types, functions, role of apoproteins, importance in health and disease.
- Biological membranes - structure, function, properties and importance.
- Micelles and liposomes

Nucleotides and nucleic acids

- purine and pyrimidine bases in DNA and RNA
- nucleosides and nucleotides
- physiologically important nucleotides
- synthetic analogues of purine/pyrimidine bases and nucleosides used as therapeutic agents (anti-cancer drugs, anti-viral drugs)
- Watson and Crick model of DNA structure
- Structure and functions of different types of RNA.

Cell biology

- Structure of the cell and different subcellular organelles
- Structure and functions of cell membrane, solute transport across biological membranes
- Intracellular traffic and sorting of proteins

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- Intracellular signaling pathways, membrane receptors and second messengers Extracellular matrix: composition, importance and biomedical importance, cellular adhesion molecules and intercellular communication
- Cytoskeleton, muscle contraction and cell motility
- Cell cycle, mitosis, meiosis and mechanisms of cell death
- Red and white blood cells

Analytical techniques in biochemistry

- Spectrophotometry (UV and visible spectrophotometry),
- atomic absorption spectrophotometry
- Flame photometry
- Fluorometry
- Turbidimetry and nephelometry
- Gravimetry
- Electrochemistry (pH electrodes, ion-selective electrodes, gas-sensing electrodes)
- Chemiluminescence
- Water testing
- Electrophoresis (principle, types, applications; isoelectric focusing capillary electrophoresis; 2-D electrophoresis)
- Chromatography (principle, types [including high performance liquid chromatography and gas chromatography])
- Techniques in molecular biology: Blotting techniques, polymerase chain reaction (PCR), DNA and protein sequencing, microarrays and DNA chip technology, cloning techniques, genomics, proteomics and metabolomics

Nanotechnology and microfabrication

Techniques to study in vivo metabolism - NMR, SPECT, PET scans, etc
Radioisotope-based techniques and its applications

Biostatistics and research methodology

- Basic concepts of biostatistics as applied to health science

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- Statistical tests: t-test, analysis of variance, chi-square test, non-parametric tests, correlation and regression
- Statistical methods of validation of diagnostic tests
- Basics of epidemiological study designs and sampling methodologies
- Meta-analysis and systematic reviews

Basics of medical education in teaching and assessment of biochemistry

Principles of adult learning, taxonomy of learning, educational objectives, principles of assessment and question paper setting, methods of assessing knowledge, appropriate use of media, microteaching, small group teaching.

Environmental Biochemistry:

Health and pollution.

Paper II:

Enzymes, bioenergetics, biological oxidation, intermediary metabolism and regulation, inborn errors of metabolism and nutrition

Enzymes:

Properties, classification, mechanism of action, coenzymes and cofactors, kinetics of enzyme activity, regulation of enzyme activity, isoenzymes, diagnostic and therapeutic enzymes, principles of assays of enzymes, enzymes as therapeutic targets of drugs.

Biological oxidation

Basic concepts of thermodynamics and its laws, as applied to living systems, Exergonic and endergonic reactions and coupled reactions, redox potential High energy compounds

Classification and role of oxidoreductases

Cytochromes; cytochrome P450 system

Respiratory chain and oxidative phosphorylation

- Components, complexes and functioning of the respiratory chain
- Process of oxidative phosphorylation
- Mechanisms of ATP synthesis and regulation
- Mitochondrial transport systems and shuttles
- Inhibitors, uncouplers and ionophores
- OXPHOS diseases

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Overview of metabolism and intermediary metabolism

Metabolism of carbohydrates

- Digestion and absorption
- Glycolysis and TCA cycle, including regulation
- Glycogen metabolism and its regulation
- Cori cycle, gluconeogenesis and control of blood glucose
- Metabolism of fructose and galactose
- Pentose phosphate and uronic acid pathways and their significance
- Polyol pathway
- Regulation of blood glucose levels
- Diabetes mellitus (including gestational diabetes mellitus) – classification, pathogenesis, metabolic abnormalities, diagnostic criteria, principles of treatment, pathogenesis of complications, laboratory tests
- Metabolism of ethanol

Metabolism of lipids

- Digestion and absorption, including role of bile salts
- Biosynthesis and oxidation of fatty acids
- Ketone bodies – formation, utilisation and regulation
- Metabolism of unsaturated fatty acids and eicosanoids
- Metabolism of triacylglycerol; storage and mobilisation of fats
- Metabolism of cholesterol
- Metabolism of lipoproteins
- Metabolism in adipose tissue
- Role of liver in lipid metabolism
- Role of lipids in atherogenesis
- Metabolism of phospholipids and associated disorders

Metabolism of amino acids and proteins

- Digestion and absorption
- Pathways of amino acid degradation - transamination, oxidative deamination
- Transport and metabolism of ammonia

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- Metabolism of individual amino acids.
- Plasma proteins

Metabolism of nucleotides

- De novo synthesis of purine nucleotides
- Salvage pathway for purines
- Degradation of purines
- De novo synthesis of pyrimidine nucleotides
- Degradation of pyrimidine
- Synthetic analogues of purine/pyrimidine bases and nucleosides used as therapeutic agents

Metabolism of haem

- Biosynthesis of heme and associated disorders
- Degradation of heme and associated disorders

Metabolism in individual tissues and in the fed and fasting states

Liver, adipose tissue, brain, RBCs

Nutrition

- Principal food components
- General nutritional requirements
- Energy requirements
- Biological value of proteins
- Thermogenic effect of food
- Balanced diet, diet formulations in health and disease, mixed diet
- Nutritional supplements
- Food toxins and additives
- Parenteral nutrition
- Disorders of nutrition, obesity, protein and protein energy malnutrition, dietary fibers, under-nutrition, laboratory diagnosis of nutritional disorders
- National Nutrition Programme.

Vitamins

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Classification, biochemical role, sources, RDA and deficiency state of each vitamin (including diagnostic tests for deficiency and treatment)

Minerals

Classification, biochemical role, sources, requirement and deficiency state of each mineral (including diagnostic tests for deficiency and treatment)

Metabolism of xenobiotics

Free radicals and anti-oxidant defence systems in the bodyand associations with disease processes

Paper III:

Molecular biology, molecular and genetic aspects of cancer, immunology and effects of environmental pollutants on the body

Structure and organization of chromosomes and chromatin re-modelling DNA replication

- DNA replication in prokaryotes and eukaryotes (including important differences between the two):
- Roles of DNA polymerase, helicase, primase, topoisomerase and DNA ligase
- Replication fork
- Okazaki fragments and its importance in replication.
- Overview of role of major DNA repair mechanisms – mismatch repair, base excision repair, nucleotide excision repair and double strand break repair.
- Diseases associated with abnormalities of DNA repair systems
- DNA recombination

Transcription

- Structure of a gene - exons and introns, promoter, enhancers/repressors and response elements.
- Process of transcription in prokaryotes and eukaryotes – initiation, elongation and termination (including important differences).
- Post-transcriptional processing – capping, tailing and splicing.

Genetic code and mutations

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- Characteristics of the genetic code
- Molecular basis of degeneracy of the genetic code (Wobble hypothesis)
- Mutagens- examples of physical, chemical and biological mutagens.
- Types of mutations – point mutations and chromosomal mutations
- Relationship of mutations with specific diseases

Translation

- Basic structure of prokaryotic and eukaryotic ribosomes.
- Structure of tRNA (diagram of clover leaf model of tRNA structure) and its function in protein synthesis.
- Function of aminoacyl tRNA synthase.
- Process of protein synthesis (translation) – initiation, elongation and termination (including important differences between prokaryotic and eukaryotic translation).
- Inhibition of prokaryotic translation by antibiotics.
- Post-translational modifications

Regulation of gene expression in prokaryotes and eukaryotes

- The operon concept in prokaryotes
- Role of general and gene specific transcription factors
- Small interference RNA (siRNA) and micro RNA (miRNA).
- Other modes of regulation of gene expression: alternative splicing, alternative promoter usage, DNA methylation, Histone acetylation / deacetylation, RNA editing, alterations of RNA stability

Recombinant DNA technology and its applications in modern medicine

- Concepts of recombinant DNA, genetic engineering, biotechnology and cloning.
- Restriction endonucleases.
- Vectors for cloning – plasmids and phages.
- Genomic and cDNA libraries.
- Applications of recombinant DNA technology in medicine.
- Gene therapy

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- Diagnosis of genetic diseases and genetic counseling
- DNA fingerprinting
- DNA sequencing
- Microarrays
- Fluorescent in situ hybridization (FISH)
- DNA vaccines
- Transgenic animals
- Application of molecular techniques in forensic investigation and medico-legal cases

Overview of Human Genome Project

Basics of bioinformatics

Principles of human genetics

- Alleles, genotypes and phenotypes
- Patterns of inheritance: monogenic and polygenic inheritance
- Population genetics
- Genetic factors in causation of diseases
- Types of genetic diseases: Chromosomal, monogenic and polygenic disorders, mitochondrial disorders, nucleotide repeat expansion disorders, imprinting disorders
- Screening for genetic diseases and prenatal testing
- Ethical and legal issues related to medical genetics

Stem cells in clinical medicine

- Basic concepts regarding stem cells
- Types of stem cells: embryonic and induced pleuripotent stem cells (IPSC)
- Potential applications in the clinical medicine
- Ethical and legal issues related to use of stem cells in medicine

Cancer

- Carcinogens: physical, chemical and biological
- Clonal origin of cancers

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- Genetic basis of carcinogenesis
- Role of oncogenes and tumour suppressor genes
- Familial cancer syndromes
- Cancer stem cells
- Epigenetic regulation in cancer
- Gene expression profiling in cancer
- Cancer cell biology: cell cycle abnormalities, telomerase activity, proliferative capacity and decreased apoptosis
- Metastasis
- Tumor markers
- Biochemical basis of cancer chemotherapy and drug resistance
- New methods of anti-cancer therapy: targeted cancer therapy, cancer immunotherapy.

Immunology

- Innate and acquired immunity
- Humoral and cell-mediated immunity
- Cells and organs of the immune system - T and B cells, macrophages, dendritic cells, NK cells, granulocytes
- Antigens, epitopes and haptens
- Immunoglobulin classes, isotypes, allotypes, idiotypes, monoclonal antibodies, organization and expression of immunoglobulin genes, immunoglobulin gene rearrangement, class switching
- Antigen-antibody interaction - immunochemical techniques
- Major histocompatibility complex, antigen processing and presentation,
- T cell and B cell receptor, toll like receptors
- T cell maturation/activation/differentiation
- B cell generation/activation/differentiation
- Cytokines
- Complement system, cell
- Immune response to infections
- Hypersensitivity reactions
- Vaccines
- Immuno-deficiency syndromes

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- Autoimmunity
- Transplantation immunology
- Cancer and immune system,
- Immunodiagnostics
- Immunotherapy

Paper IV

Clinical biochemistry and molecular diagnostics related to different body systems/organs, endocrinology, and recent advances in biochemistry

Basic principles and practice of clinical biochemistry

Units of measure, reagents, clinical laboratory supplies, basic separation techniques, laboratory calculations, specimen collection and processing, safety in the laboratory, clinical utility of laboratory tests (including sensitivity, specificity, ROC curves, etc), analysis in the laboratory, selection and evaluation of methods (including statistical techniques), evidence- based laboratory medicine, establishment and use of reference values, pre-analytical variables and biological variations, quality management, c1inical laboratory informatics

Analytical techniques and instrumentation

Principles of basic techniques used in a clinical biochemistry laboratory (spectrophotometry, electrochemistry, electrophoresis, osmometry, chromatography, mass spectrometry, immunochemical techniques, molecular techniques, automation, point of care testing,

Clinical correlates and analytical procedures

- Amino acids, peptides and proteins; non-protein nitrogenous compounds
- enzymes
- carbohydrates
- lipids, lipoproteins and apolipoproteins and other cardiovascular risk factors
- electrolytes
- blood gases and pH
- hormones and associated disorders
- catecholamines and serotonin
- vitamins; trace and toxic elements
- hemoglobin, and bilirubin

- porphyrins and associated disorders
- bone and mineral metabolism
- tumour markers
- assessment of organ functions (hypothalamus and pituitary, adrenal glands, gonads, thyroid, parathyroid, liver, kidney, heart, stomach, pancreas, intestine, etc) and associated disorders
- pregnancy and maternal and fetal health
- reproduction related disorders – infertility
- newborn screening
- inborn errors of metabolism
- hemostasis
- therapeutic drug monitoring
- clinical toxicology
- molecular diagnostics
- body fluid analyses

Regulation of fluid and electrolyte balance and associated disorders

Regulation of acid-base balance and associated disorders

Biochemistry of the endocrine system

- Classification and general mechanism of action of hormones
- Biosynthesis, secretion, regulation, transport and mode of action of hypothalamic peptides, adenohypophyseal and neurohypophyseal hormones, thyroid and parathyroid hormones, calcitonin, pancreatic hormones, adrenocortical and medullary hormones, gonadal hormones, gastrointestinal hormones, opioid peptides, parahormones.
- Biochemistry of conception, reproduction and contraception
- Endocrine interrelationship and their involvement in metabolic regulation
- Neuro-modulators and their mechanism of action and physiological significance
- Biochemical aspects of diagnosis and treatment of endocrinal disorders:

Hematopoietic disorders

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- Iron deficiency and other hypoproliferativeanaemias - iron metabolism, laboratory tests of iron status, iron therapy
- Anaemia of chronic disease, anaemia of renal disease
- Hemoglobinopathies - sickle cell anaemia, methaemoglobinemias, thalassemia syndromes, Megaloblastic anaemia
- RBC membrane and metabolism
- Hemolytic anaemia - inherited defects in RBC membrane and enzymes (G6PD deficiency), immunologic causes of hemolysis
- ABO blood group system - biochemical basis, transfusion biology.
- Plasma cell disorders - multiple myeloma.

Hemostasis and thrombosis

Biochemical mechanisms, related laboratory tests, antiplatelet/anticoagulant/fibrinolytic therapy

Cardiovascular system

Atherosclerosis - pathogenesis, risk factors, prevention and treatment

Cardiac failure, acute coronary syndrome, cardiac biomarkers

Respiratory system

Gaseous exchange in lungs - physiological features and disturbances, arterial blood gases

Pathogenesis of cystic emphysema, alpha-1 anti-trypsin deficiency

Kidney

Kidney function tests; pathophysiology, biochemistry, laboratory findings and management in acute kidney injury and chronic kidney disease; estimation of GFR; glomerular diseases - pathogenesis and mechanisms of glomerular injury, nephrotic syndrome, diabetic nephropathy; tubular disorders - renal tubular acidosis, proteinuria, nephrolithiasis, kidney transplant; biochemical aspects of renal stones.

Gastrointestinal system

- Gastric physiology
- Pathophysiology of peptic ulcer disease, including role of *H. pylori*; gastric function tests; Zollinger-Ellison syndrome

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- Digestion and absorption of nutrients; evaluation of malabsorption (steatorrhea, lactose intolerance)
- Celiac disease
- Inflammatory bowel disease
- Protein losing enteropathy
- Regulatory peptides in the gut
- Neuroendocrine tumours

Liver

- Liver function tests
- Hyperbilirubinemias
- Viral hepatitis
- Serologic/virologic markers
- Alcoholic liver disease, fatty liver, chronic liver disease, cirrhosis and its complications
- Pathogenesis of ascites
- Hepatic encephalopathy
- Metabolic diseases affecting liver
- Reye's syndrome
- Diseases of gall bladder/bile ducts - pathogenesis of gallstones
- Pancreas - acute and chronic pancreatitis, cystic fibrosis, pancreatic function tests.

Bone and mineral metabolism

Bone structure and metabolism;metabolism of calcium, phosphate and magnesium; regulation and abnormalities of bone metabolism; vitamin D; parathyroid hormone; calcitonin; parathyroid hormone-related (PTHrP); osteoporosis – pathophysiology; markers of bone turnover

Nervous system

- Neurotransmitters and their receptors
- Ion channels and channelopathies
- Neurotrophic factors
- Protein aggregation and neurodegeneration

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- Alzheimer's disease, Parkinson's disease, Huntington's disease, multiple sclerosis
- Prions and prion diseases
- Guillain-Barre syndrome – immunopathogenesis
- Myasthenia gravis – pathophysiology
- Hereditary myopathies - Duchenne muscular dystrophy
- Inherited disorders of muscle energy metabolism
- Mitochondrial myopathies
- Pathophysiology of psychiatric disorders such as anxiety, depression and schizophrenia

TEACHING AND LEARNING METHODS

Teaching methodology

Active and interactive learning should be the mainstay of the program. The following methods are to be used to facilitate learning by and training of MD students.

Interactive lectures, tutorials, problem-based learning, case discussions, seminars, guest lectures, E-learning

The above teaching learning methods should be employed for the post graduate students to acquire updated knowledge on various aspects of basic and clinical biochemistry, immunology and molecular biology, and their application in modern medicine and also to learn to communicate effectively.

Journal club

Journal club sessions should be used by post graduate students to learn to search medical literature, to learn how scientific data is to be disseminated, to develop skills in presentation of research papers, to critically analyse and evaluate data, to become familiar with research methodologies, to keep oneself updated on new developments/emerging trends in biochemistry and to learn to communicate effectively

Practical exercises

These exercises should be used by post graduate students to equip themselves with knowledge and hand-on skills in various techniques used for laboratory bench-work in

biochemistry and molecular biology and in a diagnostic laboratory, and to learn to analyze and interpret data obtained.

Thesis

Under the supervision of a Professor or Associate Professor in the Department of Biochemistry, each PG student is expected to generate a hypothesis/research question and design a research protocol to test/answer it. The protocol should have clearly defined objectives and a work plan. The post graduate student will carry out the experimental research work proposed, analyze data, interpret results and write athesis/dissertation based on the work done and results obtained.

Presentation of work done on thesis to peers

A post graduate 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.

Teaching of undergraduates

Postgraduate students in Biochemistry shall be required to participate in teaching and training programmes of undergraduate students. They should learn how to organize, conduct and co-ordinate UG laboratory teaching in practical classes, to participate in clinical case-based teaching sessions and small group discussions (as part of a team that includes faculty members and senior residents of the department), to develop skills of self-directed learning, effective communication and leadership. They should learn how to work as part of a team and to facilitate learning by students.

Horizontal and vertical integration of teaching of Biochemistry with other pre- clinical, para-clinical and clinical departments

The post graduate students should take part in integrated teaching of undergraduates by participation in joint teaching sessions and seminars with different departments, participation in clinical rounds for discussing cases of interest and by small group discussions ofcase-based problems.

Training in the basics of medical education and technology

The post graduate students may be provided with training in the basics of medical education and technology through workshops at the departmental and/or institutional level.

Development of communication skills

The post graduate students should develop effective communication skills by making presentations at seminars and journal club sessions and by teaching undergraduates.

Training in clinical Biochemistry:

The post graduate students should receive hands-on training in a diagnostic laboratory in Biochemistry; such training should be extensive and rigorous enough for each post graduate student to acquire adequate skills and expertise to manage and supervise such a laboratory. The post graduate students should be posted in all sections of the laboratory in the institution, starting from sample collection and processing. They should become proficient in working with the autoanalysers in the laboratory, in quality control methods, setting up of a clinical biochemistry laboratory, specialized assays and statistical analysis of data. It would also be desirable for them to acquire experience in running a 24-hours diagnostic laboratory; towards this end, it would help if they are posted in the laboratory out of regular hours as well.

Rotation in clinical departments

It would be desirable for the post graduate students to be posted in clinical departments after their training period in the diagnostic laboratory, for up to 3 months of the course. Suggested departments and durations of postings are as follows:

General medicine (1 month which includes endocrinology and intensive care units),

Hematology (1 month),

Routine Microbiology (1 month),

Pediatrics (10 days).

These postings will help post graduate students get a better perspective on diagnostic tests in clinical practice and will enable them to contribute more effectively to patient care.

- **Log Book:**

All post graduate students should maintain a log book that documents all the work that they have done during their years of training. This log book should be checked and assessed periodically by the faculty members involved in the training programme.

- Department should encourage e-learning activities.

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 medical colleges is mandatory.

ASSESSMENT

Formative assessment during the training

FORMATIVE ASSESSMENT, ie., during the training

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 practical/clinical examination.

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).

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SUMMATIVE ASSESSMENT at the end of training,

Thesummative examination will be carried out as per the Rules given in **POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.**

The postgraduate examination shall be in three parts.

1. **Thesis**

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognized post-graduate teacher. The results of the work done shall be written up and submitted in the form of a thesis. The aim of doing a thesis is to contribute to development of aspirit of enquiry, to familiarize the post graduate students with research methodology, literature searches, laboratory techniques, analysis of data, interpretation of results and skills in scientific writing.

The 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 examinations. 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 examination*

The examinations shall be organized on the basis of a 'Grading'or 'Marking' system to evaluate and certify a post graduate student's level of knowledge, skills and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' and 'Practical' examinations separately shall be mandatory for passing the examination as a whole. The examination for MD/MS shall be held at the end of the 3rd academic year.

There shall be 4 theory papers each of three hours duration:

Paper I: Biomolecules, cell biology, biochemical techniques, biostatistics and research methodology, basics of medical education in teaching and assessment of biochemistry

Paper II: Enzymes, bioenergetics, biological oxidation, metabolism of biomolecules, intermediary metabolism and regulation, inborn errors of metabolism and nutrition

Paper III: Molecular biology, molecular and genetic aspects of cancer, immunology and effects of environmental pollutants on the body

Paper IV: Clinical biochemistry and molecular diagnostics related to different body systems/organs, endocrinology, and recent advances in biochemistry

3. Practical and oral/viva voce examination:

This should be held over two days.

Practical examination

The practical examinations will be held over 2 days; one day will be mainly for the practical exercises and the second day for the oral/ viva voce. The practical examinations will have the following components:-

A. A clinical case for which an actual patient or a paper-based case may be used, as per the facilities available in each institution running the course. The clinical features of the patient and relevant laboratory investigation of biochemical abnormalities present will be discussed

B. Identification the carbohydrate/amino acid provided and confirm of its identity by paper chromatography, Urine analysis.

C. Performance of an electrophoresis for serum proteins and discussion of electrophoretic pattern.

D. Quality Control, its interpretation and Method validation

Viva-voce Examination

E. Thesis presentation (of about 15 mins duration)

F. Pedagogy (20 mins duration plus 10 mins for questions)

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Suggested reading material:

Books (latest edition)

1. Lehninger Principles of Biochemistry, David L. Nelson, Michael M. Cox. W H Freeman & Co (Sd).
2. Biochemistry (Stryer), Jeremy M. Berg , John L. Tymoczko , Lubert Stryer, W. H. Freeman.
3. Biochemistry (Voet & Voet), Donald Voet , Judith G. Voet, John Wiley & Sons Inc.
4. Textbook of Biochemistry with Clinical Correlations, Thomas M. Devlin, John Wiley & Sons.
5. Kuby Immunology, Judy Owen, Jenni Punt , Sharon Stranford, W. H. Freeman.
6. Clinical Chemistry: Principles, Techniques, and Correlations, Michael L Bishop, Edward P Fody, Larry E Schoeff, Lippincott Williams and Wilkins.
7. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics, Carl A. Burtis, Edward R. Ashwood , Saunders.
8. Harpers Illustrated Biochemistry, Victor W. Rodwell , David Bender, Kathleen M. Botham, Peter J. Kennelly, P. Anthony Weil , McGraw-Hill Education / Medical.
9. Biochemistry (Lippincott's Illustrated Reviews), Denise R Ferrier , Lippincott Williams and Wilkins.
10. Harrison's Principles of Internal Medicine, Dennis L. Kasper, Anthony S. Fauci, Stephen L. Hauser, Dan L. Longo, J. Larry Jameson, Joseph Loscalzo, McGraw- Hill Education / Medical.
11. Davidson's Principles and Practice of Medicine, Walker, Elsevier Health Sciences – UK.
12. Clinical Biochemistry: Metabolic and Clinical Aspects, William J. Marshall & Márta Lapsley & Andrew Day & Ruth Ayling, Imprint - Churchill Livingstone.
13. Biochemistry: A Case-oriented Approach, Rex Montgomery, Thomas W. Conway, Arthur A. Spector, David Chappell, Mosby.
14. Interpretation of Diagnostic tests, Jacques Wallach, Lippincott Williams & Wilkins.

Journals

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

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Annexure 1

Postgraduate Students Appraisal Form Pre / Para /Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM……TO……

Sr. No.	PARTICULARS	Not Satisfactory	Satisfactory	More Than Satisfactory	Remarks
		1 2 3	4 5 6	7 8 9	
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 CONSULTANT** **SIGNATURE OF HOD**

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GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN COMMUNITY MEDICINE

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.

Community Medicine is an academic subject, a branch of Medicine which deals with promotion of health and prevention of diseases, involving people's participation, utilizing professional management skills. The Community Medicine specialist, will inculcate a holistic view of health and medical interventions primarily focused on Community Health/Population Health. Thus, he/she should be equipped with the knowledge, skills, competencies in primary, secondary & tertiary care, control and prevention of outbreaks/epidemics, community diagnosis, health needs assessment, epidemiological assessment, research and planning evidence-based health policies and programmes.

The Guidelines for teaching Community Medicine, therefore, should be designed to create a cadre of professionals who are competent to meaningfully contribute their expertise in planning, implementation, co-ordination, monitoring, evaluation of Primary Health Care Programs based on scientific evidence. The competencies must cover a wide spectrum of skills viz., technical, managerial, administrative, organizational skills, applied skills in Health Information Management, software application and soft skills of communication, motivation, decision-making, team building, training in scientific communication and medical writing.

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 Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. 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 OBJECTIVES

1. To create a skilled cadre of medical professionals having expertise in application of principles of Public Health, Community Medicine and applied epidemiology, contributing meaningfully in formulating National Health Policies & Programmes with a systems approach for overall human development.
2. To standardize the teaching & training approaches at post- graduate level, for Community Medicine

3. Research: To formulate research questions, do literature search, conduct study with an appropriate study design and study tool; conduct data collection and management, data analysis and report.

SUBJECT SPECIFIC COMPETENCIES

At the end of the course the student should be able to acquire the following competencies under the three domains, Cognitive, Affective and Psychomotor:

A. Cognitive domain (The student should be able to:)

1. Describe conceptual (and applied) understanding of Public Health, Community Medicine, clinical and disease-oriented approach, preventive approach & health promotion, disease control & promotion.
2. Have knowledge about communicable and non-communicable diseases, emerging and re-emerging diseases, their epidemiology, control and prevention.
3. Apply the principles of epidemiology, health research and Bio-statistics, application of qualitative research methods
4. Calculate Odds Ratio, Relative Risk, Attributable risk and other relevant health and morbidity indicators.
5. To describe nutritional problems of the country, role of nutrition in health and disease and to describe common nutritional disorders
6. Develop nutrition plan for an individual based on his requirements and with concerns to special situations if applicable
7. Plan comprehensive programme to address issue of malnutrition in a given area for a specific group
8. To describe the concept of Environmental Health and its various determinants.
9. Identify environmental health issues in a given area/community
10. Assess impact of adverse environmental conditions on health of human beings
11. Plan awareness programmes at various levels on environmental issues and mobilize community resources and participation to safeguard from local adverse environmental conditions
12. Should be able to provide technical advice for water purification, chlorination, installing gobar gas plant, construction of soakage pits etc.
13. Be a technical expert to advice on protection measures from adverse environmental exposure
14. To describe the working of Primary Health Care system, Panchayat Raj system, National Health Programmes, urban/rural differences, RCH, Demography and Family Welfare.
15. Do orientation of the inter-linkage of health sector and non-health sector for promotion of Health & control and prevention of diseases.
16. Have familiarity with administrative procedures and protocols
17. Have knowledge about role of media and its use in health.

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18. Have knowledge of Health Care Administration, Health Management and Public Health Leadership
19. To describe Health Policy planning, Medical Education technology, Information Technology and integration of alternative Health system including AYUSH.
20. To describe the intricacies of Social & Behavioral sciences and their applications.
21. To describe Public Health Legislations
22. To understand and describe International Health & Global Diseases surveillance.
23. To relate the history of symptoms with specific occupation, diagnostic criteria, preventive measures, identification of various hazards in a specific occupational environment and legislations.
24. To keep abreast of recent advances in Public Health & formulate feasible, optimal, sustainable, cost effective strategies in response to the advances in public health & development.
25. To describe the principles of Health Economics and apply it in various public health settings.
26. To explain and correlate common health problems (medical, social, environmental, economic, psychological) of urban slum dwellers, organization of health services in urban slum areas
27. Develop workable interventions for control and prevention of emerging and re-emerging diseases at local, national and global level.
28. Identify behavior pattern of individual or group of individuals detrimental or adversely affecting their health
29. Define and identify vulnerable, under-privileged high risk communities and their special needs
30. To create awareness about various public health laws
31. Evaluate cost effectiveness and cost benefits of a Health Program
32. Understand and express implications of 'Poverty Line', 'Social Inclusion', 'Equity', 'taxations', 'Insurance' on Health care management.
33. To categorize hospital waste and be able to guide for proper disposal.
34. To provide a comprehensive plan for disaster management and mitigation of sufferings.

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 other 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.

A. C. Psychomotor domain: ((The student should be able to:)

The student should be able to perform independently the following :

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- Conduct community surveys for assessment of health & morbidity profile, epidemiological determinants, assessment of health needs, disease surveillance, evaluation of health programmes and community diagnosis
- Conduct epidemic investigations, spot maps, predict disease trends, preparation of reports, planning and implementation of control measures
- Demonstrate clinical skills of preparing case history, examination, provisional diagnosis, treatment and clinical case management and interpretation of laboratory findings. Conduct common procedures such as incision, drainage, dressings & injections.
- Do data collection, compilation, tabular and graphical presentation, analysis and interpretation, applying appropriate statistical tests, using computer-based software application for validation of findings
- Conduct epidemiological research studies to establish cause-effect relationships in elaborating the epidemiology of diseases and health events
- Develop appropriate IEC Material, assessment of community communication needs, training skills, counseling skills, conduct Health Education Programmes in urban and rural settings
- Conduct dietary surveys, assessment of nutritional status, nutritive values of common food menus, detection of food adulterants, use of lactometer, recording and interpretation of growth and development charts.
- Use and apply various instruments and processes concerned with environmental health and biological waste management eg. waste collection, segregation and disposal as per protocols, needle-disposers, disinfection procedures. Also use of Dosi-meters, Kata / Globe Thermometer, Slings Psychrometer, Gobar Gas Plant, Soakage pit, Solar Energy, functioning of ILRs, Deep Freezers, Cold Boxes, Vaccine Carriers.
- identify different types of mosquitoes, detect vector breeding places and orientation of the methods of elimination of breeding places and placement of a mosquito-proof water tank.
- Conduct clinical screening of various diseases and organize community health camps involving community participation in urban and rural settings. Use of Snellen charts for vision, Ischiara's chart for colour blindness, tourniquet tests for dengue diagnosis in fever, BMI and other physical measurements of infants, children and adults etc., copper-T insertions and preparation of pap smear.
- Conduct tests for assessment of chlorine demand of water (Horrock's Apparatus), procedure of well-water and urban water-tank chlorination, assessment of chlorination levels, physical examination of water, methods domestic water purification, oriented in use of water filters.
- Prepare health project proposals with budgeting based on the project objectives.

Miscellaneous skills: (The student should be able to)

1. Devise appropriate health education messages for public health awareness using various health communications strategies.

2. Identify family level and community level interventions and facilitate the implementation of the same e.g. food hygiene, food storage, cooking demonstrations, community kitchen, kitchen garden, empowerment of women for promoting nutritional health etc.
3. Demonstrate counselling skills for family planning services.
4. Plan and execute BCC strategy for individuals.
5. Conduct measurement of occupational exposure to harmful influences.
6. Diagnose occupational hazards and undertake surveys to identify occupational exposures as and when necessary.
7. Elicit appropriate response at individual and community level to prevent occupational hazards including IEC activities at different levels.
8. Use modern IT applications especially internet & internet-based applications.

Syllabus

Course contents:

1. Conceptual (and applied) understanding of Public Health, Community Medicine, clinical disease-oriented approach, Preventive approach & Health promotion, disease control & promotion.

Learning objectives:

At the end of this course topic, the student should be able to:-

i. Understand and explain the concept & application and give suitable analogies/examples related to Public Health/Community Medicine (with differences), Disease-oriented v/s Preventive approach, health promotion disease control & prevention.
ii. Explain correlation between health and human development with analogies/ examples.
iii. Explain concept of Primordial, Primary, Secondary and Tertiary prevention with examples.
v. Evolutionary History and mile-stones in Public Health – National and International levels.

2. Communicable and Non-Communicable diseases, emerging and re-emerging diseases

Learning objectives:

At the end of this course, the student should be able to:-

i. Understand and explain Epidemiology of Communicable/Non-communicable diseases- its causes, precipitating factors, social & other non- health causes, mechanisms of transmission, signs/systems, management, control & prevention measures, related national Health Programmes & national Guidelines, Directives, special projects, if any.
ii. Explain application of Disease surveillance system in control of Communicable/Non-communicable diseases.
iii. Explain & undertake steps to investigate & control outbreaks, epidemics and take measures to prevent the same.
iv. Evolve prevention & control measures based on local & regional epidemiological funding, synchronizing with National guidelines.

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3. Applied Epidemiology, Health research, Bio-statistics

Learning objectives:

At the end of this course, the student should be able to:-

i. Explain the concept & application of Epidemiology of Disease and Health giving suitable examples.

ii. Explain Epidemiological approach, the terms Distribution & Determinants, uses, types of Epidemiological studies, interpretation, merits/demerits and limitations, odds ratio, relative risk, attributable & population attributable risks, Hybrid designs (with examples), validity of Epidemiological Data and application in practice at field level.

iii. Explain Epidemiological Research methods, Research related protocols, Literature review, estimating sample size, data collection/ compilation/Analysis/ Research, interpretation.

iv. Develop Health interventional programs based on Epidemiological Finding & create evidence for Public Health action.

v. Understand difference between data, information & intelligence, types of data, survey methods, formulating questionnaires, interview schedule, data presentation types & analysis.

vi. Apply computer based software application for data designing, data management & collation analysis e.g. SPSS, Epi-info, MS office and other advanced versions.

4. Nutrition

Learning objectives:

At the end of this course, the student should be able to:-

i. Identify various nutritional problems in the region, state and country and contributing factors for the same, with due emphasis on ecology perspectives.

ii. Explain importance of various nutrients (including micronutrients) in health, their sources, requirements and problems associated with their deficiencies as well as over consumption.

iii. Plan balanced diet and dietary requirements of various age and sex groups.

iv. Dietary/nutritional concerns of vulnerable groups – young children, adolescents, ANC/PNC/Lactating mothers/senior citizens/individuals with various health problems e.g hypertension, diabetes, renal problems etc.

v. Classification of food, food additives, food fortification, food enrichment, food toxins and food adulteration.

vi. Explain Food production, Food hygiene and safety, food storage, food preparation, food wastage and feeding practices.

vii. Assessment of nutritional status of a community by adopting different methodologies.

viii. Nutritional supplementation, surveillance, education and rehabilitation.

ix. National programmes in nutrition and their evaluation

x. National nutrition policy.

5. Environmental health

Learning objectives:

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At the end of this course, the student should be able to:-

i. Highlight importance of external environment (air, water, noise, radiation, temperature, ventilation, solid waste disposal, insects and vectors, domestic and country yard pests, industrial waste disposal etc. and its impact on ecology and human health.
ii. Elaborate on health issues related to housing, air, water, noise, radiation pollution i.e. size of problems, area and specific groups affected, measurement of pollution levels and health impact of the same, corrective measures
iii. Elaborate on requirements of water, water chlorination and household purification measures, measurement of chlorine demand, Break-point chlorination levels, water quality.
iv. Assessment of quality of water and air, control of air pollution
v. Explain environmental sanitation and control measures (including appropriate technologies) – modern methods of sewage disposal, mechanical ventilation, soakage pits, gobar gas plants, smokeless Chula, solar energy, rainwater harvesting, sewage water recycling plants at society level etc.
vi. Explain global warming and its health impact.
vii. Elaborate on forest reserves, social forestry and health
viii. Study vectors of medical importance and integrated control measures against them.
ix. Explain dynamics of transmission of vector borne diseases
x. Explain pest control measures
xi. Explain environmental health issues in urban and rural areas
xii. Understand functioning of public sector measures to safeguard environmental health e.g water purification plant
xiii. Explain Legislative measures for protection of environmental health

6. Primary Health Care System, Panchayat Raj, National Health Programmes including RCH, Demography & Family Welfare:

Learning Objectives

At the end of this course, the student should be able to:-

i. Explain the meaning of Primary Health Care with suitable analogies with reference to India, and be able to define the systems approach for implementation of Primary Health Care.
ii. Enumerate the elements, principles, population coverage norms, staff patterns, day to day activities, programme schedule, stakeholders at PHC level.
iii. Explain the scope and implications of 3-tier system of Primary Health Care.
iv. Understand functioning of Rural Panchayat Raj system of development and its co-relation with health.
v. Promote community participation in Primary Health Care programme and motivate various stakeholders for the same.
vi. Understand and comply with medico-legal procedures related to Primary Health Care activities.
vii. Integrate, coordinate both health and non-health sectors for implementing various national health programmes.

Medical Council Of India

viii. Deliver the provisions of various health schemes to eligible be beneficiaries such as Janani Suraksha Yojana, Rashtriya Swasthya Beema Yojana, Rajiv Gandhi Jeevandayi Arogya Yojana etc.

ix. Impart training in health programmes for paramedical workers, lab technicians, community health volunteer's, interns and provide health education in the community.

x. Implement Public Health Skills for investigations and containment of outbreaks & epidemics.

xi. Understand history of evolution of public health, important milestones in the world and in India.

xii. Enumerate the various health committees established and their major recommendations since 1947-48 to till date.

7. Health Care Administration, Health Management and Public Health Leadership

Learning Objectives:

At the end of this course, the student should be able to:-

i. Explain the conceptual difference between Administration and Management, Power and Authority with reference to health care.

ii. Explain the role of fundamental principles of constitution, principles of Democracy and its correlation with health care administration.

iii. Explain the role of Bureaucracy, Technocracy, Political system, Judiciary, Media and people in health care administration.

iv. Explain and identify the key positions and their role in health administration at State, District, Taluka (Tehsil block) and village level.

v. Explain the frame work of health care system at State, District, Taluka & village level and understand the mechanism of coordination between bureaucrats, technocrats, political, judiciary and media at each of these levels.

vi. Enumerate functions of a manager, explain concepts of management and leadership styles, various management techniques, planning process, monitoring & evaluation skills.

vii. Should be sensitive to quality issues in health care management and comply with relevant quality management techniques.

viii. Formulate and manage team approach for implementing health programmes.

ix. Apply skills of effective human resource management and identify relevant roles, responsibilities and duties of functionaries.

x. Implement skills of motivation, communication, negotiation and conflict management at PHC level.

xi. Develop budgetary statements based on evidence of needs assessment and be able to maintain account of expenditure as per norms.

xii. Undertake community health needs survey, conduct training & communication needs assessment of paramedical and health workers, identify vulnerable, underprivileged communities, implements high risk approach.

8. Health Policy, Medical Education, Integrating Alternative system of Medicine

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Learning Objectives

At the end of this course, the student should be able to:-

i. Understand and elaborate implications of the policy provision with reference to the current health scenario in the country.
ii. Explain the role of health policy in promotion of Primary Health care, ensuring equity, inter-sectoral co-ordination, appropriate technology and community participation.
iii. Explain the various provisions for promotion of preventive and curative health services including National Health Mission, National Health Programs, Quality Hospital based services, Medical Education and AYUSH.
iv. Critically appreciate merits and demerits of the Health Policy.
v. Explain SWOT analysis of the policy and debate on evidence based recommendations, additions, deletions.
vi. Debate on suggestions or recommendations for future inclusions.

9. Social and behavioral sciences

Learning objectives:

At the end of this course, the student should be able to:-

i. Understand influence of social and behavioral practices on health.
ii. Understand principles of behavior change of an individual and community. Clearly understand difference between knowledge, attitude and practices..
iii. Understand importance of social medicine and health.
iv. Importance of behavior change communication (BCC).
v. Socio-cultural factors influencing behavior change.
vi. Formal and informal organizations in the community.
vii. Influence of peer pressure.
viii. Know the health problems, where BCC interventions are necessary.
ix. Understand factors promoting and detrimental to BCC.

11. Public Health Legislations

Learning objectives:

At the end of this course, the student should be able to:-

i. Explain public health legislations and need for the same.
ii. Know in detail each public health law – when, why, implementation, impact, issues etc.
iii. Enforcement of various public health laws.
iv. Judiciary mechanism for ensuring proper implementation of public health laws.
v. Scope for integrated approach for implementation of public health laws.

12. International Health

Learning Objectives:

At the end of this course, the student should be able to:-

Medical Council of India

i. Understand the need and scope for international health measures.
ii. Enlist and understand functioning of various UN agencies (including WHO) playing key role in international health.
iii. Enlist and understand functioning of bilateral vs multilateral international donor agencies.
iv. Provide advice to international travelers and vaccination requirements,
v. Understand International health control measures e.g. quarantine, airport management etc.
vi. Understand the management of international ports from health perspectives.

13. Occupational Health

Learning Objectives:

At the end of this course, the student should be able to:-

i. Understand the concept of occupational health and its importance, Occupational environment and work dynamics.
ii. Know different types of occupational exposures at various settings.
iii. Enlist various occupational hazards and their relative magnitude.
iv. Understand measurement of exposure levels to harmful influences during occupation.
v. Understand preventive and control measures against various occupational hazards – global, national and local level measures.
vi. Understand individual and community responses towards preventing exposure to occupational hazards.
vii. Understand and advise occupational safety measures.
viii. Understand legislative measures to prevent exposures to occupational hazards.
ix. Advise compensation provisions to persons exposed to various occupational hazards.
x. Understand occupational health problems amongst people in unorganized sector
xi. Understand and advise social security and welfare provisions for workers – ESIS, Factory's Act, Role of ILO, Ministry of Labor, DGFASLI.

14. The recent advances in Public Health & miscellaneous issues

Learning Objectives:

At the end of this course, the student should be able to:-

i. identify & enlist events at local, district, national & global levels influencing or adversely affecting health /medical issues of the population.
ii. Adopt & practise skills related to utilization of modern technology, software, IT application in the interest of health promotion & disease prevention.

15. Health Economics

Learning Objectives:

At the end of this course, the student should be able to: -

i. Describe the scope of health economics.

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ii. Understand health market & its characteristics.

iii. Understand & apply economic evaluation techniques.

iv. Assess the mechanism of Funding Health Care services, especially health insurance.

v. Advise on alocation of resources appropriately in their work area.

TEACHING AND LEARNING METHODS

Teaching methodology

The following is a rough guideline to various teaching/learning activities that may be employed:

- **Journal Club :** Critical appreciation and discussion of research articles in indexed journals
- **Seminar**
- **Lecture/Discussion :** Lectures on newer topics by faculty
- **Case presentation :** Communicable disease case presentation (focus on epidemiology, control, prevention) or Family case (focus on health needs assessment, SWOT analysis of family, social determinants and social empowerment, community management, role of primary health care and mobilizing resources for empowerment of the family). PG students will present the cases in presence faculty and discuss various modalities of management.
- **Public Health Management training** in Immunization clinics, Disease Surveillance Units, General Preventive OPD, hands-on training in management of national health programs at urban health centre and rural health centre along with orientation in health administrative system.
- The PG student shall be required to participate in the teaching and training programme of Undergraduate students and interns.
- The PG student must have attended Mandatory training in Research Methodology during his tenure.
- 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.
- Special Seminars / Workshops: conducted by External Faculty on cross-cutting subjects directly or indirectly concerned with Health. eg. Critical appreciation of National Developmental Budget, delivered by prominent Economist.
- **Log Book:** Postgraduate students shall maintain a log book of the work carried out by them and the training programme undergone during the period of training including details of work experience during their postings, including programs implemented under supervision and those performed independently. The log book shall be checked and assessed periodically by the faculty members imparting the training.
- Department should encourage e-learning activities.
- **Postings are given below:**

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Recommended schedule for three years training:

Orientation Training/Field postings for students of MD Community Medicine

No.	Field Posting and work	Duration
01	Posting at Sub-centers & PHCs Under & at RHTC and UHTC attached to Dept of Community Medicine as per MCI norm	Total period of ONE year during the 3 year period of PG course. Posting at RHTC should be residential.
02	Posting in the teaching hospital for exposure to clinical departments namely Pediatrics, OBGY & General medicine to acquire clinical skills for diagnosis and management of Communicable and Non-Communicable Diseases	Total - One month General Medicine-2 wks Pediatrics -1 wk Ob. & Gy. -1 wk Time of posting shall be at the discretion of local feasibility
03	Work attachment to gain hands- on skills based, training in public health department & orientation in Health Administration and Management of various National Health Programmes and aspects of public health management at the offices of the DHO/DHS/THO/DTO/DMO/CDPO/MOH of Local Civic Body or district health authorities.	Total - One month Place & time of 2 postings of 2 wks each shall be at discretion of local feasibility.
04	Short duration posting in various camps, melas, public health emergencies, investigation of epidemics, implementation of NHP, linen dept of hospital, Hospital kitchen, Hospital record section, central drug store, Medical Supdt. Office, blood bank, casualty dept., CCL, Hospital waste management, ART-VCTC, Matron Office (HRD), HMIS etc.	Total - one month Minimum of four postings of 1wk duration each shall be done subject to local feasibility.
05	Visits to various institutions of Public Health Importance	Subject to local feasibility

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 medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, ie., during the training may be as follows:

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.

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, ie., at the end of training

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The examination shall be in three parts:

1. **Thesis**

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 Examination:**

The Post Graduate examination shall be in three parts: -

1. **Thesis:** It should be submitted to the University by each post graduate student at least 6 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, appointed by the university and who shall not be the examiners for theory and practical. A post graduate student shall be allowed to appear for the theory and practical/clinical examination only after the acceptance of the thesis by two examiners.

2. **Theory**:

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**.**

There shall be four theory papers as follows:

Paper I : Conceptual (and applied) understanding of Public Health, Community Medicine, Communicable and Non- Communicable diseases, emerging and re-emerging diseases, Applied Epidemiology, Health research, Bio-statistics.

Paper II: Nutrition, Environmental Health, Primary Health Care system, Panchayat Raj system, National health Programs, RCH, Demography and Family Welfare, Health Care Administration, Health Management and Public Health Leadership.

Paper III: Social & Behavioral sciences- applied aspects, Scientific communications & Medical writing, Research Methodology, Public Health Legislations, International Health & Global Diseases surveillance.

Paper IV: Health Policy planning, Medical Education technology, Information Technology, Integration of alternative Health system including AYUSH, Occupational Health, Recent advances in Public Health & Miscellaneous issues, Health Economics.

Practical/Clinical and oral examination:

The practical examination should be conducted over two days, not more than 8 post graduate students per batch, per day as follows :

1. **One long Family case from the community**:

Socio-economic, demographic, cultural and holistic history taking, of the family to understand the various risk factors affecting health and quality of life, assessment of social support system, assessment of present morbidity and its implications, evolve interventions for medical relief and social empowerment and role of family, community and primary health care system in resolving family issues. This shall be conducted preferably in the community setting.

2. **One long Case (30 minutes), 2 short cases (20 minutes each) – Cases with Communicable Diseases**

Students will elaborate on clinico-epidemiological case history to assess the epidemiological factors, precipitating factors, probable source of infection and evolve measures for diagnosis, treatment, management with reference to the case as well as major public health concerns, i.e. Control, prevention of the diagnosed disease and interventions in case of eminent outbreak / epidemic situations. Short cases may be assessed without presentation of detailed history, beginning with Differential Diagnosis in the given time.

3. **Epidemiology and Statistics problem-solving exercises (5):**
   (Epidemiological – 3, Statistical – 2)
4. **Public Health Spots (5) :** including interpretation of analytical reports of water, food, environmental assessment and public health micro-biology
5. **Viva-voce Examination**

Oral/ Viva-Voce Examination shall be comprehensive enough to test the post graduate student's overall knowledge of the subject.

Recommended reading:

A. Books (latest edition)

1. *Public Health and Preventive Medicine* (Maxcy-Rosenau-Last Public Health and Preventive Medicine) by Robert B. Wallace
2. *Basic Epidemiology*. R Bonita, R Beaglehole, T Kjellstrom. World Health Organization Geneva.
3. *Epidemiology,* by Leon Gordis.
4. *Oxford Textbook of Public Health.* Holland W, Detel R, Know G.
5. *Practical Epidemiology*, by D.J.P Barker
6. *Park's Textbook of Preventive and Social Medicine*, by K.Park
7. *Principles of Medical Statistics,* by A. Bradford Hill
8. *Interpretation and Uses of Medical Statistics,* by Leslie E Daly, Geoffrey J Bourke, James MC Gilvray.
9. *Epidemiology, Principles and Methods*, by B. MacMahon, D. Trichopoulos
10. *Hunter's Diseases of Occupations*, by Donald Hunter, PAB Raffle, PH Adams, Peter J. Baxter, WR Lee.
11. *Epidemiology and Management for Health Care,*, by Sathe PV and Doke PP.
12. *Vaccines*, by Stanley A. Plotkin.
13. All reports and documents related to all National Programmes from the Ministry of Health and Family Welfare.

B. Journals

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

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Annexure I

Postgraduate Students

Appraisal Form Pre / Para

/Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM……TO……

Sr. No.	PARTICULARS	Not Satisfactory	Satisfactory	More Than Satisfactory	Remarks
		1 2 3	4 5 6	7 8 9	
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 CONSULTANT** **SIGNATURE OF HOD**

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COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN DERMATOLOGY, VENEREOLOGY & LEPROSY

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 should be able to recognize the health needs of community, should be competent to handle effectively the medical problems and aware of recent advances pertaining to the discipline. The PG student should acquire basic skills in teaching medical/para-medical students. The student should be able to counsel patients and relatives in infectious diseases like HIV/AIDS, STDs, cutaneous tuberculosis, leprosy and any event of serious illness or death.

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 Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. 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 OBJECTIVES

At the end of 3 years of post graduate training in Dermatology, Venereology & Leprosy:

- Student should have knowledge of basic sciences (Anatomy, Physiology, Biochemistry, Microbiology, Pathology and Pharmacology) as applied to dermatology. The student should acquire in-depth knowledge of his subject including recent advances. The student should be fully conversant with the bedside procedures (diagnostic and therapeutic) and having knowledge of latest diagnostics and therapeutics available.
- Student should have acquired practical and procedural skills related to the subject.
- Critically evaluate, initiate investigation and clinically manage cases in Dermatology, Venereology and Leprosy with the help of relevant investigations.

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- Should plan and advise measures for the prevention and rehabilitation of patients with various dermatological conditions.
- Able to ensure the implementation of National Health Programmes, particularly in sexually transmitted diseases (STD) and leprosy.
- Acquire training skills in research methodology, professionalism, attitude and communication skills, as below:
    - Student must know basic concepts of research methodology, plan a research project, consult library and online resources, has basic knowledge of statistics and can evaluate published studies.
    - Should be able to practice the specialty of dermatology ethically.
    - Recognize the health needs of patients and carry out professional obligations in keeping with principles of National Health Policy and professional ethics.
- Teaching skills in the subject
    - Student should learn the basic methodology of teaching and develop competence in teaching medical/paramedical students.
- Should have acquired Problem Solving skills

SUBJECT SPECIFIC COMPETENCIES

By the end of the course, the student should have acquired knowledge (cognitive domain), professionalism (affective domain) and skills (psychomotor domain) as given below:

A. Cognitive domain

At the end of the course, the student should have acquired following theoretical competencies:

- Describe structure, functions and development of human skin.
- Describe ultrastructural aspects of epidermis, epidermal appendages, dermo-epidermal junction, dermis, and sub-cutis.
- Describe basic pathologic patterns and reactions of skin.
- Demonstrate the knowledge of common laboratory stains and procedures used in the histopathologic diagnosis of skin diseases and special techniques such as immunofluorescence, immunoperoxidase and other related techniques.
- Describe the basics of cutaneous bacteriology, mycology, virology, parasitology and host resistance.
- Describe papulosqamous and vesiculobullous disorders.
- Describe disorders of epidermal appendages and related disorders.
- Describe inflammatory and neoplastic disorders of dermis.
- Describe skin lesions in nutritional, metabolic and heritable disorders.

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- Describe pharmacokinetics and principles of topical and systemic therapy.
- Describe drug reaction, its diagnosis and management.
- Describe cutaneous manifestations of systemic disorders.
- Describe anatomy of male and female genitalia, epidemiological transmission, clinical aspects and management of STDs and HIV.
- Describe clinical features, reactions, treatment and rehabilitation in leprosy.
- Describe etiology, pathophysiology, principles of diagnosis and management of common problems in dermatology including emergencies in adults and children.
- Describe indications and methods for fluid and electrolyte replacement therapy including blood transfusion in dermatological conditions.
- Describe common dermatological malignancies in the country and their management including prevention.
- Should be expert in evaluation of ECG, chest X-ray (CXR), biochemical, haematology and immunology reports related to dermatology.
- Acquire knowledge of common laboratory stains and procedures used in the histopathologic diagnosis of skin diseases and special techniques such as immuno-fluorescence, immuno-peroxidase and other related techniques.
- Acquire knowledge of the basics of laser operation and precautions which needs to be taken.
- Demonstrate competence in basic concepts of research methodology and interpretation of data in medical literature/publications.
- Skilled as a self-directed learner, recognize continuing educational needs; use appropriate learning resources and critically analyze relevant published literature in order to practice evidence-based dermatology;
- Should also have a broad idea how to approach an uncommon dermatological disease.

B. Affective Domain

At the end of the course, the student should have acquired the following attitudinal competencies:

- Demonstrate self-awareness and personal development in routine conduct.
- **Behavior and Emotional Stability:** Dependable, disciplined, dedicated, stable in emergency situations and shows positive approach.
- **Motivation and Initiative:** Is innovative, enterprising,does not shirk duties or leave any work pending and motivates team members.
- **Honesty and Integrity:** Is truthful, admits mistakes, does not cook up information, has ethical conduct and exhibits good moral values.
- **Interpersonal Skills and Leadership Quality:** Has compassionate attitude towards patients and attendants, gets on well with colleagues and paramedical staff, is respectful to seniors, has good communication skills.

- Should be able to maintain confidentiality with regards to history, physical examination and management of patients.
- Identify social, economic, environmental, biological and emotional determinants of patients, and institute diagnostic, therapeutic, rehabilitative, preventive and promotive measures to provide holistic care to patients at individual and community level against skin, venereal disease and leprosy.
- Recognize the emotional and behavioral characteristics of patients and keep these fundamental attributes in focus while dealing with them.
- Demonstrate empathy and humane approach towards patients and their families and respect their sensibilities.
- Demonstrate communication skills of a high order in explaining management and prognosis, providing counseling and giving health education messages to patients, families and communities.
- Organize and supervise the desired managerial and leadership skills.
- 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 other colleagues to provide the best possible diagnosis or opinion.
- 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.

C. Psychomotor Domain

A student at the end of training of 3 years of MD programme, must acquire the following practical skills:

- General medical skills as learnt in MBBS to be maintained:
    - Should be able to provide basic life support (BLS).
    - Should be expert in blood pressure measurement, intravenous access, blood sampling, fluid electrolytes therapy, plerual and cerebrospinal; fluid (CSF) fluid examination.
    - Should be able to provide basic and advanced life-saving support services in emergency situations.
    - Should be able to undertake complete monitoring of the patient and identify social, economic, environmental and emotional determinants in a given case and take them into account for planning therapeutic measures.
- Recognize conditions that may be outside the area of his specialty/competence and refer them to the proper specialist.

Dermatology, Venereology and Leprosy, HIV/AIDS Skills The

student should:

- Acquire skills in history taking, physical examination, diagnosis and management of patients in dermatology, venereology and leprosy.
- Be able to identify, classify and differentiate cutaneous findings in dermatological terms in a systematic way.
- Be able to perform systemic examination (chest, cardiac, abdomen, neurological, genitals, oral, eye and gynaecological examination) relevant to dermatologic condition.
- Be competent to manage dermatologic emergencies like angioedema, toxic epidernmal necrolysis (TEN), Stevens-Johnson syndrome (SJS), pemphigus, drug reaction and necrotic erythema nodosum leprosum (ENL).
- Be able to plan and deliver comprehensive treatment for diseases using principles of rational drug therapy.
- Be able to plan and advice measures for the prevention of infectious disease.
- Be able to plan rehabilitation of patient suffering from chronic illness and disability and those with special needs like leprosy.
- Demonstrate skills in documentation of case details and of morbidity/mortality data relevant to the assigned situation.

Laboratory Skills The student:

- Should be able to perform common laboratory procedures like potassium hydroxide (KOH) mount, Gram stain, Giemsa stain, acid fast bacilli (AFB) stain, Woods lamp examination, stains,culture media etc. related to the cutaneous diagnosis independently.
- Should be able to order relevant investigations and interpret them to reach to a diagnosis.
- Should be familiar with other recent investigations.

Dermatopathology - Student should be competent enough to:

- To interpret histopathology of common skin diseases.
- To diagnose common skin diseases by examining slides under microscope.

Surgery in dermatology

At the end of training following skills should be performed independently by the student:

1. Should able to give incisions, take stitches and sutures.
2. Should be trained in taking skin biopsy and nail biopsy.
3. Should be able to perform chemical peels, manual dermabrasion, skin punch grafting and wound dressing independently.

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4. Should be able to perform cryosurgery, nail surgery and acne surgery.
5. Able to perform chemical cauterization, cryotherapy, patch and photopatch test, slit smears and tissue smears.

Venereology

1. Should be competent in the clinical approach to the patient of STDs and HIV/AIDS.
2. Should be able to interpret the histopathological diagnosis including laboratory aids related with venereology.
3. Able to perform dark ground illumination, gram stain, Bubo aspiration and tissue smear.
4. Able to manage the patient according to syndromic approach for treatment of STDs.

Leprosy

The student should be:

1. Able to diagnose and approach the case of leprosy.
2. Perform AFB smear.
3. Able to manage cases of lepra reaction.
4. Identify, judge and decide when to refer the patients at appropriate level for surgery or rehabilitation.Should able to manage pediatric cases with skin diseases.

Syllabus

Course contents

Topics related to allied basic sciences

- The structure, functions and development of human skin.
- Ultrastructural aspects of epidermis, epidermal appendages, dermo-epidermal junction, dermis, and sub-cutis.
- Immunology, molecular biology and genetics in relation to the skin.
- Epidermal cell kinetics and keratinization.
- Lipids of epidermis and sebaceous glands.
- Percutaneous absorption.
- Skin as an organ of protection and thermoregulation.
- Biology of eccrine and apocrine sweat glands.
- Biology of melanocytes and melanin formation.
- Biology of hair follicles, sebaceous glands and nails.
- Epidermal proteins.
- Dermal connective tissue: collagen, elastin, reticulin, basement membrane and ground substance.
- Metabolism of carbohydrates, proteins, fats and steroids by the skin.
- Cutaneous vasculature and vascular reactions.

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- Mechanism of cutaneous wound healing.
- Cellular and molecular biology of cutaneous inflammation and arachidonic acid metabolism.
- Immunologic aspects of epidermis.
- Human leukocyte antigen (HLA) system.
- Immunoglobulins.
- Cytokines and chemokines.
- Lymphocytes, neutrophils, eosinophils, basophils and mast cells.
- Complement system.
- Hypersensitivity and allergy.
- Cutaneous carcinogenesis (chemical, viral and radiation).
- Basics of cutaneous bacteriology, mycology, virology, parasitology and host resistance.
- Common laboratory procedures, stains,culture media etc. related to the cutaneous diagnosis.
- Basic pathologic patterns and reactions of skin.
- Common laboratory stains and procedures used in the histopathologic diagnosis of skin diseases and special techniques such as immunofluorescence, immunoperoxidase and other related techniques**.**

Clinical dermatology

- Epidemiology of cutaneous disease.
- Psychologic aspects of skin disease and psycho-cutaneous disorders.
- Pathophysiology and clinical aspects of pruritus.

Papulosquamous diseases

- Psoriasis, pityriasis rubra pilaris, pityriasis rosea.
- Parapsoriasis, lichen planus, lichen niditus.
- Palmo-plantar keratodermas, Darier's disease, porokeratosis.
- Ichthyoses and ichthyosiform dermatoses.
- Kyrle's disease and other perforating disorders.

Vesiculo - bullous disorders

- Erythema multiforme, Stevens-Johnson syndrome, Toxic epidermal necrolysis.
- Bullous pemphigoid, Pemphigus.
- Chronic bullous disease of childhood.
- Herpes gestationis (pemphigoid gestationis).
- Hereditary epidermolysis bullosa.
- Epidermolysis bullosa acquisita.
- Dermatitis herpetiformis.
- Familial benign pemphigus.

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- Subcorneal pustular dermatoses.
- Pustular eruptions of palms and soles.

Disorders of epidermal appendages and related disorders

- Disorders of hair and nails.
- Disorders of sebaceous glands.
- Rosacea, Perioral dermatitis, acne.
- Disorders of eccrine and apocrine sweat glands.
- Follicular syndromes with inflammation and atrophy.

Epidermal and appendageal tumours

- Precancerous lesions, squamous cell carcinoma and basal cell carcinoma
- Keratoacanthoma, benign epithelial tumours, appendageal tumours
- Merkel cell carcinoma, Paget's disease

Disorders of melanocytes

- Disorders of pigmentation, albinism, benign neoplasia and hyperplasias of melanocytes, dysplastic melanocytic nevi, cutaneous malignant melanoma.

Inflammatory and neoplastic disorders of the dermis

- Acute febrile neutrophilic dermatosis (Sweet's syndrome)
- Erythema elevatum diutinum
- Cutaneous eosinophilic diseases
- Granuloma faciale
- Pyoderma grangrenosum
- Erythema annulare centrifugum and other figurate erythemas
- Granuloma annulare
- Malignant atrophic papulosis (Dego's Disease)
- Neoplasms, pseudoneoplasms and hyperplasias of the dermis
- Vascular anomalies
- Kaposi's Sarcoma
- Anetoderma and other atrophic disorders of the skin
- Ainhum and pseudoainhum
- Neoplasias and hyperplasias of neural and muscular origin
- Elastosis perforans serpiginosa and reactive perforating collagenosis

Lmphomas, pseudolymphomas and related conditions Disorders

of subcutaneous tissue

- Panniculitis

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- Lipodystrophy
- Neoplasms of the subcutaneous fat

Disorders of the mucocutaneous integument

- Biology and disorders of the oral mucosa
- Disorders of the anogenitalia of males and females

Cutaneous changes in disorders of altered reactivity

- Genetic immunodeficiency diseases
- Urticaria and Angioedema
- Disorders associated with complement abnormalities
- Graft-versus-host Disease
- Muco-cutaneous manifestations in immunosuppressed host other than HIV-infection
- Contact dermatitis
- Auto-sensitization dermatitis
- Atopic dermatitis (atopic eczema)
- Nummular eczematous dermatitis
- Seborrhoeic dermatitis
- Vesicular palmoplantar eczema

Skin changes due to mechanical and physical factors

- Occupational skin disease
- Radiobiology of the skin
- Skin problems in amputee
- Sports dermatology
- Skin problems in war field
- Decubitus ulcers

Photomedicine, photobiology and photo immunology in relation to skin

- Acute and chronic effects of ultraviolet radiation and sun light on the skin
- Narrow-band ultraviolet B (NBUVB) therapy, phototherapy, photochemotherapy

Disorders due to drugs and chemical agents

- Cutaneous reactions to drugs
- Mucocutaneous complications of anti-neoplastic therapy
- Cutaneous manifestations of drug abuse

Dermatology and the ages of man

- Neonatal dermatological problems
- Pediatric and adolescent dermatological problems

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- Ageing of skin
- Geriatric dermatological problems

Skin lesions in nutritional metabolic and heritable disorders

- Cutaneous changes in nutritional disease
- Acrodermatitis enteropathica and other zinc deficiency disorders
- Cutaneous changes in errors of amino acid metabolism: Tyrosinemia II, phenylketonuria, arginine succinic aciduria, and alkaptonuria
- Amyloidosis of the skin
- The porphyrias
- Xanthomatosis and lipoprotein disorders
- Fobry's Disease; galactosidase - a deficiency (Angiokeratoma corporis diffusum universale)
- Lipid proteinosis
- Cutaneous mineralisation and ossification
- Heritable disorders of connective tissue with skin changes
- Heritable disease with increased sensitivity to cellular injury
- Basal cell Naevus syndrome

Skin manifestations of hematologic disorders

- Skin changes in hematological disease
- Langerhans cell and other cutaneous histiocytoses
- The Mastocytosis syndrome

Skin manifestations of systemic disease

- The skin and disorders of the alimentary tract
- The hepatobiliary system and the skin
- Cutaneous changes in renal disorders, cardiovascular, pulmonary disorders and endocrinal disorders
- Skin changes and diseases in pregnancy
- Skin changes in the flushing disorders and the carcinoid syndrome

Skin manifestations of rheumatologic disease

- Lupus Erythematosus
- Dermatomyositis
- Scleroderma
- Systemic Necrotizing Arteritis
- Cutaneous Necrotising venulitis
- Cryoglobulinemia and Cryofibrinogenemia
- Relapsing Polychondritis
- Rheumatoid Arthritis, Rheumatic Fever and Gout

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- Sjogren's syndrome
- Raynaud's phenomenon
- Reiter's syndrome
- Multicentric Reticulohisticytosis

Cutaneous manifestations of disease in other organ systems

- Sarcoidosis of the skin
- Cutaneous manifestations of Internal Malignancy
- Acanthosis Nigricans
- Scleredema
- Papular Mucinosis
- Neurocutaneous disease
- Tuberous Sclerosis Complex
- The Neurofibromatosis
- Ataxia Telangiectasia
- Behcet's disease

Bacterial diseases with cutaneous involvement

- General considerations of bacterial diseases
- Pyodermas: Staphylococcus aureus, Streptococcus, and others
- Staphylococcal Scalded-Skin syndrome
- Soft Tissue Infections: Erysipelas, Cellulitis, Septicemia and Gangrenous Cellulitis
- Gram-Negative Coccal and bacillary infections
- Bartonellosis
- Miscellaneous bacterial infections with cutaneous manifestations
- Tuberculosis and other myopacterial infections
- Actinomycosis, Necardiosis, and Actinomycetoma
- Lyme Borreliosis
- Kawasaki Disease

Fungal diseases with cutaneous involvement

- Superficial fungal infection: Dermatophytosis, Tinea Nigra, Piedra
- Yeast Infections: Candidiasis, Pitryiasis (Tinea) Versicolor
- Deep Fungal Infections

Viral and ricketisial disease

- Viral Diseases: general consideration
- Rubella (German Measles)
- Measles
- Hand, Foot and Mouth Disease
- Herpangina

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- Erythema Infectiosum and Parvovirus B 19 infection
- Herpes simplex
- Varicella and Herpes Zoster
- Cytomegalovirus Infection
- Epstein - Barr Virus Infections
- Human Herpes virus 6 & 7 infections and Exanthem subitum (Roseola Infantum or Sixth Disease)
- Smallpox and Complications of small pox vaccination
- Contagious Pustular Dermatitis, Contagious Ecthyma: Orf virus infection
- Milluscum Contagiosum
- Miller's Nodules
- Warts
- Human Retroviral Disease: Human T-Lymphotropic Virusviruses

Therapeutics

Topical therapy

- Pharmacokinetics principles intopical applications of drugs.
- Principles of topical therapy.

Topical agents

- Glucocorticoids, Acne therapies, Analgesics, Anesthetics, Anti-inflammatory, Anti hair loss, Anti-microbial, Anti-parasitic, Anti-perspirants, Anti-pruritic, Anti- viral, Astringents, Bleaching agents, Keratolytics, Psoriasis therapies, Wart therapies, Topical Retinoids, Topical Antibiotics, Topical Anti-fungal Agents, Sun-protective Agents, Keratolytic Agents, Topical Cytotoxic Agents, Cosmetics and Skin care in practice.

Systemic therapy

- Systemic glucocorticoids, Sulfones, Aminoquinolines, Cytotoxic and Antimetabolic Agents, Oral Retinoids, Antihistamines, Antibiotics, Antiviral Drugs, Oral Antifungal Agents, Immunosuppressive and Immunomodulatory drugs, Thalidomide, photo-chemotherapy and photo-therpay, electric cautery, cryotherapy, electrolysis, tattooing, intra-lesional injections etc.

Surgery in dermatology

- Dermatologic Surgery: Introduction and Approach
- Skin Resurfacing: Chemical Peels
- Skin Resurfacing: Dermabrasion
- Skin Resurfacing: Laser
- Skin punch grafting
- Wound Dressings
- Cryosurgery

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- Nail Surgery

Venereology

- Clinical approach to the patient of sexually transmitted disease
- Anatomy of male and female genitalia
- Epidemiological aspects of STDs
- Viral STDs including HIV, Herpes, Human Papilloma virus (HPV), Molluscum contagiosum, Espirito Santo virus (ESV) etc.
- Bacterial STD's: Syphilis, Gonorrhoea, Chancroid, Donovanosis
- Chlamydial infections: Lymphogranuloma venereum, urethritis, cervicits, nongonococcal urethritis (NGU), non-specific vaginitis etc.
- Fungal: Candidiasis
- Protozoal: Trichomoniasis
- Ectoparasitic: Scabies, Pediculosis infestations.
- Syndromic management of STDs
- HIV/AIDS - Epidemiology, transmission, patient load, High risk groups, cutaneous manifestations of HIV, treatment of opportunistic infections, antiretroviral therapy, management of STDs in HIV positive cases
- STDs in reproduction health and Pediatrics
- STDs and HIV
- Prevention, counselling and education of different STDs including HIV
- National Control Programmes of STDs and HIV infection
- Medico-legal, social aspects of STDs including psychological and behavioural abnormalities in STD patients

Leprosy

- Approach to the patient with leprosy
- Epidemiological aspects
- Structure, biochemistry, microbiology of Mycobacterium leprae
- Animal models
- Pathogenesis
- Classification
- Immunology and molecular biological aspects
- Histopathology and diagnosis including laboratory aids
- Clinical features
- Reactions
- Systemic involvement (Ocular, bone, mucosa, testes and endocrine etc.)
- Pregnancy and leprosy
- HIV infection and leprosy

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TEACHING AND LEARNING METHODS

A post graduate student pursuing the course should work in the institution as a full time student. No candidate should be permitted to run a clinic/laboratory/nursing home while studying postgraduate course. Each year should be taken as a unit for the purpose of calculating attendance. Every student shall attend teaching and learning activities during each year as prescribed by the department and should not be absent from work without valid reasons**.**

Teaching methodology:

A list of teaching and learning activities designed to facilitate students acquire essential knowledge and skills outlined is given below.

1. **Lectures:** Lectures are to be kept to a minimum. They may, however, be employed for teaching certain topics. Lectures may be didactic or integrated.
   a) **Didactic Lectures**: Few topics are suggested as examples:
      1) Bio-statistics
      2) Use of library
      3) Research Methodology
      4) Medical code of Conduct and Medical Ethics
      5) National Health and Disease Control Programmes
      6) Communication Skills

   These topics may preferably be taken up in the first few weeks of the first year.
   b) **Integrated Lectures:** Some of the topics may be taken up by multidisciplinary teams eg. Jaundice, Diabetes mellitus, Thyroid etc.

2. **Journal Club & Subject seminars:** Both are recommended to be held once a week. All PG students are expected to attend and actively participate in discussion and enter relevant details in the Log Book. Further, every post graduate student must make a presentation from the allotted journal(s), selected articles at least four times a year. The presentations would be evaluated and would carry weightage for internal assessment.
3. **Student Symposium**: Recommended as an optional multi-disciplinary programme. The evaluation may be similar to that described for subject seminar.
4. **Ward Rounds:** Ward rounds may be service or teaching rounds.
   a) **Service Rounds:** Post graduate students and Interns should be responsible for everyday care of the patients. Newly admitted patients should be worked up by the PGs and presented to the seniors the following day.
   b) **Teaching Rounds:** Every unit should have 'grand rounds' for teaching purpose. A diary (log book) should be maintained for day to day activities by the students.

   Entries of (a) and (b) should be made in the Log book. Log books shall be checked and assessed periodically by the faculty members imparting the training.

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5. **Clinical Case Presentations:** Minimum of 5 cases to be presented by every post graduate student each year. They should be assessed using check lists and entries made in the log book

6. **Clinico-Pathological Conference (CPC):** Recommended once a month for all post graduate students. Presentation is to be done by rotation. If cases are not available, it could be supplemented by published CPCs.

7. **Inter-Departmental Meetings:** Strongly recommended particularly with Departments of Pathology and Radio-Diagnosis at least once a week. These meetings should be attended by post graduate students and relevant entries must be made in the Log Book.

Pathology: A dozen interesting cases may be chosen and presented by the post graduate students and discussed. The staff of Pathology department would then show the slides and present final diagnosis. In these sessions, the advances in immuno-histochemical techniques can be discussed.

Radiodiagnosis: Interesting cases and imaging modalities should be discussed.

8. Teaching Skills: The post graduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.

9. The post graduate students should undertake audit, use information technology tools and carry out research, both basic and clinical, with the aim of publishing the work and presenting the same at various scientific fora.

10. Continuing Medical Education Programmes (CME): At least two CME programmes should be attended by each student during the MD programme.

11. Conferences: The student should attend courses, conferences and seminars relevant to the speciality.

12. 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.

13. Department should encourage e-learning activities.

14. Rotation:

Clinical Postings

A major tenure of posting should be in the Department of Dermatology. It should include care of in-patients, out-patients, special clinics like STD clinic, leprosy clinic, vitiligo clinic and maintenance of case records for both in- and out-patients.

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A short posting for 2-4 weeks in the Department of Medicine is to be arranged for exposure to Emergency Medicine and Resuscitation.

15. Clinical meetings:

There should be intra - and inter- departmental meetings for discussing uncommon / interesting medical problems. Each student must be asked to present a specified number of cases for clinical discussion, perform procedures/tests/operations/present seminars/review articles from various journals in inter-unit/interdepartmental teaching sessions. These should be entered in a Log Book; log books should be checked and assessed periodically by the faculty members imparting the training.

16. Thesis writing:

Thesis writing is compulsory. All MD students are required to carry out work on a selected research project under the guidance of a recognized post graduate teacher, the result of which shall be written up and submitted in the form of a Thesis.

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 surgical skills laboratories in medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, i.e., during the training may be as follows:

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.

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

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

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The examination shall be in three parts:

1. Thesis

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 Examination:

There shall be four papers each of three hours duration. Each paper shall consist of two long essay questions, three short essay questions and four short notes. These are:

Paper – I	**Basic Science as applied to Dermatology, STDs and Leprosy**
Paper – II	**Dermatology**
Paper – III	**STD & Leprosy**
Paper – IV	**Recent advances in field of Dermatology, Applied Sciences pertaining to skin /VD & internal medicine and skin**

3. Clinical / Practical and viva voce Examination

Practical examination should be taken to assess competence and skills of techniques and procedures and should consist of two long cases, two short cases and 10 spots.

During oral/viva voce examination, student should be evaluated for Interpretation of data, instruments, clinical problems, radiological and biochemical investigations, slides, drugs, X-rays etc.

Recommended Reading:

Books (latest edition)

- Sexually Transmitted Diseases - Sharma V K
- IADVL Text book of Dermatology - R G Walia
- IAL Textbook of Leprosy - H Kar
- Bolognia “Textbook of Dermatology”
- Text Book of Dermatology, Wilkinson/Ebling/Rook, 4 Volumes, Oxford
- Text Book of Dermatology, Samuel L. Moschelia M.D. Harry J. Hurllay M.D., 2 Volumes
- Histopathology of the Skin, Walter - F. Lever- Gundula Schaumburg Lever
- Atlas of Dermatology, 2 Volumes, Bhalani Publishing House, Dadar, Mumbai.
- Diseases of the skin, I Iarry L Arnold Richard 13-Dom William D. James, Andrews
- Differential Diagnosis in Dermtology, Satish S. Savant, Radha Atalshah, Deepak Gore, Richard Ashan, Barbara Lepdard

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- Leprosy, Dharmendra, 2 Volumes, Samant and Company, Mumbai.
- Recent Advances in Dermatology, Champion, R.H. Pye, R.J. 8th Volumes.
- Venereal Diseases, Amborse King Claude Nicol Philip Rodin, EL.BS English Language Book Society/ Baillere Tindal, East Sussex.
- Sexually Transmitted Diseases, King K Holmes, McGraw-Hill Health profession
- Hand Book of leprosy, Jopling W.H, William Hethgunnah Medical Book Ltd., London.
- Dermatology in General Medicine, Thomas B. Fitzpatrick, McGraw Hill Book Company.
- Fundamentals of Pathology of skin, Mysore Venkataram

Journals

Three international and two national journals (all indexed)

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Annexure I

Postgraduate Students Appraisal Form
Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM……TO……

Sr. No.	PARTICULARS	Not Satisfactory	Satisfactory	More Than Satisfactory	Remarks
		1 2 3	4 5 6	7 8 9	
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 CONSULTANT SIGNATURE OF HOD

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NATIONAL MEDICAL COMMISSION

Postgraduate Medical Education Board

N-P050(20)/16/2024-PGMEB-NMC **Date:20.09.2024**

GUIDELINES FOR COMPETENCY-BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN EMERGENCY MEDICINE

Preamble:

Emergency Medicine is a specialty dedicated to diagnosing and treating all emergency medical disorders and injuries. It encompasses a unique body of knowledge as defined by its scope of practice of Emergency Medicine includes the initial evaluation, diagnosis, treatment, and disposition of any patient requiring expeditious medical, surgical, or psychiatric care.

The field of Emergency Medicine encompasses acute aspects of almost all subspecialties and it is designed to ensure the management of patients in life-threatening emergencies by providing immediate and definitive care till the patient is taken over by the concerned specialty department.

This curriculum aims to prepare an M.D. in Emergency Medicine to acquire the competencies pertaining to knowledge, skills, and attitude necessary to function independently and effectively under any circumstances. This will enable them to deliver high-quality emergency care and function effectively as educators, researchers, and administrators in Emergency Medicine.

SUBJECT SPECIFIC LEARNING OBJECTIVES

- Care for physiologically stable patients presenting to acute care across the full range of complexity

At the end of the MD Emergency Medicine Course the student should be able to:

- Develop expertise in history taking,
- Develop expertise in Physical examination,
- Develop expertise in decision making and
- Develop expertise in emergency management full range of disorders.

- Identify sick patients, be able to resuscitate and stabilise and know when it is appropriate to stop.

At the end of the Course the student should be able to:

- Deliver the role of emergency physician as an expert in resuscitation and stabilisation of critically ill patients.
- Lead or participate as a member of the resuscitation team.
- Communicate with the patients and their caregivers with empathy.
- Support and guide the resuscitation team.
- Know when not to resuscitate and when to stop resuscitation.
- Care for the patients at the end of their lives.

- Care for acutely injured patients across the full range of complexity

At the end of the Course the student should be able to:

- Anticipate and recognize the Life threatening, limb threatening trauma presentations. In all age groups
- Organize and alert the trauma team and ancillary laboratory and blood bank and other support systems
- Collect and analyze the information from the EMS and prepare the adjuncts and be ready to receive the trauma victims.
- Resuscitate, stabilize and manage the trauma patients as per ATLS guidelines and make correct and timely decisions in patient care.
- Refer to appropriate specialist care as indicated once the patient is stabilized.
- Decide and transport under supervision and after proper communication.
- Document the injuries, Notify medico legally if indicated.
- Be prepared for any disaster/ mass casualties.

- Care for children of all ages in the ED, at all stages of development and children with complex needs

At the end of the Course the student should be able to:

- Evaluate the paediatric patients and investigate appropriately.
- Make decisions, safeguard, resuscitate and care the paediatric patients.
- Communicate with empathy and clarity to the parents or guardians of the paediatric patients.

- Support the ED team by answering clinical questions and making safe decisions:

At the end of the Course the student should be able to:

- Understand the key steps in diagnostic reasoning, how to make clinical decisions and to recognize the factors that have a negative or positive impact on patient care.
- Acquire the skills to recognize and rectify cognitive errors that can cause harm and threaten patient safety.
- Acquire the knowledge-base and apply the core principles of evidence-based medicine to everyday clinical problems.
- Formulate safe plans of management and decisions on disposal.
- Effectively communicate with and seek opinion from the seniors in profession, subordinates and supporting staff for collective decision making.

- Deliver key procedural skills

At the end of the Course the student should be able to:

- Perform key emergency skills that are time critical and/or life/limb saving.
- Organize the equipment and manpower for the procedure concerned.
- Anticipate and manage the post procedure complications
- Acquire knowledge, skills and attitude in Basic Life Support (BLS), Advanced Cardiac Life Support (ACLS), Advanced Trauma Life Support (ATLS), Pediatric Advanced Life Support (PALS), Point of Care Ultrasound (POCUS) training, Neonatal Advance Life Support (NALS), Basic Disaster Life Support (BDLS) Advanced Disaster Life Support (ADLS), HAZMAT life support, or **Equivalent Courses** etc, by enrolling standard training courses with periodic updation.

- Deal with complex and challenging situations in the work place

At the end of the Course the student should be able to:

- Anticipate and manage specific situations or circumstances that can have the potential to significantly impact patient care.
- Manage situations or circumstances that can affect the functioning of the Emergency Department like unpredicted events in relation to the interactions with patients attending the ED, other agencies attending the ED, challenging professional interactions or events that impact on the delivery of Emergency care.
- Document and timely report to the authorities if there are medico legal implications involved.

- Lead the ED shift

At the end of the Course the student should be able to:

  - Lead the Emergency team during the ED shift
  - Organize the duty schedules for the ED
  - Alert the response team and organize the functioning of the rapid response team in case of disaster or mass casualties.
  - Ensure proper documentation and maintenance of registers.
  - Communicate effectively with other departments.

- Support, supervise and educate

At the end of the Course the student should be able to:

  - Support and give relevant suggestions to the superiors and management authorities.
  - To Support, appreciate and supervise the subordinate staff in patient care and collective decision making.
  - Educate and train the learners /juniors / undergraduates /public coming under his/her sphere.

- Participate in research and managing data appropriately

At the end of the Course the student should be able to:

  - Participate in and undertake research
  - Acquire fundamental knowledge. skills and attitude to collect, manage and analyze data from clinical materials.
  - Develop the attitude towards sharing and disseminating information with presentations, posters and publication in indexed journals.

- Participate in and promote activity to improve the quality and safety of patient care

At the end of the Course the student should be able to:

  - Participate in activities to improve the quality and safety of patient care by monitoring and evaluation of the system.
  - Periodic review and feedback to identify the strength and weakness and to make corrective measures.
  - Involve in patient education and public awareness programs.

- Suggest steps of improvement to the administrators so as to implement patient safety measures.

- Manage, Administer and Lead

At the end of the Course the student should be able to:

- Acquire the basic knowledge in the principles of ED administration
- Acquire the knowhow on how to establish and develop an Emergency Department with the necessary infrastructure and manpower as per accreditation standards.
- Lead all the activities in the Emergency Department, Academic, research and patient care activities.
- Participate in Conferences, workshops, curriculum improvement programs and peer group activities.
- Keep abreast of the recent advances in the field and incorporate in the patient care.

SUBJECT SPECIFIC COMPETENCIES

By the end of the M.D. course in Emergency Medicine, the student should acquire the following competencies:

Cognitive Domain:

1. Prehospital Care - Comprehend the key features of emergency medical services, the role of prehospital equipment and adjuncts, air medical transport, neonatal and pediatric transport, and the dynamics of mass gatherings. Reflect upon their implications in the broader framework of emergency medicine.
2. Disaster Preparedness - Familiarize yourself with the conceptual and practical aspects of disaster preparedness and response mechanisms. This includes understanding the management of natural disasters, comprehending the medical response to bomb, blast, and crush injuries, becoming proficient in mass casualty and chemical agent management, and gaining knowledge about bioterrorism recognition and response, as well as radiation injury management.
3. Resuscitation - Grasp and internalize the principles and methodologies surrounding sudden cardiac death management, adult cardiopulmonary resuscitation, neonatal and

child resuscitation, resuscitation in pregnancy, ethical concerns in resuscitation, cerebral resuscitation, therapeutic hypothermia, acid-base disorders, blood gases, fluid and electrolyte balance, cardiac rhythm disturbances, pharmacology of antiarrhythmics and vasopressor agents, patient evaluation in shock, fluid and blood resuscitation, anaphylaxis, acute allergic reactions, and angioedema management.

4. Resuscitative Procedures - Acquire skills and understanding in non-invasive airway management, pediatric airway management, tracheal intubation, mechanical ventilation, surgical airway management, neonatal and pediatric intraosseous and central venous access, adult venous and intraosseous access, hemodynamic monitoring, cardiac pacing, defibrillation, cardioversion, and pericardiocentesis.
5. Analgesia, Anesthesia, and Procedural Sedation - Learn to effectively handle acute pain in adults, pain in infants and children, and to administer local and regional anesthesia. Develop the ability to perform procedural sedation and analgesia, and manage adults with chronic pain
6. Emergency Wound Management - Attain a comprehensive understanding of wound evaluation, wound preparation for treatment, and different wound closure techniques. Learn to manage injuries to the face, scalp, arm, hand, fingertip, nail, leg, foot, and handle soft tissue foreign bodies. Gain knowledge about the management of puncture wounds, bites, and post-repair wound care.
7. Cardiovascular Disease - Enhance your knowledge and expertise in the evaluation, diagnosis, and management of a broad spectrum of cardiovascular conditions such as chest pain, acute coronary syndromes, cardiogenic shock, low probability acute coronary syndrome, syncope, congestive heart failure, acute pulmonary edema, and valvular emergencies. Learn about the evaluation, diagnosis, and management of cardiomyopathies, myocarditis, pericardial disease, thromboembolism, systemic and pulmonary hypertension, aortic dissection, related aortic syndromes, aneurysms of the aorta, major arteries, and occlusive arterial disease.
8. Pulmonary Emergencies - Understand and become proficient in managing respiratory distress, hemoptysis, acute bronchitis, upper respiratory tract infections, community-acquired pneumonia, aspiration pneumonia, non-infectious pulmonary infiltrates,

empyema, lung abscess, tuberculosis, spontaneous and iatrogenic pneumothorax, acute asthma in adults, and chronic obstructive pulmonary disease.

9. Gastrointestinal Emergencies - Deepen your understanding of the evaluation, diagnosis, and management of acute abdominal pain, nausea, vomiting, disorders presenting primarily with diarrhea, acute and chronic constipation, upper and lower gastrointestinal bleeding, esophageal emergencies, gastroesophageal reflux disease, swallowed foreign bodies, peptic ulcer disease, gastritis, pancreatitis, cholecystitis, hepatic disorders, jaundice, hepatic failure, acute appendicitis, diverticulitis, bowel obstruction, volvulus, hernias in adults, anorectal disorders, gastrointestinal procedures and devices, and complications of general surgical procedures.
10. Renal and Genitourinary Disorders - Become adept at understanding and managing acute renal failure, rhabdomyolysis, emergencies in renal failure and dialysis patients, urinary tract infections, hematuria, acute urinary retention, male genital problems, urologic stone disease, and complications of urologic procedures and devices.
11. Obstetrics and Gynecology - Develop a solid knowledge base for managing vaginal bleeding in the nonpregnant patient, abdominal and pelvic pain in the nonpregnant female, ectopic pregnancy and emergencies in the first 20 weeks of pregnancy, comorbid diseases in pregnancy, normal pregnancy, emergencies after 20 weeks of pregnancy and the postpartum period. Learn about the emergency delivery process, vulvovaginitis, pelvic inflammatory disease, breast disorders, urogynaecology disorders, and complications of gynaecologic procedures.
12. Paediatrics - Cultivate a comprehensive understanding of the assessment procedures for children in the emergency department, care strategies for neonatal emergencies and common neonatal problems, sudden infant death syndrome, serious bacterial illness associated with fever, and various disorders related to the ear, eye, nose, mouth, and throat in infants and children. Further, enhance your skills in managing specific conditions like stridor, drooling, wheezing, pneumonia, heart diseases, gastrointestinal issues, and urinary tract infections in children. Learn about the intricacies of dealing with seizures and status epilepticus, headaches, altered mental states, minor head injuries, musculoskeletal disorders, rashes, sickle cell disease, oncology, hematology emergencies, hypoglycemia, and metabolic emergencies in infants and children.

13. Infectious Diseases - Develop a solid understanding of the evaluation process for sexually transmitted diseases, toxic shock syndrome, septic shock, soft tissue infections, and disseminated viral infections. Gain proficiency in managing HIV infection and AIDS, infective endocarditis, tetanus, rabies, and malaria. Become conversant with the assessment procedures for foodborne and waterborne diseases, zoonotic infections, medical issues of world travellers, occupational exposures, infection control, and standard precautions. Understand the pharmacological aspects of antimicrobials, antifungals, and antivirals.
14. Neurology - Attain expertise in the diagnosis and management of a variety of neurological conditions, including headache, facial pain, subarachnoid and intracerebral hemorrhage, stroke, transient ischemic attack, cervical artery dissection, altered mental status, coma, ataxia, gait disturbances, vertigo, dizziness, and seizures. Learn about the evaluation of acute peripheral neurologic lesions, chronic neurologic disorders, central nervous system and spinal infections, and comprehend the operations of central nervous system procedures and devices.
15. Toxicology - Enhance your understanding and skills in the assessment and management of patients with poisoning from various substances including a wide range of drugs, alcohols, pesticides, metals, industrial toxins, vitamins, herbals, and antimicrobials. Deepen your comprehension of the concept of dyshemoglobinemias.
16. Environmental Injuries - Gain knowledge about the diagnosis and management of environmental injuries like frostbite, hypothermia, heat emergencies, bites and stings, reptile bites, trauma from marine fauna, dysbarism, diving complications, drowning, thermal and chemical burns, electrical injuries, lightning injuries, mushroom poisoning, poisonous plant exposures, high-altitude medical problems, and carbon monoxide exposure.
17. Endocrine Emergencies - Understand and manage cases involving patients with type 1 and type 2 diabetes mellitus, diabetic ketoacidosis, alcoholic ketoacidosis, and hyperosmolar hyperglycaemic state. Learn to deal with thyroid disorders including hypothyroidism, myxoedema crisis, hyperthyroidism, and thyroid storm, and how to diagnose and manage adrenal insufficiency and adrenal crisis.

18. Hematologic and Oncologic Emergencies - Develop a thorough understanding of how to recognize and manage anemia, interpret tests of haemostasis, and handle acquired bleeding disorders. Acquire skills in managing clotting disorders, hemophilias, von Willebrand disease, sickle cell disease, other hereditary haemolytic anemias, and acquired haemolytic anaemia. Familiarize yourself with the details of transfusion therapy and the management of anticoagulants, antiplatelet agents, and fibrinolytics. Learn to manage emergency complications of malignancy
19. Eyes, Ears, Nose, Throat, and Oral Surgery - Develop proficiency in managing a wide spectrum of emergency conditions concerning the eyes, ears, nose, throat, and oral region. Learn about the diverse emergencies linked to the facial structure and jaw, epistaxis, nasal fractures, and rhinosinusitis. Enhance your understanding of the various oral and dental emergencies, infections and disorders of the neck and upper airway, and potential complications associated with airway devices.
20. Skin Disorders - Acquire in-depth knowledge about diagnosing and treating a multitude of skin disorders presenting in the emergency department, including serious generalized skin disorders. Learn to address disorders of the face and scalp, hands, feet, extremities, and disorders of the groin and skinfolds. Handle common skin disorders found on the trunk effectively.
21. Trauma - Enhance your capabilities in managing trauma in adults, children, geriatric patients, and during pregnancy. Gain expertise in handling various forms of trauma such as head, spine and spinal cord, facial, neck, and pulmonary trauma. Learn to evaluate cardiac trauma, abdominal trauma, penetrating trauma to the flank and buttocks, genitourinary trauma, and penetrating trauma to the extremities.
22. Orthopaedics - Cultivate your skills in the initial evaluation and management of orthopedic injuries, including those to the hand, wrist, elbow, shoulder, pelvis, hip, knee, and foot. Gain understanding of the diagnosis and management of neck and back pain, shoulder pain, hip and knee pain, systemic rheumatic diseases, nontraumatic disorders of the hand, acute disorders of the joints and bursae, and soft tissue problems of the foot.
23. Psychosocial Disorders - Attain expertise in understanding and handling behavioral disorders. Gain a thorough understanding of emergency assessment procedures, diagnostic criteria, psychotropic medications, rapid tranquilization, anorexia nervosa,

bulimia nervosa, panic disorder, conversion disorder, and the management of substance abuse.

24. Abuse and Assault - Develop a sensitive and informed approach to managing issues related to child abuse and neglect, female and male sexual assault, intimate partner violence, and abuse of the elderly and impaired. Understanding the medicolegal aspects of abuse and assault in the state
25. Special Situations - Learn to manage health concerns for special populations such as injection drug users, transplant patients, morbidly obese patients, and patients facing grief, death, and dying. Gain knowledge of the legal aspects of emergency medicine.
26. Principles of Emergency Imaging - Acquire knowledge about non-invasive myocardial imaging, computed tomography, magnetic resonance imaging, and emergency ultrasonography.
27. Point of Care Ultrasound - Develop expertise in the use of point of care ultrasound in a variety of clinical scenarios. Understand its application for intubation and tube placement confirmation, guidance for venous access, echocardiography, transoesophageal echo, cardiac arrest, heart failure, valvular pathologies, lung and pleural assessment, hemodynamic status, FAST/E-FAST examination, peripheral nerve blocks, musculoskeletal ultrasound, joint aspiration, DVT screening, paracentesis, obstetric conditions, paediatric access, airway ultrasound, ocular ultrasound, and intracranial pressure measurement.
28. Medicolegal Aspects of Emergency Medicine Practice in India - Understand and apply the best standards of case documentation, consent, signs of established death, medicolegal proceedings, brain death criteria, validity of DNR/DNI/DNT orders, and various acts related to transplantation of human organs, MTP, PCPNDT, POCSO, Mental Health, Clinical Establishments, Sexual Harassment of Women at Workplace, Consumer Protection, Domestic Violence, Good Samaritan Law, Hospital Protection Act. Learn about court procedures, dying declaration, expert witness roles, inquests, subpoenas and summons, medicolegal autopsy, wound and injury documentation, associated offenses, rape case procedures, and the role of the Clinical Forensic Medicine Unit.
29. Administration - Understand and apply concepts related to credentialing, career development, recruitment, budgeting, health care financing, managed care, personnel

management, public relations, marketing, hospital administration, practice management, contracts, work schedules, cost containment, NABH, JCI, NMC, NBE requirements, and hospital and Emergency Department administrative organization.

Psychomotor Domain:

Clinical assessment skills:

1. Elicits a focused clinical history
2. Perform a thorough physical examination of all the systems
   a. Respiratory system
   b. Cardiovascular system
   c. Neurological system
   d. Abdomen including hernia and rectal examination
   e. Ophthalmologic examination
   f. ENT examination
   g. Obstetric examination
   h. Dermatologic examination

Procedural skills:(Minimum number of procedures that a candidate needs to perform are:)

1. Airway management and cervical spine Control
   a. Basic airway management (opening airway by various methods) (100)
   b. Bag mask ventilation (100)
   c. Advanced airway management (25)
   d. Tracheal intubation (100)
   e. Alternative procedures (non-surgical and surgical (25)
   f. Pediatric airway management (25)
   g. Neonatal airway management (5)
2. Cardiopulmonary resuscitation
   a. Basic (50)
   b. Advanced (50)
3. Electric therapy
   a. Cardioversion/defibrillation (40)

    b. Temporary cardiac pacing (10)
4. ECG interpretation (250)
5. Ventilator management (100)
6. Basic trauma management and Advanced
    a. Trauma Life Support (100)
    b. Intercostal chest tube (10)
    c. Needle thoracentesis (10)
    d. ED thoracotomy (1)
    e. Surgical and needle cricothyroidotomy (5)
    f. Suprapubic catheterization (4)
    g. Central venous access (25)
    h. Suture technique (100)
    i. Arterial puncture (100)
    j. Nasal packing (10)
    k. Foreign body removal (10)
    l. Foley's catheterization (50)
7. Pulmonary procedures
    a. Invasive ventilation principles
    b. Thoracentesis
    c. Needle/tube thoracostomy
8. Cardiovascular procedures
    a. Cardiac compression (100)
    b. Intra-osseous access (10)
    c. Pericardiocentesis (10)
9. Decontamination procedures
    a. Gastric lavage (10)
    b. Skin/eye decontamination
10. Paracentesis (25)
11. Neurological: Lumbar puncture (10)
12. Wound management
    a. Wound preparation (50)
    b. Wound closure techniques (50)
    c. Debridement (25)
    d. Dressing techniques (50)
    e. Removal of foreign bodies (10)
13. Orthopedic emergency procedures
    a. Splinting/immobilization (50)
    b. Spinal immobilization (50)
    c. Logrolling (50)
    d. Helmet removal (10)
    e. Fasciotomy
    f. Reduction of dislocations (20)
    g. Traction splints (10)
    h. Plaster techniques for various Fractures (25)
    i. Joint aspiration (10)
    j. Cervical collar application (50)
    k. Pelvic stabilization techniques (2)
14. Local and regional anaesthesia: Conscious sedation and analgesia (50)

15. Ear, nose and throat procedures
    a. Indirect laryngoscopy (10)
    b. Nasal packing (10)
    c. Removal of foreign bodies (10)
    d. Troubleshooting tracheostomy tube problems (5)
16. Maxillo-facial techniques
    a. Dental anaesthesia (4)
    b. Dental socket suture (4)

17. Ocular techniques
    a. Slit lamp (20)
    b. Foreign body removal (4)
    c. Lateral Canthotomy (1)
    d. IOP measurement (5)
18. Gynaecological and Obstetrics:
    a. Delivery (10)
    b. Speculum examination (10)
    c. Perimortem Caesarean section
19. Others
    a. Reducing paraphimosis (2)
    b. Nasogastric tube insertion (100)
    c. Incision and drainage of abscess (20)
    d. Nerve blocks (20)
    e. Detorsion of torsion of testis (2)
20. Transportation of patients
    a. Intra-hospital (25)
    b. Inter-hospital (10)
21. Communication skills:
    a. Patients and relatives (50)
    b. Colleagues and other personnel (50)
22. Ultrasonography and echocardiography (both diagnostic and therapeutic)
    a. FAST/E-FAST (50)
    b. Focused ECHO (50)
    c. Airway ultrasound (25)
    d. Shock assessment (50)
    e. Pulmonary ultrasound (50)
    f. Abdominal and Renal POCUS (50)
    g. Soft tissue and skin ultrasound (25)
    h. Joint and fracture assessment (25)
    i. Cardiac arrest POCUS/TEE (5)
    j. Procedural guidance (50)
    k. Ocular ultrasound (25)
23. Interpretation of laboratory investigations/plain X-rays/CT/MRI (100)
24. Major incident planning (10)

Affective Domain:

1. **Communication and Interpersonal Skills**: This involves empathetic communication with patients and their caregivers, effective collaboration with team members, and the establishment of effective relationships with other departments and staff members.
2. **Leadership and Teamwork**: The ability to lead effectively in an Emergency Department (ED) setting, including managing duty schedules, coordinating response teams, and handling disaster or mass casualty situations. This also includes functioning collaboratively as part of a team.
3. **Informed Decision Making and Professionalism**: The capacity to make informed decisions based on sound diagnostic reasoning and to act with professional integrity and responsibility, including timely and accurate reporting of medico-legal implications.
4. **Commitment to Patient Care and Lifelong Learning**: The commitment to improve the quality and safety of patient care, emphasizing a patient-centered approach, along with a dedication to self-improvement, self-directed learning, and staying abreast of recent advances in the field.
5. **Ethics in End-of-Life Care**: Sensitivity and understanding towards ethical issues in end-of-life care, including making informed decisions about resuscitation and providing empathetic care for patients at the end of their lives.

SYLLABUS

Cardiovascular Diseases:

1. Cardiopulmonary Resuscitation
    a. Basic life support (one and two-rescuer CPR)
    b. Advanced life support
        - Recognition of cardiac rhythms during cardiac arrest
        - Use of drugs
        - Defibrillation
        - Pacing
        - Post-cardiac arrest syndrome
        - Ethical issues
    c. Leadership during CPR
    d. Choking victim
    e. Neonatal/pediatric CPR
    f. CPR during pregnancy
2. Chest pain

a. Stable angina
b. Acute coronary syndromes (unstable angina, ST-elevation and Non-ST-elevation myocardial infarction)
   - Use of thrombolytics
   - Use of glycoprotein inhibitors in ED
   - Angioplasty vs. thrombolytics
c. Pulmonary embolism
d. Aortic dissection

3. Congestive heart failure and pulmonary oedema
4. Palpitations
5. Cardiac arrhythmias
   a. Tachycardias
      - Narrow complex vs. broad complex
      - Electric cardioversion
      - Anti-arrhythmic drugs
   b. Bradycardias
6. Hypertensive urgencies and emergencies
7. Temporary and permanent cardiac pacemaker
8. Shock
   a. Haemorrhagic shock
   b. Cardiogenic shock
   c. Neurogenic shock
   d. Septic shock
   e. Anaphylactic shock
   f. Blood/blood products
   g. Cardiovascular drugs
      - Fluids
      - Vasopressors
9. Deep vein thrombosis and pulmonary embolism
10. Valvular heart diseases
11. Stuck artificial cardiac valve
12. Infective endocarditis
13. Acute pericarditis and cardiac tamponade
14. Acute myocarditis
15. Acute rheumatic fever
16. Vascular access
17. Hemodynamic monitoring
18. Peripheral vascular disease
19. Aortic emergencies
20. Sudden cardiac death
21. Cardiac transplant patient

Airways management and Anesthesia

1. Principle of airway management including difficult airway management
2. Non-invasive ventilation and mechanical ventilation
3. Rapid sequence intubation
4. Pain management
5. Procedural sedation
6. Regional, local and general anaesthesia

7. Surgical airway

Trauma:

1. Trauma resuscitation
    a. Primary survey
    b. Secondary survey
    c. Advanced trauma life support
    d. Transfer arrangements
2. Wound management:
    a. Lacerations
    b. Abrasions
    c. Contusion
    d. Puncture wounds
    e. Principles of management
    f. Control of local bleeding
    g. Suturing
        - General
        - Specific sites
    h. Local anaesthesia
3. Head and facial trauma
    a. Head injury
    b. Fractures of bones of face
    c. Facial injuries
    d. Dental injuries
    e. Nasal injuries
    f. Ear injuries
    g. Oral cavity injuries
    h. Temporomandibular joint dislocation
4. Spinal trauma
    a. Immobilization
    b. Examination
    c. Cervical
    d. Dorsal
    e. Lumbar
5. Chest trauma
    a. Blunt/penetrating
    b. Tension pneumothorax
    c. Cardiac tamponade
    d. Massive haemothorax
    e. Open chest wound
    f. Ruptured aorta
    g. Flail chest
    h. Contusion lung
    i. Emphysema
6. Abdominal trauma
    a. Blunt/penetrating trauma
    b. E-FAST
    c. Diagnostic peritoneal lavage
    d. Ultrasound and CT

e. Pelvic trauma
f. Genitourinary trauma

7. Pelvic fracture
8. Extremity trauma
    a. Skeletal trauma (fractures)
    b. Dislocation
    c. Vascular trauma
    d. Soft tissue trauma (strains and sprains)
    e. Hand trauma
    f. Compartment syndrome
    g. Degloving injuries
    h. Amputation/reimplantation
    i. Fat embolism
9. Trauma in children
10. Trauma during pregnancy
11. Trauma in elderly
12. Blast injuries
13. Mass Casualties and Injury Care

Respiratory emergencies

1. Dyspnoea
2. Respiratory failure and ARDS
3. Haemoptysis
4. Acute severe Asthma / COPD
5. Pneumothorax
6. Foreign body
7. Pneumonia and chest infections
8. Thermal/chemical injury to lungs
9. Sleep apnoea syndrome
10. Lung empyema and lung abscess
11. Tuberculosis

Gastrointestinal and Hepatic emergencies

1. Abdominal pain
    a. Acute abdomen
    b. Acute gastritis
    c. Cholangitis, cholecystitis
    d. Acute pancreatitis
    e. Acute appendicitis
    f. Perforation/peritonitis
    g. Mesenteric ischaemia
    h. Renal pain
    i. Intestinal obstruction
    j. Paralytic ileus
    k. Inflammatory bowel disease
2. Vomiting and diarrhoea/constipation
    a. Evaluation of dehydration
    b. Fluid therapy
3. Acute GI bleed
    a. Upper GI bleed

b. Lower GI bleed
4. Foreign body ingestion
5. Acute volvulus
6. Haemorrhoids
7. Rectal prolapse
8. Perirectal abscess
9. Hernias
10. Diverticulitis
11.Ascites
12.Acute liver failure 13.Cirrhosis and its complications
14.Liver abscess
15.Jaundice
16. Liver transplant patient
17. Gastrointestinal procedures and devices

CNS emergencies

1. Headache
   a. Approach
   b. Specific disorders (including migraine)
2. Syncope, vertigo and dizziness
3. Seizures
   a. Epileptic seizures
   b. Pseudoseizures
   c. Status Epilepticus
4. Coma and neurological impairment
   a. Metabolic coma
      - Hypoglycaemia
      - Ketoacidosis
      - Hyperosmolar coma
      - Hepatic encephalopathy
   b. Neurological coma
5. Meningitis and encephalitis
6. Acute stroke
   a. Ischaemic
   b. Haemorrhagic
   c. Transient ischaemic attack
   d. Subarachnoid haemorrhage
7. Cavernous sinus thrombosis
8. Ataxia and gait abnormalities
9. Compressive and non-compressive myelopathies
10 Peripheral neuropathy (including LGB syndrome)
11. Myasthenic gravis and crisis
12. Cranial nerve palsies
13. Complications of central nervous system devices and procedures

Genitourinary emergencies

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1. Nephrolithiasis
2. Acute renal failure
3 Acute retention of urine
4. Sexual assault
5. Complications of chronic kidney disease
6. Haematuria
7. Torsion of testis
8. Sexually transmitted diseases
9. Epididymitis/orchitis/prostatitis
10. Obstructive uropathy
11. Acute pyelonephritis and perinephric abscess
12. Phimosis and paraphimosis; priapism
13. Foreign body insertion
14. Kidney transplant patient
15. Complications of urological procedures and devices

Ocular emergencies

1. Red eye
    a. Conjunctivitis
    b. Acute glaucoma
    c. Uveitis
2. Trauma
    a. Foreign body
    b. Corneal abrasión
    c. Hyphema
    d. Blow-out fracture
    e. Chemical burns
3. Visual loss/impairment
4. Orbital cellulitis

ENT and Dental emergencies

1. Upper airway obstruction and stridor
2. Epistaxis
3. Acute tonsillitis/sore throat/acute laryngitis
4. Foreign bodies
5. Acute suppurative otitis media and externa
6. Acute sinusitis
7. Other infections
8. Nasal bone fracture and nasal septal hematoma
9. Orofacial pain
10. Dental fracture
11. Dental subluxation and avulsion
12. Complications of airway devices

Non-traumatic orthopaedic emergencies

1. Orthopaedic and neurovascular examination of extremities
2. Acute osteomyelitis

3. Acute arthritis 4. Acute gout 5. Prosthesis-related emergencies 6. Acute back pain 7. Acute neck pain 8. Acute shoulder pain 9. Hand and foot infections 10. Joint infections and inflammations 11. Muscle and tendon infections and inflammation
Onco-haematological emergencies 1. Normal hemostasis 2. Acute bleeding (including congenital and acquired bleeding disorders) 3. Disseminated intravascular coagulation 4. Clotting disorders 3. Use of antithrombotic and antiplatelet agents 4. Febrile neutropenia 5. Thrombocytopenia 6. Anemia and polycythemia 7. Acute haemolysis (congenital and acquired) 8. Superior vena cava syndrome 9. Tumour lysis syndrome 10. Cord compression 11. Metastatic emergencies 12. Blood/blood products and transfusion 13. Stem cell and bone marrow transplantation
Infections 1. HIV in Emergency department 2. Malaria (complicated and uncomplicated) 3. Leptospirosis 4. Enteric fever 5. Chicken pox and herpes zoster 6. Measles/mumps 7. Dengue and other haemorrhagic fevers 8. Chikungunya 9. Evaluation of fever in Emergency department 10. Acute hepatitis 11. Disseminated tuberculosis 12. Management of needlestick injury 13. Tetanus 14. Rabies 15. Diphtheria/Pertussis 16. Cholera 17. Food poisoning 18. Polio 19. Plague 20. Toxic shock syndrome

21. Gas gangrene and other anaerobic infections
22. Sexually transmitted diseases
23. Influenza
24. Fever
25. Immunization
26. Sepsis
27. Soft tissue infections
28. Sexually transmitted infections

Metabolic and Endocrine emergencies

1. Type 1 and Type 2 diabetes mellitus
2. Diabetic emergencies:
    a. Hypoglycaemia
    b. Hyperosmolar hyperglycaemic state
    c. Diabetes ketoacidosis and other ketoacidotic syndromes
3. Fluid and electrolyte abnormalities
    a. Normal physiology
    b. Hypovolemia
    c. Hyper/Hyponatremia
    d. Hyper/hypokalemia
    e. Hyper/hypocalcemia
4. Acid-base disturbances
5. Hypopituitarism/Hypoadrenalism
6. Hyperthyroidism and thyrotoxic crisis
7. Hypothyroidism and myxoedema coma

Acute toxicology

1. Initial management
2. Recognition of toxidromes
3. Antidotes
4. Insecticides and pesticides
5. Overdose with various therapeutic drugs
6. Poisoning due to various recreational agents
7. Snake bites, and scorpion and insect stings
8. Plant poisoning
9. Kerosene oil poisoning
10. Ethyl alcohol poisoning and withdrawal
11. Other alcohols (methyl alcohol, ethylene glycol and isopropanol)
12. Methaemoglobinemia
13. Hyperthermias
14. Substance abuse
15. Caustic ingestion
16. Asphyxiants
17. Metal poisoning
18. Industrial toxins
19. Mushroom poisoning

20. CBRN disasters

21. Poison control centers

Gynaecology & Obstetrics emergencies

1. Ectopic pregnancy
2. Lower abdominal pain
3. Abnormal uterine bleeding
4. Abortion
5. Pre-eclampsia/Eclampsia
6. Conduct of delivery
7. Emergency contraception
8. Sexual assault victim
9. Amniotic fluid embolism
10. Comorbid disorders during pregnancy
11. Antepartum and postpartum hemorrhage
12. Premature rupture of membranes
13. Other complications during pregnancy
14. Vulvovaginitis, pelvic inflammatory disease

Pediatric emergencies

1. Advanced pediatric life support
2. Care of newborn
3. Stridor (including croup/epiglottitis)
4. Asthma
5. Fever (neonate, young infant, older infant, child)
6. Sepsis
7. Pneumonia
8. ENT and eye disorders
9. Congenital diseases (including cardiac diseases)
10. Neonatal emergencies
11. Dehydration and fluid therapy
12. Sudden infant death syndrome
13. Drug therapy in newborns, infants and children
14. Orthopedic trauma
15. Head injury in children
16. Intubation and ventilation
17. Vascular access in children
18. Pain management and procedural sedation
19. Acute abdominal pain
20. Genitourinary emergencies
21. Neurologic emergencies
22. Hematologic emergencies
23. Oncologic emergencies
24. Metabolic emergencies (including diabetes mellitus)
25. Skin rashes
26. Child abuse
27. Child with special healthcare needs

Environmental emergencies

1. Burns (thermal and chemical)
2. Smoke inhalation
3. Lightening
4. Electric burns
5. High altitude illnesses
6. Diving emergencies
7. Cold-induced illnesses
8. Heat-induced illnesses
9. Near-drowning
10. Animal and human bites
11. Marine trauma and envenomation

Rheumatological emergencies

1. Acute vasculitis
2. Anti-phospholipid antibody syndrome
3. Rheumatologic disorders involving vital organs
4. Kawasaki's syndrome

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Dermatological emergencies

1. Initial evaluation and management
2. Exfoliative dermatitis
3. Steven Johnson syndrome
4. Toxic epidermal necrolysis
5. Skin infections, inflammation and allergies

Geriatric emergencies

1. Psycho-social assessment
2. Mobility assessment
3. Drug pharmacology
4. Geriatric abuse

Psychiatric emergencies

1. Thought & Mood Disorders
2. Anxiety & somatiform disorders
3. Self-harm
4. Delirium, dementia and psychosis
5. Suicide and homicide
6. Alcohol & substance abuse
7. IV drug abuse
8. Sexual assault & child abuse
9. Domestic violence & elder abuse
10. Violence in the ED

Disaster Medicine

1. Definitions
2. Disaster planning
3. Medical response to terrorist incidents

Miscellaneous

1. Pre-hospital care
2. Forensic aspects
    a. Medico-legal examination
    b. Examination of sexual assault accused
    c. Wound examination
    d. Bullet wounds
    e. Types of injuries (simple, grievous, dangerous)
    f. Signs of death
    g. POCSO Act
3. Palliative care in emergency department
4. Death notification in emergency department
5. Legal issues
6. Biostatistics
7. Imaging techniques:
    a. Plain x-rays
    b. Ultrasound and echocardiography
    c. CT
    d. MRI
    e. Interventional techniques
8. Nuclear medicine in emergencies

TEACHING AND LEARNING METHODS

Formal teaching sessions in Emergency medicine department

	Minimum sessions
Bedside rounds/Handover rounds	- Daily
Seminar	- Once in a week
rnal club	- Once in two weeks
Evidence based medicine discussion	- Once in two weeks
Simulation session	- Once in two weeks
Radiology Conference (USG/CT/X-RAY)	- Once in a month
Clinical case discussion	- Once in a week
Mortality meeting	- Once a month
Audit	- Once a month

Student thesis presentation - Once in 6 months

All above may refer to sessions conducted in the Emergency Department and not for each trainee. In addition, 10 lectures per year covering various ED administration and workflow would be taken by faculty. In addition, students should attend accredited scientific meetings (CME, symposia, and conferences) once or twice a year.

PG students shall be required to participate in the teaching and training program of Undergraduate students, emergency medicine technicians and interns.

A post-graduate student of Emergency Medicine will do at least one of the following to make him/her eligible to appear in his/her final examination:

a. Poster presentation at a National/Zonal/State conference of his/her speciality;

b. Podium presentation at a National/Zonal/State conference of his/her speciality;

c. Have one research paper published/accepted for publication in journal of his/her speciality as first author.

Basic structured courses for cardiac life support, trauma life support, airway management, research methodology, suturing and splinting, to be completed by end of first year and mechanical ventilation, pediatric life support, neonatal life support, nerve block needs to be completed by the postgraduate by the end of fifth semester.

List of recommended text books:

- Rosen's Emergency Medicine
- Tintinalli's Emergency Medicine: A Comprehensive Study Guide
- Principles of Pediatric & Neonatal Emergencies by Piyush Gupta
- Goldfrank's Toxicologic Emergencies
- Clinical Procedures in Emergency Medicine and Acute Care by Roberts and Hedges' Fliesher and Ludwig's Pediatric Emergency Medicine
- Ma & Mateer's Emergency Ultrasound
- Textbook of Critical Care by Mitchell P. Fink, Jean-Louis Vincent, Frederick A. Moore
- Clinical Emergency Radiology by J. Christian Fox
- Geriatric Emergency Medicine by Christian Nickel, Abdelouahab Bellou, Simon Conroy Stephens

- Current diagnosis and Treatment Emergency Medicine by C. Keith Stone, Roger Humphries Symptom to Diagnosis: An Evidence Based Guide by Scott Stern, Adam Cifu

List of recommended Journals

- Annals of Emergency Medicine
- Journal of emergency medicine
- American journal of emergency medicine
- Emergency Medicine Journal
- Journal of Emergencies, Trauma and Shock
- Western Journal of emergency medicine
- Resuscitation
- Academic Emergency Medicine
- Shock
- Wilderness and environmental medicine
- Prehospital Emergency Care

LOG BOOK:

Post-graduate students of Emergency Medicine shall maintain a dynamic e-log book which needs to be updated on a weekly basis about the work being carried out by them and the training programme undergone during the period of training.It shall be the duty of the Post- graduate guide imparting the training to assess and authenticate monthly the record (e-Log) books.

.Monthly observation Proforma

- Residents' medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self-directed learning and ability to practice in the system will be assessed continuously on the ED floor.
- Attendance (number of authorized leaves and number of absences) and reporting time at work will be recorded.
- Directly observed procedural skills will be assessed (Performa in Annexure I)
- A Shift based work placed based assessment will be done daily (Performa in Annexure II)

- Workplace based assessment of clinical skills will be assessed (Performa in Annexure III)

Total procedures(consolidated)

S. No	Date	Procedure	Number assisted	Number performed	Comments	Faculty signature with date

Academic activities (consolidated –within department/peripheral posting/outside department/outside institution)

- Journal Club Presentation performance
- Thesis review Presentation & performance
- Seminar Presentation
- Presentation in conferences & CME
- Publications & Posters
- Mortality & Morbidity audit

S.No	Date	Academic activity	Place	Comments	Faculty signature

Rotation:

Schedule for three years of MD Emergency Medicine postings:

Year	**Rotation**	**Duration**
First Year	Emergency Department	8 months
	Paediatric Emergency	1 month
	Dermatology	2 weeks
	Forensic Medicine	2 weeks
	Cardiology	2 weeks
	Wound care and Procedural sedation (In ED Dressing room/MOT)	2 weeks
	Orthopedics (in ED)	2 weeks
	Medicine	2 weeks
	Emergency Department	5 months
	Critical Care	1 month
	OBG	1 month

Second Year	Orthopaedics (in ward and OPD)	2 weeks
	District residency posting	3 months
	Surgery (in ward and minor OT)	1 month
	Ophthalmology	2 weeks
Third Year	Emergency Department	7 months
	Radiology (CT, MRI, USG)	2 weeks
	Psychiatry	2 weeks
	NICU	2 weeks
	PICU	2 weeks
	Neurology	2 weeks
	ENT	2 weeks
	Orthopedics (in ED)	2 weeks
	Paediatric Emergency	1 month
	Elective	2 weeks

.ASSESSMENT

The evaluation of the students in the M.D. Emergency Medicine course is continuous and comprehensive, aimed at assessing their knowledge, skills, and attitudes. It includes:

FORMATIVE ASSESSMENT

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.

- Monthly observation proforma's captured in the Logbook.
- End Semester Internal assessment by theory exam

SUMMATIVE ASSESSMENT

Post graduate Examination shall be as per the guidelines given in PGMER-23.

The final examination consists of following parts:

- Thesis
- Theory evaluation
- Practical/Clinical and Viva-Voce

1. Thesis/Dissertation

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.

2. Theory:

Theory consists of four papers of 3 hours each having 10 short-structured questions with 10 marks each

Paper I: Basic Medical Sciences relevant to Emergency Medicine (Anatomy, Physiology, Biochemistry, Microbiology, Pathology, Research methodology and Statistics)

Paper II: Emergency medical specialties (Medical emergencies, Radiology and Imaging, Anaesthesia and resuscitation, Toxicology, Emergencies in Dermatology and psychiatry)

Paper III: Emergency surgical specialties (Surgical emergencies, Trauma, Orthopedics, Eye, ENT)

Paper IV: Recent Advances in Emergency Medicine, Pre hospital care, Pediatrics, Obstetrics, Disaster medicine, Forensic, ED administration, medico-legal aspects.

3. Scheme of Clinical / Practical Examination(280 marks + 20 marks for Thesis/Dissertation)

i) Objective Structured Clinical Examination including X-rays, ABG, CT, MRI and ECGs (40 marks)

ii) Clinical Cases: This would include semi-long cases and short cases related to various clinical disciplines (Total 150 marks):

- Medical emergencies – One semi-long case
- Surgical emergencies – One semi-long case
- Trauma – One semi-long case
- Pediatrics – One semi-long case
- Obst./Gynae – One short case

- ENT – One short case
- Ophthalmology – One short case
- Dermatology – One short case

iii) Demonstration of skills (90 marks):

- Airway stabilization
- Cardiac Life support skills
- Communication
- Suturing and fracture splinting
- Pediatric life support skills
- Point of care ultrasound skills
- Trauma Life support skills

iv) Thesis/Dissertation (20 marks)

4. Scheme of Viva-Voce

iv) Viva Voce (100 marks):

- Instruments and Drugs
- Clinical Problems
- Research, Publication & Conference Presentation
- Pedagogy

*****

Annexure I

Emergency Medicine Workplace Based Observation
Direct Observation of Procedural Skills

Name of student:

Semester of training:

Month of posting:

Modality Posted:

Leaves taken: authorised unauthorised Reporting time:

		Score 0 Trainee did not perform	**Score 1** Trainee performed; senior clinician input required for majority of shift	**Score 2** Trainee performed; senior clinician input required for minority of shift	**Score 3** Trainee performed independently; senior clinician observed and advised for trouble shooting	**Score 4** Trainee performed independently ; senior clinician required to check	**Score 5** Trainee performed independently at Senior resident level
1	Technical Skill Performing the Procedure Knowledge, technique, efficiency, safety						
2	Indications and Contraindications Specific to patient and procedure						
3	Informed Consent Risks, benefits, carers						
4	Preparation and planning Setting, equipment (including monitoring), staff, patient positioning, medications						
5	Situational Awareness Procedure, patient, and surrounding environment						
6	Prevention and Management of Complications During and after procedure						
7	Post Procedure Management Follow up investigations, clinical care and documentation						
8	Discharge Advice to Patient/Carers						
	Total (8*5=40)						
	Logbook (10)						
	Total 50 Marks						
						Signature of faculty	

Resident's percept of exercise:

Overall faculty assessment: Area for development and agreed learning goals for next assessment:

Annexure II

Emergency Medicine Workplace Based Observation
Shift Based Assessment

Name of student:
Semester of training:
Month of posting:
Modality Posted:
Leaves taken: authorised unauthorised Reporting time:

		Score 0 Trainee did not perform	**Score 1** Trainee performed; senior clinician input required for majority of shift	**Score 2** Trainee performed; senior clinician input required for minority of shift	**Score 3** Trainee performed independently; senior clinician observed and advised for trouble shooting	**Score 4** Trainee performed independently; senior clinician required to check	**Score 5** Trainee performed independently at Senior resident level
1	Medical Expertise Assessment and management Receive and direct patient transfers						
2	Prioritisation and Decision Making Clinical reasoning, situational awareness						
3	Communication Verbal, non-verbal and written						
4	Leadership and Management Situational awareness across area/ department Lead ED Staff Resourcing Patient flow						
5	Scholarship and Teaching Teaching best practice clinical care						
6	Health Advocacy Advocacy, screening, intervention and health promotion						
7	Professionalism Ethical, caring and honest						
	Total (7*5=35)						
	Logbook (15)						
	Total 50 Marks						
						Signature of faculty	

Resident's percept of exercise:

Overall faculty assessment: Area for development and agreed learning goals for next assessment:

Annexure III

Emergency Medicine Workplace Based Observation Clinical Skills

Name of student:
Semester of training:
Month of posting:
Modality Posted:

Leaves taken: **authorised/unauthorised** **Reporting time:**

		Score 0 Trainee did not perform	**Score 1** Trainee performed; senior clinician input required for majority of shift	**Score 2** Trainee performed; senior clinician input required for minority of shift	**Score 3** Trainee performed independently; senior clinician observed and advised for trouble shooting	**Score 4** Trainee performed independently; senior clinician required to check	**Score 5** Trainee performed independently at Senior resident level
1	History Taking From patient and/or collateral sources						
2	Physical Examination Presence or absence of signs, structured examination						
3	Clinical Synthesis Appropriate, prioritised differential diagnosis, investigation approach and/or management plan						
4	Shared Decision Making with Patient/Care						
5	Communication Clear, collaborative, culturally safe						
6	Professionalism Competent, caring and hones						
7	Organisation and Efficiency Organisation and prioritisation of assessment or tasks. Performs assessment or tasks in a timely manner						
	Total (7*5=35)						
	Logbook (5)						
	Total 40 Marks						
					Signature of faculty		

Resident's percept of exercise:

Overall faculty assessment: Area for development and agreed learning goals for next assessment :

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MS IN OTORHINOLARYGOLOGY

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.

The purpose of MS ENT is to standardize Otorhinolaryngology teaching at Post Graduate level throughout the country so that it will benefit in achieving uniformity in undergraduate teaching as well and resultantly creating competent ENT Surgeons with appropriate expertise.

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 Reconciliation Board of Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. 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

At the end of postgraduate training the student should be able to:

1. Practice his specialty ethically keeping in mind the requirement of the patient, community and people at large.
2. Demonstrate sufficient understanding of basic sciences related to his specialty and be able to integrate such knowledge in his Clinical practice.
3. Diagnose and manage majority of conditions in his specialty (clinically and with the help of relevant investigations)
4. Plan and advise measures for the promotive, preventive, curative and rehabilitative aspects of health and diseases in the specialty of ENT.
5. Should be able to demonstrate his cognitive skills in the field of ENT and its ancillary branches during the formative and summative evaluation processes.
6. Play the assigned role in the implementation of National Health Programs
7. Demonstrate competence in basic concepts of research methodology and writing thesis and research papers.
8. Develop good learning, communication and teaching skills.

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9. Demonstrate sufficient understanding of basic sciences and the clinical applications related to the specialty to be able to integrate this knowledge into Clinical practice. Acquire in-depth knowledge in the subject including recent advances.
10. Demonstrate that he is fully conversant with the latest diagnostics & therapeutics available.

SUBJECT SPECIFIC LEARNING OBJECTIVES

1. Theoretical Knowledge:

A student should have fair knowledge of basic sciences (Anatomy, Physiology, Biochemistry, Microbiology, Pathology and Pharmacology) as applied to ENT and be able to integrate such knowledge in his clinical practice. She/He should acquire in-depth knowledge of his subject including recent advances. She/He should be fully conversant with the bedside procedures (diagnostic and therapeutic) and having knowledge of latest diagnostics and therapeutics available.

2. Clinical / Practical skills:

A student should be adept at good history taking, physical examination, providing basic life support and advanced cardiac life support, common procedures like FNAC, Biopsy, aspiration from serous cavities, lumber puncture etc. She/he should be able to choose the required investigations to enhance the attitude, communication skills, including dealing with patient's relatives with the required empathy, adapt to changing trends in education, learning methods and evolving new diagnostic and therapeutic techniques in the subject of ENT.

3. Research:

She/He should know the basic concepts of research methodology, plan a research project, plan and write a thesis and should know how to use library facilities. Basic knowledge of statistics is also required. Knowledge about use of internet resources is required.

4. Teaching:

The student should learn the basic methodology of teaching and assessment and develop competence in teaching medical/paramedical students and their assessment.

SUBJECT SPECIFIC COMPETENCIES

A. Cognitive Domain

At the end of training, the student should be able to demonstrate ability to practically apply knowledge gained during training period. This would include the following:

Basic Sciences related to Otolaryngology

- Physiology- Mechanism of perception of smell and taste, mechanism of breathing and voice production, lacrimation, deglutition and salivation. Functional tests of the nose and paranasal sinuses, mechanism of cough and sneezing.
- Physics of sound, theories of hearing, mechanism of perception of sound and speech production, physiology of equilibrium and cerebral function. Physiology of brain in connection with hearing, speech, smell and phonation. Audiologic tests like audiometry, impedance, evoked potentials, OAE, Speech audiometry.
- Physiology of larynx, tracheobronchial tree and oesophagus - Histology of mucous membranes, internal ear and other associated organs and structures, nose, PNS NPx, Larynx, Tracheo-Bronchial tree, Lymphoepithetical system. Mechanism of immune system/immunology and genetics.
- Anatomy-Embryogenesis of ear, nose and throat including palate and the larynx, Oesophagus, trachea and lungs, tongue, salivary gland Head and Neck and skull base etc.
- Parapharyngeal spaces in the neck including connective tissue barriers of larynx.
- Applied anatomy of the skull bones, accessory sinuses, external, middle and inner ears, nose, PNS, nasopharynx, meninges, brain, pharynx, larynx, trachea and bronchi, lungs, pleurae, oesophagus and the mediastinum.
- Anatomy of all cranial nerves with their functions.

Principles and Practices of Otolaryngology, Audiology and Speech Pathology

- Clinical Methodology as applied to ORL HN diseases in adult and children and the accessory sinuses, diagnosis and surgical treatment of diseases of nose, throat and ear in adult and children. Prevention and treatment, infectious diseases of Otolaryngology and Head Neck region. Circulatory and nervous disturbances of the nose, throat and ear and their effects on other organs of the body. Deformities, injuries sinus infections, polyps and the tumors of the nose, and paranasal sinuses.
- Examination of the ear, deafness and allied diseases, complications of diseases of the ear. Injuries, tumors, nervous and circulatory neurological disturbances of the ear. Diagnosis and treatment of tinnitus and vertigo. Diagnosis and rehabilitation of the Hearing handicapped including, dispensing of hearing aid other vibrotatile aids.
    - Surgical pathology of Otolaryngology and Head Neck region.
    - Basic knowledge of anaesthesia as related to ENT.
    - Examination of diseases of children (Paediatric ORL) in connection with throat and larynx. Neurological and vascular disturbances. Congenital and neonatal stridor.
    - Pathology of various diseases of the larynx and throat, tracheo- bronchial tree and their causative organisms.

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- Indications and various techniques of direct laryngoscopy, nasal endoscopy. Bronchoscopy and oesophagoscopy, including microlaryngoscopic procedures.
- Reading of radiograms, scans, audiograms, nystagmograms and tympanograms in connection with ENT diseases/disorders.
- Special apparatus for the diagnosis and treatment of the diseases of ear, nose and throat including audiometer, BERA, Speech analyser etc.

Recent advances in Otolaryngology and Head Neck surgery

- Recent developments in the diagnosis, pathogenesis and treatment of the ENT diseases
- The knowledge of the frontiers of the oto-laryngology and lateral skull base surgery
- Rhinoplasty, endoscopic sinus surgery, and anterior cranial fossa surgery
- Knowledge of LASERS and fibre optics
- Other methods of managing Hearing loss
- Implantable hearing aids cochlear implants
- Phonosurgery
- Etiology and Managements of sleep apnoea/snoring
- Hypophysectomy and optic nerve decompressions
- Immunotherapy and modalities of the gene therapy
- Newer techniques for Radiotherapy including, use of gamma knife for treatment of Intracranial tumors and other malignancy
- Chemotherapy of cancer

General Surgical Principles and Head-Neck Surgery

- General Surgery, Head and Neck oncology, and Medicine as applicable to the ENT disorders/diseases. Surgery of congenital deformities of nose, ear (Pinna) and trachea/oesophagus etc.
- Radiology, Imaging – computed tomography and magnetic resonance imaging, (MRI) and intervention radiology and angiography as related to ENT
- General Pathologic aspects such as wound healing and also pathology and Pathogenesis of ENT diseases, Pharmacology, molecular biology, genetics, cytology, haematology, and immunology as applicable to otolaryngology
- General Principles of faciomaxillary traumatology and neck injury
- Plastic Surgery as applicable to Otolaryngology

B. Affective Domain

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1. The student will show integrity, accountability, respect, compassion and dedicated patient care. The student will demonstrate a commitment to excellence and continuous professional development.
2. The student should demonstrate a commitment to ethical principles relating to providing patient care, confidentiality of patient information and informed consent.
3. The student should show sensitivity and responsiveness to patients' culture, age, gender and disabilities.
4. The student should be able to choose the required investigations to enhance the attitude, communicative skills, including dealing with patient's relatives with the required empathy, adapt to changing trends in education, learning methods and evolving new diagnostic and therapeutic techniques in the subject of ENT.

C. Psychomotor Domain

By the end of the training, a student should be able to demonstrate his skills in:

- Taking a good history and demonstrating good examination techniques.
- arrive at a logical working diagnosis, differential diagnosis after clinical examination and order appropriate investigations keeping in mind their relevance (need based) and thereby provide appropriate care that is ethical, compassionate, responsive and cost effective and in conformation with statutory rules.
- Should be able to perform and demonstrate the practical skills in the field of ENT including the following:
    - Examination of the ear, nose and throat oral cavity examination
    - Clinico-physiological examination and evaluation of the audio-vestibulo neurological system
    - Examination of the larynx and the throat including flexible endoscopy, stroboscopy, voice analysis and the clinico-physiological examination of the speech
    - Examination of the otological and audiological system including Tuning fork testing, audiological evaluation, micro and otoendoscopy
    - Clinical and physiological evaluation of the nose and paranasal sinuses including nasal endoscopy and olfactory evaluation
    - Examination of the neck and its structures
- Should demonstrate and perform various therapeutic skills related to the speciality such as :
    - Tracheostomy
    - Anterior/ posterior nasal packing
    - Ear Packing and Syringing
    - Foreign body removal from air nose and throat

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- Airway management including basic life support skills, Cardiopulmonary resuscitation, intubation, homeostasis maintenance, IV alimentation and fluid, electrolyte maintenance and principles of blood transfusion alimentation including Nasogastric feeding, gastrostomy
- Wound suturing, dressings and care of the wounds
- Basic principles of rehabilitation
- common procedures like FNAC, biopsy, aspiration from serous cavities, lumber puncture etc.

- Should understand principles of and interpret X-rays/CT/MRI, audiograms, ENG, BERA, OAE, ultrasonographic abnormalities and other diagnostic procedures in relation to the speciality
- Should have observed/performed under supervision the various surgical procedures in relation to the speciality

Syllabus

Course contents:

1. Anatomy and Physiology of Ear, Nose and Throat, Trachea and esophagus.
2. The generation and reception of speech
3. Radiographic anatomy of the ear, nose, throat and imaging.
4. Bacteriology in relation to Otorhinolaryngology
5. Allergy and rhinitis
6. Haematology in relation to Otolaryngology
7. Anaesthesia for Otolaryngology
8. Pharmacology of drugs used in ENT
9. Electrolyte, fluid balance/shock conditions
10. Use of teaching aids
11. Routine blood, urine testing
12. Preparation of slides
13. Facial nerve stimulation test
14. Audiometric tests like pure tone Audiometry, Impedance Audiometry, Free field Audiometry, Specialized tests of hearing including SISI, Tone decay, ABLB, Speech discrimination score etc.
15. Vestibular tests like caloric testing (Water and Air) stopping test, Fukuda's test,
16. Evoked response audiometry.

Ear:

1. The physical and functional examination of the ear
2. The functional and physical examination of the vestibular system.
3. Tinnitus
4. Affections of external ear
5. Repair of deformities of the external ear.

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6. Congenital conditions of the middle ear cleft
7. Traumatic conductive deafness
8. Acute inflammation of the middle ear cleft
9. Non-suppurative otitis media
10. Chronic suppurative otitis media
11. Management of chronic suppurative otitis media
12. Complications of infections of middle ear.
13. Tumors of the middle ear cleft and temporal bone
14. Diseases of the otic capsule-otosclerosis
15. Diseases of the otic capsule-other diseases
16. The deaf child
17. Acoustic neuroma
18. Ototoxicity
19. Presbycusis
20. Diagnosis and management of sudden and fluctuant sensorineural hearing loss
21. Meniere's disease
22. Neurologic aspects of vertigo
23. Facial paralysis
24. Rehabilitation of adults with acquired Hearing loss-Hearing aids
25. The cochlear Implants
26. Nystagmus
27. Otoacoustic emissions

Nose:

1. Examination of the nose
2. Conditions of the external nose
3. Injuries of the facial skeleton
4. Congenital diseases of the nose
5. The nasal septum
6. Foreign bodies in the nose, rhinolith
7. Epistaxis
8. Acute chronic inflammations of the nasal cavities
9. Vasomotor rhinitis-allergic and non-allergic
10. Nasal polyposis
11. Abnormalities of smell
12. Acute sinusitis
13. Chronic sinusitis
14. Nasal Allergy/Fungal allergic sinusitis
15. Complications of acute and chronic sinusitis
16. Tumors of nose and sinuses
17. Facial pains
18. Trans-ethmoidal hypophysectomy

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19. Functional endoscopic sinus surgery (FESS)

Throat:

1. Methods of examination of the mouth and pharynx
2. Diseases of the mouth
3. Diseases of the salivary glands
4. Pharyngeal lesions associated with general diseases
5. Diseases of the tonsils and adenoids (excluding neoplasms)
6. Tumors of the pharynx
7. Hypopharyngeal diverticulum (Pharyngeal Pouch)
8. Methods of examining and larynx and tracheobronchial tree
9. Congenital diseases of the larynx
10. Laryngeal disorders in singers and other voice users
11. Neurological affections of larynx and pharynx
12. Intubation of the larynx, laryngotomy and tracheostomy
13. Cervical node dissection
14. Skin grafts in Otolaryngology and reconstructive methods including regional and distant flaps for repair of defects after excision of tumors or trauma.
15. Micro laryngeal surgery/thyroplasty

Miscellaneous and head and neck:

1. Cranial nerves
2. Raised intracranial tension-causes, diagnosis, management with particular reference to otitis hydrocephalus
3. Head injuries and I.C. Haemorrhage
4. Pituitary gland, anatomy, physiology hypo - and hyper - pituitarism, new growths.
5. Intracranial venous sinuses and their affections
5. Osteology: skull, mandible cervical and thoracic vertebral sternum
6. Cervical fascia, facial spaces in neck, retro-pharyngeal and parapharyngeal Abscesses
7. Anatomy and physiology of thyroid gland, goitre, diseases of the thyroid and carcinoma of thyroid
8. Large blood vessels in neck, thoracic duck development of major cervical and thoracic blood vessels.
9. Head and neck reconstructive surgery

Drugs used in ENT:

1. Antibiotics Antihistaminic
2. Nasal vasoconstrictors
3. Local anaesthetics
4. Corticosteroids

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5. Cyto-toxic agents
6. Antibiotics
7. Radioactive isotopes
8. Antifungal agents
9. Vasopressive and other agents used in shock like states.

General:

1. Physiology of circulation, regulation of blood pressure, reactions of body to haemorrhage, patho-physiology of shock, fluid balance, blood transfusion and its hazards, fluid replacement therapy, burns
2. Agents used in shock like states

Desirable

1. The ears and nasal sinuses in the aerospace environment
2. Physiological consideration of pressure effects on the ear and sinuses in deep water diving
3. The principles of cancer immunology with particular reference to head and neck cancer
4. Principles of chemotherapy in head and neck cancer
5. Recording of nystagmus by ENG and its interpretation

Ear:

1. Traumatic lesions of the inner ear
2. Inflammatory lesions of the vestibular and auditory nerve
3. Vascular lesions of the inner ear
4. Electronystagmography
5. Skull base/Neurologic surgery

Nose:

1. Cosmetic surgery of the nose
2. Non-healing granuloma of the nose
3. Surgery of the pterygopalatine fossa
4. LASER Surgery

Throat:

1. Oesophageal conditions in the practice of ear, nose and throat surgery
2. Disorders of speech
3. Lower respiratory conditions in Otolaryngology

Miscellaneous and head and neck

1. Functional Anatomy of cerebellum and brainstem

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2. Anatomy of mediastinum
3. Pleura, plural cavity, broncho-pulmonary segments and their clinical importance
4. Facial plastic surgery

TEACHING AND LEARNING METHODS

Teaching methodology

Didactic lectures are of least importance; small group discussion such as seminars, journal clubs, symposia, reviews and guest lectures should get priority for theoretical knowledge. Bedside teaching, grand rounds, structured interactive group discussions and clinical demonstrations should be the hallmark of clinical/practical learning with appropriate emphasis on e-learning. Student should have hand-on training in performing various procedures and ability to interpret various tests/investigations. Exposure to newer specialized diagnostic/therapeutic procedures concerning her/his subject should be given. Self-learning tools like assignments and case-based learning may be promoted. Exposure to newer specialized diagnostic/therapeutic procedures concerning ENT should be given.

1. Rotations:
   - A major portion of posting should be in ENT Department. It should include in-patients, out-patients, ICU, trauma, emergency room, specialty clinics includingVertigo Clinic, Rhinology Clinic, Otology Clinic, Cancer Clinic, Cadaveric dissection Lab, Audiology and speech therapy.
   - Inter-unit rotation in the department should be done for a period of up to one year.
   - Rotation in appropriate related subspecialties for a total period not exceeding 06 months.
2. Clinical meetings:

   There should be intra- and inter- departmental meetings for discussing the uncommon /interesting cases involving multiple departments.

3. **Log book:** Each student must be asked to present a specified number of cases for clinical discussion, perform procedures/tests/operations/present seminars/review articles from various journals in inter-unit/interdepartmental teaching sessions. They should be entered in a Log Book. The Log books shall be checked and assessed periodically by the faculty members imparting the training.
4. Thesis writing and research:

   Thesis writing is compulsory.
5. The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
6. 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.

7. The student should know the basic concepts of research methodology, plan a research project, be able to retrieve information from the library. The student should have a basic knowledge of statistics.
8. Department should encourage e-learning activities.

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 surgical skills laboratories in the medical colleges is mandatory.

ASSESSMENT

Assessment should be comprehensive & objective. It should address the stated competencies of the course. The assessment needs to be spread over the duration of the course.

FORMATIVE ASSESSMENT, i.e., assessment during the training would include:
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.

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.

Quarterly assessment during the MS training should be based on following educational activities:

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**

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

SUMMATIVE ASSESSMENT ie.,at the end of the training

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The examination will be in three parts:

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 candidate 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 candidate shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

2. Theory

The examinations shall be organised on the basis of 'Grading'or 'Marking system' to evaluate and to certify candidate'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 MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

Theory shall consist of four papers of 3 hours each.

Paper I: Basic Sciences related Otolaryngology
Paper II: Principles and Practices of Otolaryngology
Paper III: Recent advances in Otolaryngology and Head Neck surgery.
Paper IV: General Surgical Principles and Head-Neck Surgery.

3. Clinical / Practical and viva voce Examination

Clinical examination shall be conducted to test the knowledge, skills, attitude and competence of the post graduate students for undertaking independent work as a

specialist/teacher, for which post graduate students shall examine a minimum one long case and two short cases.

The Oral examination shall be thorough and shall aim at assessing the post graduate student's knowledge and competence about the subject, investigative procedures, therapeutic technique and other aspects of the specialty, which form a part of the examination.

Assessment may include Objective Structured Clinical Examination(OSCE).

Oral/Viva-voce examination needs to assess knowledge on X-rays, instrumentation, operative procedures. Due weightage should be given to Log Book Records and day-to-day observation during the training.

Recommended Reading:

Books (latest edition)

- Scott-Brown's *Otorhinolaryngology and Head and Neck Surgery*
- Cummings *Otolaryngology - Head and Neck Surgery*
- *Otolaryngology, Otology &Neurotalogy* by Paprella&Micheal
- Glasscock-Shambaugh's*Surgery of the Ear*
- *Essentials of Functional Sinus Surgery* by Heinz Stammberger MD
- *Color Atlas of Head & Neck Surgery* by Jatin P Shah
- *Handbook of Clinical Audiology*by Jack Katz
- Stell& Maran's *Textbook of Head and Neck Surgery and Oncology*

Journals

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

Annexure I

Postgraduate Students Appraisal Form Pre / Para /Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM……TO……

Sr. No.	PARTICULARS	Not Satisfactory	Satisfactory	More Than Satisfactory	Remarks
		1 2 3	4 5 6	7 8 9	
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 attributesof 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 CONSULTANT** **SIGNATURE OF HOD**

Medical Council of India

NATIONAL MEDICAL COMMISSION
Postgraduate Medical Education Board

D 11011/1/22/AC/Guidelines/09 **Date: 01-08-22**

National Medical Commission

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR M.D. IN GENERAL MEDICINE

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN GENERAL MEDICINE

Preamble:

The purpose of post graduate (PG) education in General Medicine is to create specialists who would provide appropriate health care to the community and advance the cause of science through research, training and teaching the medical fraternity.

The competency-based training programme aims to produce a postgraduate doctor who after required training should be able to deal effectively with the medical needs of the community. The postgraduate specialist is also expected to know the principles of research methodology and be able to update himself with advances and practice evidence-based medicine. They should be trained to work in synchrony with faculty in super-speciality courses of Medicine and to follow a holistic approach to medical care which would lead to the development of good quality teachers. This document has been prepared by subject-content specialists of the National Medical Commission. The Expert Group of the National Medical Commission had attempted to render uniformity without compromise to the purpose and content of the document. 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.

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SUBJECT SPECIFIC OBJECTIVES

Postgraduate training should enable the student to:

- Practice internal medicine with competence, with the help of scientific knowledge in an evidence based fashion.
- Conduct clinical examination and relevant investigations, diagnose medical conditions and refer early where indicated.
- Plan and deliver comprehensive treatment using the principles of rational drug therapy.
- Plan and advise measures for the prevention and rehabilitation of patients.

- Manage emergencies efficiently by providing Basic Life Support (BLS) and Advanced Life Support (ALS).
- Recognize conditions that may be outside of scope of general medicine and refer to an appropriate specialist.
- Exercise empathy and a caring attitude and maintain professional integrity, honesty and high ethical standards.
- Document case details including epidemiological data.
- Play the assigned role in the implementation of National Health Programs.
- Demonstrate competence in basic concepts of research methodology and clinical epidemiology; and preventive aspects of various disease states.
- Become a motivated 'teacher' - defined as one keen to share knowledge and skills with a colleague or a junior or any learner.
- Continue to evince keen interest in continuing education and use appropriate learning resources.
- Practice the medico-legal responsibilities.
- Undertake audit related to patient care, morbidity and mortality, use information technology tools and carry out research - both basic and clinical, with the aim of publishing the work and presenting the work at scientific forums.
- Participate in public health emergencies (arising in the community).
- Estimate the financial burden of care and practice health economics and rational approach to investigations.
- Communicate about the illness with patient's/relatives at all stages of care.

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SUBJECT SPECIFIC COMPETENCIES

By the end of the course, the student should have acquired knowledge (cognitive domain), professionalism (affective domain) and skills (psychomotor domain) as given below:

A. Predominant in Cognitive Domain:

1. Describe clinical features of diseases of various aetiology affecting all systems in the adult and geriatric population.

2. Apply the basic sciences knowledge in understanding and managing common diseases.
3. Describe the investigations to be undertaken at various levels like OPD, Ward, ICU etc. and choose them appropriately depending on the clinical features and epidemiologic principles.
4. Describe the pharmaco-therapeutics of various diseases and complications.
5. Describe and discuss the health issues related to environmental and ecological factors.
6. Describe and discuss the methods and mechanisms of rehabilitation following diseases.
7. Describe and discuss the issues related to palliative and terminal care.
8. Incorporate the national and international guidelines related to various diseases in day to day practice and teaching.
9. Describe and discuss the social and economic aspects of illnesses, outbreaks and epidemics.
10. Analyse the observations of disease patterns in patients and community and make suggestions for improvement in management and prevention.
11. Describe and discuss the National Health Programs.
12. Analyse and critique the publications related to various aspects of illnesses and evidence based medicine.
13. Describe and discuss the various levels of prevention in communicable and non - communicable diseases.
14. Describe and discuss various legislations related to organ transplant, brain death, informed consent, human rights etc.
15. Be updated on recent advances in internal medicine.

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, relatives, paramedical and medical colleagues to provide the best possible comprehensive care.

2. Always adopt ethical principles and maintain professional etiquette in dealing with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.

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3. Develop communication skills to interact with patients, relatives, peers and paramedical staff, with special emphasis on breaking bad news empathetically.

4. Should demonstrate equity and equality when dealing with individuals of special groups (differently abled and LGBTQIA+).

C. Predominant in Psychomotor domain:

The post graduate student, at the end of the course should be able to perform the following skills, independently (PI) or under supervision (PS):

Clinical Assessment Skills

- Elicit a detailed clinical history (PI)
- Perform a thorough physical examination of all the systems (PI)

Procedural skills

- Pleural tap (PI)
- Lumbar puncture (PI)
- Arterial puncture for ABG (PI)
- Bone marrow aspiration and biopsy (PI)
- Abdominal paracentesis - diagnostic (PI)
- Aspiration of liver abscess (PI)

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- Ultrasound abdomen at point of care (PI)
- Fine needle aspiration cytology (FNAC) from palpable lumps (PI)
- Pericardiocentesis (PS)
- Joint fluid aspiration (PI)
- Liver biopsy (PI)
- Kidney biopsy (PS)
- Cardiac-TMT (PS)
    - Holter monitoring (PS)
    - Echocardiography (point of care) (PS)
    - Doppler studies (PS)

Respiratory management

- Non-invasive and mechanical ventilation (PI)

Critically ill person

- Monitoring a sick person (PI)

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- Endotracheal intubation (PI)
- Cardio-pulmonary resuscitation(PI)
- Central vein cannulation and CVP monitoring (PI)
- Using a defibrillator (PI)
- Hemodialysis (PS)
- Certification of Brain death (PI)

Interpretation Skills

Interpretation of results of the following investigations, considering clinical data (history & examination findings).

- Treadmill testing (PI)
- ABG analysis (PI)
- Ultrasonography (PI)
- CT scan chest and abdomen (PI)
- CT scan head and spine (PI)
- MRI- Brain and spine (PI)
- Barium studies- desirable (PI)
- Pulmonary function tests (PI)
- Immunological investigations (PI)
- Nerve Conduction studies /EMG (PI)
- EEG (PI)
- Evoked Potential interpretation (PI)

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Communication skills (PI)

While eliciting clinical history and performing physical examination, emphasize on:

- Communicating health and disease,
- Pre-test and post-test counseling for HIV,
- Pedagogy: teaching students, other health functionaries: lectures, bedside clinics, discussions,
- Health education: prevention of common medical problems, promoting healthy life-style, immunization, periodic health screening, counseling skills in risk factors for

common malignancies, cardiovascular disease, AIDS etc.

- Dietary counseling in health and disease,
- Linking patients with community resources,
- Providing referral,
- Genetic counseling,
- Communicating bad news to the patient and relatives.

Others

- ***Demonstration of the following:*** **(PI)**
  - professionalism
  - ethical behavior (humane and professional care to patients)
- *Utilization of information technology*
  - Medline search, Internet access, computer usage
- *Research methodology*
  - designing a study
  - interpretation and presentation of scientific data
- *Self-directed learning*
  - identifying key information sources
  - literature searches
  - information management
- *Therapeutic decision-making*
  - managing multiple problems simultaneously
  - assessing risks, benefits and costs of treatment options
  - involving patients in decision-making
  - selecting specific drugs within classes
  - rational use of drugs

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Syllabus

Course contents:

A: Cognitive domain:

Basic Sciences

1. Basics of human anatomy as relevant to clinical practice:

- Surface anatomy of various viscera

- Neuro-anatomy
- Important structures/organ's location in different anatomical locations in the body
- Histology of organs
- Blood supply, nerve supply to various organs

2. Applied physiology of various organ systems:
    - Basic functioning of various organ-system, control of vital functions.
    - pathophysiological alteration in diseased states.
    - interpretation of symptoms and signs in relation to pathophysiology.
    - Physiology of temperature, sleep regulation.

3. Applied biochemical basis of various diseases including fluid and electrolyte disorders:
    - Acid - base disorders, disorders of carbohydrate, fat, protein, calcium, phosphorous and iron metabolism.
    - Interpretation and clinical application of various biochemical tests.

4. Applied pathology of different diseases.
    - Common pathological changes in various organs associated with diseases and their correlation with clinical signs.
    - Understanding of various pathogenic processes and possible therapeutic interventions, and
    - Preventive measures at various levels to reverse or arrest the progression of diseases.

5. Knowledge about various microorganisms, their special characteristics important for their pathogenetic potential or of diagnostic help:
    - Important organisms associated with tropical diseases, their growth pattern/life-cycles,
    - Levels of therapeutic interventions possible in preventing and/or eradicating the organisms,
    - Antimicrobial resistance,
    - Antibiotic stewardship,
    - Hospital infection control,
    - Biomedical waste management,
    - Vaccinology.

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6. Knowledge about pharmacokinetics and pharmaco-dynamics of the drugs used for the management of common problems in a normal person and in patients with diseases of kidneys/liver/systemic disorders which may need alteration in doses due to abnormal metabolism/excretion of the drugs:
    - pharmacokinetics and pharmaco-dynamics of drugs: principles and methodology
    - Rational use of available drugs.
    - Principles of drug therapy,
    - Adverse drug reactions,
    - Drug interaction,
    - Pharmacovigilance,
    - Drug abuse and addiction,
    - Drug development,
    - Pharmacoeconomics,
    - Pharmacogenomics.
7. Research methodology, study designs, clinical epidemiology and biostatistics relevant to medical sciences.
8. National Health Programmes:
    - investigation of community outbreak,
    - public health policy,
    - health promotion,
    - prevention of communicable and non-communicable diseases.
    - International health regulations,
    - Travel medicine.
9. Knowledge about various poisons with specific reference to different geographical and clinical settings - their diagnosis and management.
    - Knowledge about snake bite, other bites and stings,
    - medicolegal aspects.

Systemic Medicine

10. Preventive and environmental issues, including principles of preventive health care, immunization and occupational, environmental medicine and bioterrorism,
    - Health tourism,

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- Rehabilitation,
- Drowning,
- Heat and altitude related disorders.

11. Geriatric Medicine:

- Physiology and biology of aging and various organ changes in elderly.
- Principles of geriatric medicine and uniqueness of geriatric presentation.
- Physical examination of geriatric patient.
- drug metabolism, laboratory tests in elderly.
- Management of unique problems related to elderly such as nutrition, falls, gait disorders, neuro- psychiatric problems etc.
- Mental health disorders,
- Elderly neglect and abuse,
- Social and family support and rehabilitation of elderly.
- Assessment of functional and cognitive aspects, counseling and communication with elderly.
- Appropriate medication and avoidance of poly-pharmacy.

12. Genetics:

- Overview of the paradigm of genetic contribution to health and disease
- Principles of Human Genetics
- Genetic basis of medical disorders
- Single gene and chromosomal disorders
- Genetic counseling
- Prevention of genetic disorders
- Genetic analysis
- Gene therapy

13. Immunology:

- Innate and adaptive immune systems
- Mechanisms of immune mediated cell injury
- HLA system, primary and secondary immune-deficiency,
- Allergic disorders: urticaria, angioedema, anaphylaxis and other allergic disorders.
- Transplantation immunology, immunocomplex disorders, organ specific and multisystem immune disorders, monoclonal antibodies.

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14. Cardio-vascular diseases:

- Approach to the patient with possible cardio-vascular diseases
- Investigative cardiology
- Heart failure
- Arrhythmias
- Hypertension
- Coronary artery disease
- Valvular heart disease
- Infective endocarditis
- Diseases of the myocardium and pericardium
- Diseases of the aorta and peripheral vascular system
- Congenital heart diseases
- Pulmonary arterial hypertension
- Cor pulmonale

15. Respiratory system:

- Approach to the patient with respiratory diseases
- Investigative pulmonology
- Disorders of ventilation
- Asthma
- Chronic Obstructive Pulmonary Disease (COPD)
- Bronchiectasis
- Occupational lung diseases
- Interstitial lung diseases
- Hypersensitivity Pneumonitis
- Pneumonia and suppurative lung diseases
- Pulmonary embolism
- Cystic fibrosis
- Obstructive sleep apnoea syndrome and diseases of the chest wall, pleura and mediastinum
- Pulmonary manifestations of systemic diseases

16. Nephrology:

- Approach to the patient with renal diseases
- Acute kidney injury

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- Chronic kidney disease
- Glomerular diseases
- Nephrotic syndrome
- Reno vascular hypertension
- Cystic Diseases of the kidney
- Tubulo-interstitial diseases
- Nephrolithiasis
- Urinary tract infection and pyelonephritis
- Diabetes and the kidney
- Obstructive uropathy and treatment of irreversible renal failure
- Dialysis
- Renal involvement in systemic diseases

17. Gastro-intestinal diseases:

- Approach to the patient with gastrointestinal diseases
- Gastrointestinal endoscopy
- Motility disorders
- Diseases of the esophagus
- Acid peptic disease
- Functional gastrointestinal disorders
- Diarrhea
- Malabsorption syndromes
- Irritable bowel syndrome
- Inflammatory bowel diseases
- Mesenteric vascular insufficiency
- Diverticular disease
- Acute intestinal obstruction
- Peritonitis
- Diseases of the rectum and anus

18. Diseases of the liver and gall bladder:

- Approach to the patient with liver disease
- Interpretation of liver function tests
- Hyperbilirubinemia
- Acute viral hepatitis
- Drug induced /toxic hepatitis

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- Chronic hepatitis
- Alcoholic and non-alcoholic steatohepatitis
- Cirrhosis and its sequelae/ complications
- Portal hypertension
- Budd Chiari syndrome
- Hepatic failure and liver transplantation
- Diseases of the gall bladder and bile ducts
- Disease of pancreas including pancreatitis

19. Haematologic diseases:

- Hematopoiesis
- Anemias
- Leucopenia and leukocytosis
- Myelo-proliferative disorders
- Bone marrow failure syndromes
- Plasma cell disorders
- Disorders of hemostasis and haemopoietic stem cell transplantation
- Platelet Disorders
- Hypercoagulable conditions
- Blood components and transfusion medicine

20. Oncology:

- Epidemiology
- Biology and genetics of cancer
- Approach to patient with cancer
- Early detection or prevention of cancer
- Infection in cancer patients
- Oncological emergencies
- Paraneoplastic syndromes and endocrine manifestations of tumours
- Metastatic cancer of unknown primary site
- Hematological malignancies
- Cancers of various organ systems and cancer chemotherapy
- Rehabilitation and palliative care in cancer patients.

21. Metabolic diseases - inborn errors of metabolism and disorders of metabolism:

- Hemochromatosis

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- Wilson's disease
- Porphyrias
- Other inborn errors of metabolism.

22. Nutritional diseases:

- Nutritional assessment, Anthropometry
- Enteral and parenteral nutrition
- Obesity and eating disorders.
- Malnutrition
- Vitamin and trace element deficiencies and excess.

23. Endocrine diseases:

- Approach to patients with endocrine disorders
- Disorders of Pituitary
- Disorders of thyroid gland
- Disorders of adrenal cortex
- Pheochromocytoma
- Multiple endocrine neoplasia
- Autoimmune polyendocrine syndromes
- Reproductive endocrinology including menopause and postmenopausal hormone therapy
- Diabetes mellitus
- Hypoglycemia
- Metabolic Syndrome
- Dyslipidemia
- Disorders of parathyroid gland
- Disorders of bone and mineral metabolism in health and disease
- Osteoporosis

24. Rheumatic diseases:

- Approach to the patient with rheumatic diseases
- Osteoarthritis
- Rheumatoid arthritis
- Spondyloarthropathies
- Systemic lupus erythematosus (SLE)
- Sarcoidosis

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- Sjogren's syndrome
- Systemic sclerosis
- Anti-phospholipid antibody syndrome
- Bechet's disease
- Vasculitis syndromes
- Acute rheumatic fever
- Inflammatory myopathies
- Arthritis associated with systemic diseases
- Gout and crystal associated arthritis
- Relapsing polychondritis
- IgG4 related disease
- Polymyalgia rheumatica
- Fibromyalgia
- Amyloidosis

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25. Infectious diseases:

- Basic consideration in Infectious Diseases
- Clinical syndromes
- Community acquired clinical syndromes
- Nosocomial infections
- Infections in immunocompromised
- Bacterial diseases - General consideration, diseases caused by gram - positive bacteria, diseases caused by gram - negative bacteria, miscellaneous bacterial infections, Atypical bacterial infections - Mycobacterial diseases, Spirochetal diseases, Rickettsial disease, Mycoplasma and Chlamydia.
- Viral diseases - DNA viruses, RNA viruses, HIV infection, Emerging viral diseases - Coronavirus, Nipha virus, H1N1 virus, Hantavirus.
- Fungal infections,
- Protozoal infections,
- Helminthic infections.

26. Neurology

- Approach to the patient with neurologic diseases,
- Diagnostic neurology,
- Localization of neurological disease/s,

- Headache,
- Seizure disorders and epilepsy,
- Coma,
- Disorders of sleep,
- Cerebrovascular diseases,
- Cranial neuropathy,
- Dementias and neurodegenerative diseases,
- Brain abscess,
- Demyelinating diseases,
- Parkinson's disease and other movement disorders,
- Motor neuron diseases,
- Ataxic and gait disorders,
- Meningitis and encephalitis,
- Prion diseases,
- Peripheral neuropathies,
- Muscle diseases,
- Diseases of spinal cord
- Diseases of neuromuscular transmission,
- Autonomic disorders and their management.

27. Psychiatric disorders

Common psychiatric disorders in adult & geriatric population:

- Mood (affective) disorders,
- Anxiety disorders,
- Schizophrenia,
- Organic mental disorders,
- Eating disorders,
- Sexual disorders,
- Personality disorder and suicide and self-harm,
- Autistic disorders,
- Functional and psychosomatic disorder,
- Somatoform disorder,
- Dissociative/ conversion disorder.
- Substance use disorders.

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28. Dermatology:

- Structure and functions of skin.
- Infections of skin.
- Papulo-squamous and inflammatory skin rashes.
- Photo-dermatology.
- Erythroderma.
- Cutaneous manifestations of systematic diseases.
- Bullous diseases.
- Drug induced rashes.
- Disorders of hair and nails.
- Principles of topical therapy.

29. Critical care medicine

- Approach to patient with critical illness.
- Acute respiratory distress syndrome.
- Mechanical ventilatory support.
- Approach to patient with shock.
- Sepsis and septic shock.
- Cardiogenic shock and pulmonary edema.
- Cardiovascular collapse and cardiac arrest.
- Cardiopulmonary resuscitation.

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30. Miscellaneous

- Medical illnesses in pregnancy
- Peri-operative evaluations

B: Psychomotor domain: Detailed guidelines on this section are given under Subject specific competencies.

TEACHING AND LEARNING METHODS

General principles

Acquisition of competencies being the keystone of doctoral medical education, such training should be skills oriented. Learning in the program, essentially autonomous and self-directed,

and emanating from academic and clinical work, shall also include assisted learning. The formal sessions are meant to supplement this core effort.

All students joining the postgraduate (PG) courses shall work as full-time (junior) residents during the period of training, attending not less than 80% of the training activity during the calendar year, and participating in all assignments and facets of the educational process. They shall maintain a log book for recording the training they have undergone, and details of the procedures done during laboratory and clinical postings in real time.

Teaching-Learning methods

This should include a judicious mix of demonstrations, symposia, journal clubs, clinical meetings, seminars, small group discussion, bed-side teaching, case-based learning, simulation-based teaching, self-directed learning, integrated learning, interdepartmental meetings and any other collaborative activity with the allied departments. Methods with exposure to the applied aspects of the subject relevant to basic/clinical sciences should also be used. **The suggested examples of teaching-learning methods are given below but are not limited to these. The frequency of various below mentioned teaching-learning methods can vary based on the subject's requirements, competencies, work load and overall working schedule in the concerned subject.**

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Self Directed Learning (SDL) is an extension of the role of lifelong learner envisaged in the goals of the Indian Medical Graduate. All postgraduate students are expected to learn through Problem Based Learning, SDL, Project Based learning etc. Various forms of self-learning including those mediated through IT - enhanced methodologies must be adopted. Specific hours need not be ear-marked, but these should be integrated into day to day practice.

Post graduates in all specialities are expected to learn through work-based discussions and experiential learning. Beyond documentations in logbook, they should demonstrate competency related to patient care, interpretation and communication skills during the routine work in wards, OPD, ICUs, district residency postings etc. They should be involved in teaching of Undergraduate (MBBS) students also.

A. Lectures: Didactic lectures should be used sparingly. A minimum of 10 lectures per year in the concerned PG department is suggested. Topics are to be selected as per subject

requirements. All postgraduate trainees will be required to attend these lectures. Lectures can cover topics such as:

1. Subject related important topics as per specialty requirement
2. Recent advances
3. Research methodology and biostatistics
4. **Salient features of** Undergraduate/Postgraduate medical curriculum
5. Teaching and assessment methodology.

Topic numbers 3, 4, 5 can be done during research methodology/biostatistics and medical education workshops in the institute.

B. Journal club: Minimum of once in 1-2 weeks is suggested.

Topics will include presentation and critical appraisal of original research papers published in peer reviewed indexed journals. The presenter(s) shall be assessed by faculty and grades recorded in the logbook.

C. Student Seminar: Minimum of once every 1-2 weeks is suggested.

Important topics should be selected as per subject requirements and allotted for in-depth study by a postgraduate student. A teacher should be allocated for each seminar as faculty moderator to help the student prepare the topic well. It should aim at comprehensive evidence-based review of the topic. The student should be graded by the faculty and peers.

D. Student Symposium: Minimum of once every 3 months.

A broad topic of significance should be selected, and each part shall be dealt by one postgraduate student. A teacher moderator should be allocated for each symposium and moderator should track the growth of students. The symposium should aim at an evidence-based exhaustive review of the topic. All participating postgraduates should be graded by the faculty and peers.

E. Laboratory work / Bedside clinics: Minimum - once every 1-2 weeks.

Laboratory work/Clinics/bedside teaching should be coordinated and guided by faculty from the department. Various methods like DOAP (Demonstrate, Observe, Assist, Perform), simulations in skills lab, and case-based discussions etc. are to be used. Faculty from the department should participate in moderating the teaching-learning sessions during clinical rounds.

F. Interdepartmental colloquium

Faculty and students must attend monthly meetings between the main Department and other department/s on topics of current/common interest or clinical cases.

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G. (a). Rotational clinical / community / institutional postings

Depending on local institutional policy and the subject specialty needs, postgraduate trainees may be posted in relevant departments/ units/ institutions. The aim would be to acquire more in-depth knowledge as applicable to the concerned specialty. Postings would be rotated between various units/departments and details to be included in the specialty-based Guidelines. Few examples are listed below:

- Broad specialty departments
- Emergency/Casualty department
- Super specialty departments e.g. Cardiology / Endocrinology / Nephrology / Medical Oncology etc.
- Laboratory-based specialty units/departments e.g. Biochemistry/Microbiology/ Infection control unit/Laboratory Medicine etc.

G. (b). Posting under "District Residency Programme" (DRP):

All postgraduate students pursuing MS/MS in broad specialties in all Medical Colleges/Institutions shall undergo a compulsory rotation of three months in District Hospitals/District Health System as a part of the course curriculum, as per the Postgraduate Medical Education (Amendment) Regulations (2020). Such rotation shall take place in the 3rd or 4th or 5th semester of the Postgraduate programme and the rotation shall be termed as "District Residency Programme" and the PG medical student undergoing training shall be termed as "District Resident".

Every posting should have its defined learning objectives. It is recommended that the departments draw up objectives and guidelines for every posting offered in conjunction with the collaborating department/s or unit/s. This will ensure that students acquire expected competencies and are not considered as an additional helping hand for the department / unit in which they are posted. The PG student must be tagged along with those of other relevant departments for bedside case discussion/basic science exercises as needed, under the guidance of an assigned faculty.

Opportunities to present and discuss infectious disease cases through bedside discussion and ward/grand rounds with specialists / clinicians in different hospital settings must be scheduled to address antimicrobial resistance issues and strategies to deal with it.

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H. Teaching research skills

Writing a thesis should be used for inculcating research knowledge and skills. All postgraduate students shall conduct a research project of sufficient depth to be presented to the University as a postgraduate thesis under the supervision of an eligible faculty member of the department as guide and one or more co-guides who may be from the same or other departments.

In addition to the thesis project, every postgraduate trainee shall participate in at least one additional research project that may be started or already ongoing in the department. It is preferable that this project will be in an area different from the thesis work. For instance, if a clinical research project is taken up as thesis work, the additional project may deal with community/field/laboratory work. Diversity of knowledge and skills can thereby be reinforced.

I. Training in teaching skills

MEU/DOME should train PG students in education methodologies and assessment techniques. The PG students shall conduct UG classes in various courses and a faculty shall observe and provide feedback on the teaching skills of the student.

J. Log book

During the training period, the postgraduate student should maintain a Log Book indicating the duration of the postings/work done in Wards, OPDs, Casualty and other areas of posting. This should indicate the procedures assisted and performed and the teaching sessions attended. The log book entries must be done in real time. The log book is thus a record of various activities by the student like: (1) Participation & performance, (2) attendance, (3) participation in sessions, (4) completion of pre-determined activities, and (5) acquisition of selected competencies.

The purpose of the Log Book is to:

a) help maintain a record of the work done during training,
b) enable Faculty/Consultants to have direct information about the work done and intervene, if necessary,
c) provide feedback and assess the progress of learning with experience gained periodically.
d) Documentation of acquisition required competencies

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The Log Book should be used in the internal assessment of the student; should be checked and assessed periodically by the faculty members imparting the training. The PG students will be required to produce completed log book in original at the time of final practical examination. It should be signed by the Head of the Department. A proficiency certificate from the Head of Department regarding the clinical competence and skillful performance of procedures by the student will be submitted by the PG student at the time of the examination.

The PG students shall be trained to reflect and record their reflections in log book particularly of the critical incidents. Components of good teaching practices must be assessed in all academic activity conducted by the PG student and at least two sessions dedicated for assessment of teaching skills must be conducted every year of the PG program. The teaching faculty are referred to the MCI Logbook Guidelines uploaded on the Website.

K. **Course in Research Methodology**: All postgraduate students shall complete an online course in Research Methodology within six months of the commencement of the batch and generate the online certificate on successful completion of the course.

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Other aspects

- The Postgraduate trainees must participate in the teaching and training program of undergraduate students and interns attending the department.
- Trainees shall attend accredited scientific meetings (CME, symposia, and conferences) at least once a year.
- Department shall encourage e-learning activities.
- The Postgraduate trainees should undergo training in Basic Cardiac Life Support (BCLS) and Advanced Cardiac Life Support (ACLS).
- The Postgraduate trainees must undergo training in information technology and use of computers.

During the training program, patient safety is of paramount importance; therefore, relevant clinical skills are to be learnt initially on the models, later to be performed under supervision followed by independent performance. For this purpose, provision of skills laboratories in medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, ie., assessment to improve learning

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.

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 practical/clinical examination, should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills.

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Quarterly assessment during the MD training should be based on:

- Case presentation, case work up, case handling/management : once a week
- Laboratory performance : twice a week
- Journal club : once a week
- Seminar : once a fortnight
- Case discussions : once a fortnight/month
- Interdepartmental case or seminar : once a month

Note: These sessions may be organized and recorded as an institutional activity for all postgraduates.

- Attendance at Scientific meetings, CME programmes (at least 02 each)

The student to be assessed periodically as per categories listed in appropriate (non-clinical/clinical) postgraduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT, ie., assessment at the end of training

Essential pre-requisites for appearing for examination include:

1. **Log book** of work done during the training period including rotation postings, departmental presentations, and internal assessment reports should be submitted.

2. At least **two presentations** at national level conference. One research paper should be published / accepted in an indexed journal**. (It is suggested that the local or University Review committee assess the work sent for publication).**

The summative examination would be carried out as per the Rules given in the latest POSTGRADUATE MEDICAL EDUCATION REGULATIONS. The theory examination shall be held in advance before the Clinical and Practical examination, so that the answer books can be assessed and evaluated before the commencement of the clinical/Practical and Oral examination**.**

The postgraduate examination shall be in three parts**:**

1. Thesis

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 in broad specialty shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners**.**

2. Theory examination

The examinations shall be organized 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, as given in the latest POSTGRADUATE MEDICAL EDUCATION REGULATIONS. 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./ M.S shall be held at the end of 3rd academic year.

There shall be four theory papers (as per PG Regulations).

Paper I: Basic sciences as applied to the subject

Paper II: Therapeutics & Tropical Medicine

Paper III: Sytstemic Medicine of all organ systems

Paper IV: Recent advances in the subject.

3. Practical/clinical and Oral/viva voce examination

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Practical examination

Practical examination should be spread over **two** days and include various major components of the syllabus focusing mainly on the psychomotor domain.

Oral/Viva voce examination on defined areas should be conducted by each examiner separately. Oral examination shall be comprehensive enough to test the post graduate student's overall knowledge of the subject focusing on psychomotor and affective domain.

The final clinical examination in broad specialty clinical subjects should include:

- Cases pertaining to major systems (eg. one long case and three short cases)
- Stations for clinical, procedural and communication skills
- Log Book Records and reports of day-to-day observation during the training
- It is emphasized that Oral/viva voce examination shall be comprehensive enough to test the post graduate student's overall knowledge of the subject.

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Recommended Reading:

Text Books (latest edition)

1. API Text book of Medicine
2. Davidson's Principles and Practice of M
3. Harrison's Principles & Practice of Medicine
4. Oxford Text book of Medicine
5. Kumar & Clark: Book of Clinical Medicine
6. Cecil: Text Book of Medicine
7. Current medical diagnosis and treatment
8. Washington manual of medical therapeutics
9. Krishnadas. K.V: Text Book of Medicine

Journals

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

Annexure 1

Student appraisal form for MD in General Medicine											
	Element	**Less than Satisfactory**			**Satisfactory**			**More than satisfactory**			**Comments**
		1	2	3	4	5	6	7	8	9	
1	**Scholastic Aptitude and Learning**										
1.1	Has Knowledge appropriate for level of training										
1.2	Participation and contribution to learning activity (e.g., Journal Club, Seminars, CME etc)										
1.3	Conduct of research and other scholarly activity assigned (e.g Posters, publications etc)										
1.4	Documentation of acquisition of competence										
	(eg Log book)										
1.5	Performance in work based assessments										
1.6	Self- directed Learning										
2	**Care of the patient**										
2.1	Ability to provide patient care appropriate to level of training										
2.2	Ability to work with other members of the health care team										
2.3	Ability to communicate appropriately and empathetically with patients families and care givers										
2.4	Ability to do procedures appropriate for the level of training and assigned role										
2.5	Ability to record and document work accurately and appropriate for level of training										

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2.6	Participation and contribution to health care quality improvement										
3	**Professional attributes**										
3.1	Responsibility and accountability										
3.2	Contribution to growth of learning of the team										
3.3	Conduct that is ethical appropriate and respectful at all times										
4	**Space for additional comments**										
5	**Disposition**										
	Has this assessment been discussed with the trainee?	Yes	No								
	If not explain										
	Name and Signature of the assesse										
	Name and Signature of the assessor										
	Date										

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GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MS IN GENERAL SURGERY

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 should be able to recognize the health needs of the community, should be competent to handle effectively medical / surgical problems and should be aware of the recent advances pertaining to his specialty. The PG student should be competent to provide professional services with empathy and humane approach. The PG student should acquire the basic skills in teaching of medical / para-medical students and is also expected to know the principles of research methodology and self-directed learning for continuous professional development.

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 Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. 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

Clinical Objectives

At the end of postgraduate training, the PG student should be able to: -

1. diagnose and appropriately manage common surgical ailments in a given situation.
2. provide adequate preoperative, post-operative and follow-up care of surgical patients.
3. identify situations calling for urgent or early surgical intervention and refer at the optimum time to the appropriate centers.
4. counsel and guide patients and relatives regarding need, implications and problems of surgery in the individual patient.
5. provide and coordinate emergency resuscitative measures in acute surgical situations including trauma.
6. organize and conduct relief measures in situations of mass disaster including triage.

7. effectively participate in the National Health Programs especially in the Family Welfare Programs.
8. discharge effectively medico-legal and ethical responsibilities and practice his specialty ethically.
9. must learn to minimize medical errors.
10. must update knowledge in recent advances and newer techniques in the management of the patients.
11. must learn to obtain informed consent prior to performance of operative procedure.
12. perform surgical audit on a regular basis and maintain records (manual and/or electronic) for life.
13. participate regularly in departmental academic activities by presenting Seminar, Case discussion, Journal Club and Topic discussion on weekly basis and maintain logbook.
14. demonstrate sufficient understanding of basic sciences related to his specialty.
14. plan and advise measures for the prevention and rehabilitation of patients belonging to his specialty.

Research:

The student should:

1. know the basic concepts of research methodology, plan a research project and know how to consult library.
2. should have basic knowledge of statistics.

Teaching:

The student should learn the basic methodology of teaching and develop competence in teaching medical/paramedical students.

Professionalism:

1. The student will show integrity, accountability, respect, compassion and dedicated patient care. The student will demonstrate a commitment to excellence and continuous professional development.
2. The student should demonstrate a commitment to ethical principles relating to providing patient care, confidentiality of patient information and informed consent.
3. The student should show sensitivity and responsiveness to patients' culture, age, gender and disabilities.

SUBJECT SPECIFIC COMPETENCIES

By the end of the course, the student should have acquired knowledge (cognitive domain), professionalism (affective domain) and skills (psychomotor domain) as given below:

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A. Cognitive domain

- Demonstrate knowledge of applied aspects of basic sciences like applied anatomy, physiology, biochemistry, pathology, microbiology and pharmacology.
- Demonstrate knowledge of the bedside procedures and latest diagnostics and therapeutics available.
- Describe aetoiology, pathophysiology, principles of diagnosis and management of common surgical problems including emergencies, in adults and children.
- Demonstrate the theoretical knowledge of general principles of surgery.
- Demonstrate the theoretical knowledge of systemic surgery including disaster management and recent advances.
- Demonstrate the theoretical knowledge to choose, and interpret appropriate diagnostic and therapeutic imaging including ultrasound, Mammogram, CT scan, MRI.
- Demonstrate the knowledge of ethics, medico-legal aspects, communication skills and leadership skills. The PG student should be able to provide professional services with empathy and humane approach.

B. Affective domain

- 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 other colleagues to provide the best possible diagnosis or opinion.
- 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.
- Develop communication skills to word reports, obtain a proper relevant history and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.
- Obtain informed consent for any examination/procedure and explain to the patient and attendants the disease and its prognosis with a humane approach.
- Provide appropriate care that is ethical, compassionate, responsive and cost effective and in conformation with statutory rules.

C. Psychomotor domain

- Perform a humane and thorough clinical examination including internal examinations and examinations of all organs/systems in adults and children
- Write a complete case record with all necessary details.
- Arrive at a logical working diagnosis / differential diagnosis after clinical examination.
- Order appropriate investigations keeping in mind their relevance (need based).
- Choose, perform and interpret appropriate imaging in trauma - ultrasound FAST (Focused Abdominal Sonography in Trauma).

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- Perform minor operative procedures and common general surgical operations independently and the major procedures under guidance.
- Provide basic and advanced life saving support services in emergency situations
- Provide required immediate treatment and comprehensive treatment taking the help of specialist as required.
- Perform minimally invasive surgery in appropriate clinical settings. Must have undergone basic training in operative laparoscopy related to general and GI Surgery.
- Undertake complete patient monitoring including the preoperative and post operative care of the patient.
- Write a proper discharge summary with all relevant information.

Syllabus

Course Contents:

No limit can be fixed and no fixed number of topics can be prescribed as course contents. She/he is expected to know the subject in depth, however, 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. Competence in surgical skills commensurate with the specialty (actual hands - on training) must be ensured.

1. General topics:

A student should have fair knowledge of basic sciences (Anatomy, Physiology, Biochemistry, Microbiology, Pathology and Pharmacology) as applied to his specialty. Further, the student should acquire in-depth knowledge of his subject including recent advances and should be fully conversant with the bedside procedures (diagnostic and therapeutic) and having knowledge of latest diagnostics and therapeutics available.

1. History of medicine with special reference to ancient Indian texts
2. Health economics - basic terms, health insurance
3. Medical sociology, doctor-patient relationship, family adjustments in disease, organizational behavior, conflict resolution
4. Computers - record keeping, computer aided learning, virtual reality, robotics
5. Hazards in hospital and protection:
   AIDS, hepatitis B, tuberculosis, radiation, psychological
6. Environment protection - bio-medical waste management
7. Surgical audit, evidence based surgical practice, quality assurance
8. Concept of essential drugs and rational use of drugs
9. Procurement of stores and material & personal management

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10. Research methodology - library consultation, formulating research, selection of topic, writing thesis protocol, preparation of consent form from patients
11. Bio-medical statistics, clinical trials
12. Medical ethics
13. Consumer protection
14. Newer antibiotics
15. Problem of resistance.
16. Sepsis - SIRS
17. Nosocomial infection
18. Advances in imaging technologies
19. Disaster management, mass casualties, Triage
20. O.T. design, technologies, equipment
21. Critical care in surgical practice
22. Response to trauma
23. Wound healing
24. Fluid and electrolyte balance
25. Nutrition
26. Blood transfusion
27. Brain death
28. Cadaveric organ retrieval

1. Systemic Surgery

The student must acquire knowledge in the following important topics are but teaching should not be limited to these topics. A standard text-book may be followed, which will also identify the level of learning expected of the trainees.

- Wound healing including recent advances
- Asepsis, antisepsis, sterilization and universal precaution
- Surgical knots, sutures, drains, bandages and splints
- Surgical infections, causes of infections, prevention
- Common aerobic and anaerobic organisms and newer organisms causing infection including *Helicobacter Pylori*
- Tetanus, gas gangrene treatment & prevention
- Chronic specific infections TB, Filariasis
- Boils, cellulites, abscess, narcotizing fascitis and synergistic infection
- Antibiotic therapy rationale including antibiotic prophylaxis, misuse, abuse
- Hospital acquired nosocomial infection causes and prevention including MRSA etc.
- HIV, AIDS and Hepatitis B & C, Universal precautions when dealing with patients suffering from these diseases
- Fluid and electrolyte balance including acid – base disturbance, consequences,

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interpretation of blood gas analysis data and management

- Rhabdomyolysis and prevention of renal failure
- Shock (septicaemic, hypovolaemic, Neurogenic, anaphylactic), etiology, pathophysiology and management
- Blood and blood components, transfusion indication, contraindication, mismatch and prevention and management of complications of massive blood transfusion
- Common preoperative preparation (detailed preoperative workup, risk assessment according to the disease and general condition of the patient as per ASA grade) and detailed postoperative complications following major and minor surgical procedures
- Surgical aspects of diabetes mellitus particularly management of diabetic foot and gangrene, preoperative control of diabetes, consequences of hypo- and hyper-glycaemia in a postoperative setting
- Consequences and management of bites and stings including snake, dog, human bites
- Mechanisms and management of missile, blast and gunshot injuries
- Organ transplantation: Basic principles including cadaver donation, related Human Organ Transplant Acts, ethical and medicolegal aspects.
- Nutritional support to surgical patients
- Common skin and subcutaneous condition
- Sinus and fistulae, pressure sores
- Acute arterial occlusion, diagnosis and initiate management
- Types of gangrene, Burger's disease and atherosclerosis
- Investigations in case of arterial obstruction, amputation, vascular injuries: basic principles and management
- Venous disorders: Varicose veins
- Diagnosis, principles of therapy, prevention of DVT: basic principles and management
- Lymphatic: Diagnosis and principles of management of lymphangitis and lymphedema
- Surgical management of Filariasis
- Burns: causes, prevention and management
- Wounds of scalp and its management
- Recognition, diagnosis and monitoring of patients with head injury, Glasgow coma scale
- Undergo advanced trauma and cardiac support course (certified) before appearing in final examination
- Recognition of acute cerebral compression, indication for referrals.
- Cleft lip and palate
- Leukoplakia, retention cysts, ulcers of tongue

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- Oral malignancies
- Salivary gland neoplasms
- Branchial cyst, cystic hygroma
- Cervical lymphadenitis nonspecific and tuberculous, metastatic lymph nodes and lymphomas.
- Diagnosis and principles of management of goitre
- Thyroglossal cyst and fistula
- Thyrotoxicosis
- Thyroid neoplasms
- Management of solitary thyroid nodule
- Thoracic outlet syndrome
- Management of nipple discharge
- Breast abscess
- Clinical breast examination, breast self examination
- Screening and investigation of breast lump
- Concept of Single Stop Breast Clinic
- Cancer breast diagnosis, staging and multimodality management (common neoadjuvant and adjuvant and palliative chemotherapy protocols and indications of radiation and hormonal therapy, pathology and interpretation of Tumour Markers, breast cancer support groups and counseling)
- Recognition and treatment of pneumothorax, haemothorax
- Pulmonary embolism: Index of suspicion, prevention/recognition and treatment
- Flail chest, stove in chest
- Postoperative pulmonary complication
- Empyema thoracis
- Recognition of oesophgeal atresisa and principles of management
- Neoplasms of the lung including its prevention by tobacco control
- Cancer oesophagus: principles of management including importance of early detection and timely referral to specialist
- Achalasia cardia
- Gastro-esophageal reflux disease (GERD)
- Congenital hypertrophic pyloric stenosis
- Aetiopathogenesis, diagnosis and management of peptic ulcer including role of H. Pylori and its diagnosis and eradication
- Cancer stomach
- Signs and tests of liver dysfunction
- Amoebic liver abscess and its non-operative management
- Hydatid cyst and its medical and surgical management including laparoscopic management
- Portal hypertension, index of suspicion, symptoms and signs of liver failure and

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timely referral to a specialist center

- Obstructive jaundice with emphasis on differentiating medical vs surgical Jaundice, algorithm of investigation, diagnosis and surgical treatment options
- Neoplasms of liver
- Rupture spleen
- Indications for splenectomy
- Clinical features, diagnosis, complications and principles of management of cholelithiasis and cholecystitis including laparoscopic cholecystectomy
- Management of bile duct stones including endoscopic, open and laparoscopic management
- Carcinoma gall bladder, incidental cancer gallbladder, index of suspicion and its staging and principles of management
- Choledochal cyst
- Acute pancreatitis both due to gallstones and alcohol
- Chronic pancreatitis
- Carcinoma pancreas
- Peritonitis: causes, recognition, diagnosis, complications and principles of management with knowledge of typhoid perforation, tuberculous peritonitis, postoperative peritonitis
- Abdominal pain types and causes with emphasis on diagnosing early intra-abdominal acute pathology requiring surgical intervention
- Intestinal amoebiasis and other worms manifestation (Ascariasis) and their surgical complications (Intestinal Obstruction, perforation, gastrointestinal bleeding, involvement of biliary tract)
- Abdominal tuberculosis both peritoneal and intestinal
- Intestinal obstruction
- **Appendix:** Diagnosis and management of acute appendicitis
- Appendicular lump and abscess

Colon

- Congenital disorders, Congenital megacolon
- Colitis infective / non infective
- Inflammatory bowel diseases
- Premalignant conditions of large bowel
- Ulcerative colitis
- Carcinoma colon
- Principles of management of types of colostomy

Rectum and Anal Canal:

- Congenital disorders, Anorectal anamolies
- Prolapse of rectum

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- Carcinoma rectum
- Anal Canal: surgical anatomy, features and management of fissures, fistula - in – ano.
- Perianal and ischiorectal abscess
- Haemorrhoids – Non-operative outpatient procedures for the control of bleeding (Banding, cryotherapy, injection) operative options - open and closed haemorrhoidectomy and stapled haemorrhoidectomy
- Anal carcinoma
- Clinical features, diagnosis, complication and principles of management of inguinal hernia including laparoscopic repair
- Umbilical, femoral hernia and epigastric hernia
- Open and Laparoscopic repair of incisional/primary ventral hernia
- Urinary symptoms and investigations of urinary tract
- Diagnosis and principles of management of urolithiasis
- Lower Urinary tract symptoms or prostatism
- Benign prostatic hyperplasia; diagnosis and management
- Genital tuberculosis in male
- Phimosis and paraphimosis
- Carcinoma penis
- Diagnosis and principles of treatment of undescendecd testis
- Torsion testis
- Hydrocele, haematocele and pyocele Varicocele: Diagnosis (Medical Board for fitness)
- Varicocele: Diagnosis (Medical Board for fitness)
- Acute and chronic epididymo-orchitis
- Testicular tumours
- Principles of management of urethral injuries
- Management of soft tissue sarcoma
- Prosthetic materials used in surgical practice
- Telemedicine, teleproctoring and e-learning
- Communication skills

A student should be expert in good history taking, physical examination, providing basic life support and advanced cardiac life support, common procedures like FNAC, Biopsy, aspiration from serous cavities, lumber puncture etc. The student should be able to choose the required investigations.

Clinical cases and Symptoms-based approach to the patient with:

1. Ulcers in oral cavity

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2. Solitary nodule of the thyroid
3. Lymph node in the neck
4. Suspected breast lump
5. Benign breast disease
6. Acute abdominal pain
7. Blunt Trauma Abdomen
8. Gall stone disease
9. Dysphagia
10. Chronic abdominal pain
11. Epigastric mass
12. Right hypochrondium mass
13. Right iliac fossa mass
14. Renal mass
15. Inguino-scrotal swelling
16. Scrotal swelling
17. Gastric outlet obstruction
18. Upper gastrointestinal bleeding
19. Lower gastrointestinal bleeding
20. Anorectal symptoms
21. Acute intestinal obstruction
22. Obstructive jaundice
23. Acute retention of Urine
24. Bladder outlet obstruction
25. Haematuria
26. Peripheral vascular disease
27. Varicose veins
28. New born with developmental anomalies
29. Hydronephrosis , Pyonephrosis, perinephric abscess
30. Renal tuberculosis
31. Renal tumors
32. Carcinoma prostate
33. Genital tuberculosis in male

At the end of the course, post graduate students should be able to perform independently (including perioperative management) the following:

- Start IV lines and monitor infusions
- Start and monitor blood transfusion
- Venous cut-down
- Start and manage a C.V.P. line
- Conduct CPR (Cardiopulmonary resuscitation)

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- Basic/ advance life support
- Endotracheal intubation
- Insert nasogastric tube
- Proctoscopy
- Urethral catheterisation
- Surgical management of wounds
- Biopsies including image guided
- Manage pneumothorax / pleural space collections
- Infiltration, surface and digital Nerve blocks
- Incise and drain superficial abscesses
- Control external hemorrhage
- Vasectomy (Preferably non-scalpel)
- Circumcision
- Surgery for hydrocele
- Surgery for hernia
- Surgery and Injection/banding of piles
- Management of all types of shock
- Assessment and management of burns
- Hemithyroidectomy
- Excision of thyroglossal cyst
- Excision Biopsy of Cervical Lymphnode
- Excision of benign breast lump
- Modified Radical mastectomy
- Axillary Lymphnode Biopsy
- Excision of gynaecomastia
- Excision of skin and subcutaneous swellings
- Split thickness skin graft
- Management of hernias
- Laparoscopic and open cholecystectomy
- Management of Liver abscess
- appendectomy
- Management of intestinal obstruction, small bowel resection, perforation and anastomosis
- Colostomy

The student must have observed or assisted (the list is illustrative) in the following:

- Hartmann's procedure for cancer rectum
- Spleenectomy (emergency)
- Stomach perforation
- Varicose Vein surgery

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- Craniotomy (Head Injury)
- Superficial parotidectomy
- Submandibular gland excision
- Soft tissue tumours including sarcoma
- Pancreaticoduodenal resection
- Hydatid cyst liver
- Pancreatic surgery
- Retroperitoneal operations

TEACHING AND LEARNING METHODS

Teaching methodology

Didactic lectures are of least importance; small group discussion such as seminars, journal clubs, symposia, reviews and guest lectures should get priority for theoretical knowledge. Bedside teaching, grand rounds, structured interactive group discussions and clinical demonstrations should be the hallmark of clinical/practical learning with appropriate emphasis on e-learning. Student should have hand-on training in performing various procedures and ability to interpret various tests/investigations. Exposure to newer specialized diagnostic/therapeutic procedures concerning her/his subject should be given. Self-learning tools like assignments and case-based learning may be promoted.

1. Clinical postings

A major portion of posting should be in General Surgery. It should include in- patients, out-patients, ICU, trauma, emergency room and speciality clinics.

Rotation of posting

- Inter-unit rotation in the department should be done for a period of up to one year.
- Rotation in appropriate related subspecialties for a total period not exceeding 06 months.

2. Clinical meetings:

There should be intra- and inter- departmental meetings for discussing the uncommon /interesting cases involving multiple departments.

3. **Log book:** Each student must be asked to present a specified number of cases for clinical discussion, perform procedures/tests/operations/present seminars/review articles from various journals in inter-unit/interdepartmental teaching sessions. They should be entered in a Log Book. The Log books shall be checked and assessed periodically by the faculty members imparting the training.

4. Thesis writing and research:

Thesis writing is compulsory.

5. The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
6. 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.
7. The student should know the basic concepts of research methodology, plan a research project, be able to retrieve information from the library. The student should have a basic knowledge of statistics.
8. Department should encourage e-learning activities.

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 surgical skills laboratories in the medical colleges is mandatory.

ASSESSMENT

Assessment should be comprehensive & objective. It should address the stated competencies of the course. The assessment needs to be spread over the duration of the course.

FORMATIVE ASSESSMENT, i.e., assessment during the training would include: 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.

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.

Quarterly assessment during the MS training should be based on following educational activities:

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, ie., assessment at the end of training

The summative examination would be carried out as per the Rules given in **POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.**

The examination will be in three parts:

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 candidate 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 candidate shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

2. Theory

The examinations shall be organised on the basis of 'Grading'or 'Marking system' to evaluate and to certify candidate'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 MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

Theory shall consist of four papers of 3 hours each.

Paper I: Basic Sciences

Paper II: Principles and Practice of Surgery

Paper III: Principles and practice of Operative Surgery

Paper IV: Recent Advances in Surgery

3. Clinical / Practical and viva voce Examination

Clinical examination shall be conducted to test the knowledge, skills, attitude and competence of the post graduate students for undertaking independent work as a specialist/Teacher, for which post graduate students shall examine a minimum one long case and two short cases.

The Oral examination shall be thorough and shall aim at assessing the post graduate student's knowledge and competence about the subject, investigative procedures, therapeutic technique and other aspects of the specialty, which form a part of the examination.

Assessment may include Objective structured clinical examination.(OSCE)

Oral/Viva-voce examination needs to assess knowledge on X-rays, instrumentation, operative procedures. Due weightage should be given to Log Book Records and day-to-day observation during the training.

Recommended Reading:

Books (latest edition)

1. *Text Book of Surgery*, by Christopher Davis
2. ASI Text Book of Surgery
3. *Surgery of Colon, Rectum and Anal canal*, by Goligher J C
4. Schwartz *Text Book of Surgery*
5. *Textbook on Laparoscopic Surgery*
6. *Trauma (Mattox)*
7. *Recent Advances in Surgery*
8. *Year Book of Surgery*
9. *Surgical Clinics of North America*
10. *Short practice of Surgery* by Bailey and Love
11. *A manual of clinical Surgery*, by S Das
12. Hamilton Bailey's demonstration of clinical signs
13. Pye's *Surgical Handicraft*

Journals

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

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Annexure I

Postgraduate Students Appraisal Form

Pre / Para /Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM……TO……

Sr. No.	PARTICULARS	Not Satisfactory	Satisfactory	More Than Satisfactory	Remarks
		1 2 3	4 5 6	7 8 9	
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 CONSULTANT** **SIGNATURE OF HOD**

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GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MS IN OBSTETRICS AND GYNAECOLOGY

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.

The purpose of MS Obstetrics and Gynaecology is to standardize Obstetrics & Gynaecology teaching at Post Graduate level throughout the country so that it will benefit in achieving uniformity in undergraduate teaching as well and resultantly creating competent Obstetrician and Gynaecologist with appropriate expertise.

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 Reconciliation Board of Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. 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

Programme Objectives

The **goal** of the MS course in Obstetrics and Gynaecology is to produce a competent Obstetrician and Gynaecologist who can:

a. Provide quality care to the community in the diagnosis and management of Antenatal, Intra-natal and Post-natal period of normal and abnormal pregnancy and labor.
b. provide effective and adequate care to a pregnant woman with complicated pregnancy.
c. provide effective and adequate care to a normal and high risk neonate.
d. perform obstetrical ultrasound in normal and abnormal pregnancy including Doppler.
e. manage effectively all obstetrical and gynecological emergencies and if necessary make appropriate referrals.
f. provide quality care to the community in the diagnosis and management of gynaecological problems including screening, and management of all gynecological cancers including during pregnancy.

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g. conduct a comprehensive evaluation of infertile couple and have a broad based knowledge of assisted reproductive techniques including – ovulation induction, *in vitro* fertilization and intra-cytoplasmic sperm injection, gamete donation, surrogacy and the legal and ethical implications of these procedures.

h. provide counseling and delivery of fertility regulation methods including reversible and irreversible contraception, emergency contraception etc.

i. provide quality care to women having spontaneous abortion or requesting Medical Termination of Pregnancy (MTP) and manage their related complications.

SUBJECT SPECIFIC COMPETENCIES

A. Cognitive Domain

At the end of the MS Course in Obstetrics and Gynaecology, the student should have acquired knowledge in the following:

- recognizes the health needs of women and adolescents and carries out professional obligations in keeping with principles of National Health Policy and professional ethics
- has acquired the competencies pertaining to Obstetrics and Gynaecology that are required to be practiced in the community and at all levels of health system
- on genetics as applicable to Obstetrics.
- on benign and malignant gynecological disorders.
- on Gynecological Endocrinology and infertility.
- on interpretation of various laboratory investigations and other diagnostic modalities in Obstetrics & Gynecology.
- on essentials of Pediatric and adolescent Gynecology.
- on care of postmenopausal women and geriatric Gynecology.
- on elementary knowledge of female breast & its diseases.
- on vital statistics in Obstetrics & Gynecology.
- Anesthesiology related to Obstetrics & Gynecology.
- Reproductive and Child Health, family welfare & reproductive tract infections.
- STD and AIDS & Government of India perspective on women's health related issues.
- Medico-legal aspects in Obstetrics & Gynecology.
- Asepsis, sterilization and disposal of medical waste.
- be able to effectively communicate with the family and the community
- is aware of the contemporary advances and developments in medical sciences as related to Obstetrics and Gynaecology.

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- maintain medical records properly and know the medico-legal aspects in respect of Obstetrics & Gynecology
- Understands the difference between audit and research and how to plan a research project and demonstrate the skills to critically appraise scientific data and literature
- has acquired skills in educating medical and paramedical professionals

Ethical and Legal Issues:

The post graduate student should understand the principles and legal issues surrounding informed consent with particular awareness of the implication for the unborn child, postmortem examinations consent to surgical procedures including tubal ligation/vasectomy, parental consent and medical certification, research and teaching and properly maintain medical records.

Risk Management:

The post graduate student should demonstrate a working knowledge of the principles of risk management and their relationship to clinical governance and complaints procedures.

Confidentiality:

The post graduate student should:

- be aware of the relevant strategies to ensure confidentiality and when it might be broken.
- understand the principles of adult teaching and should be able to teach common practical procedures in Obstetrics and Gynaecology and involved in educational programme in Obstetrics and Gynaecology for medical and paramedical staff.
- be abreast with all recent advances in Obstetrics and Gynaecology and practice evidence based medicine.

Use of information technology, audits and standards:

The post graduate student should:

- acquire a full understating of all common usage of computing systems including the principles of data collection, storage, retrieval, analysis and presentation.
- understand quality improvement and management and how to perform, interpret and use of clinical audit cycles and the production and application of clinical standards, guidelines and protocols.

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- understand National Health Programmes related to Obstetrics and Gynaecology and should be aware of all the Acts and Laws related to specialty.

Health of Adolescent Girls and Post-Menopausal Women

The student should:

- Recognize the importance of good health of adolescent and postmenopausal women.
- Identification and management of health problems of post-menopausal women.
- Understanding and planning and intervention program of social, educational and health needs of adolescent girls and menopausal women.
- Education regarding rights and confidentiality of women's health, specifically related to reproductive function, sexuality, contraception and safe abortion.
- Geriatric problems.

Reproductive Tract and 'HIV' Infection

- Epidemiology of RTI and HIV infection in Indian women of reproductive age group.
- Cause, effect and management of these infections.
- HIV infections in pregnancy, its effects and management.
- Relationship of RTI and HIV with gynaecological disorders.
- Planning and implementation of preventive strategies.

Medico-legal Aspects

- Knowledge and correct application of various Acts and Laws while practicing Obstetrics and Gynaecology, particularly MTP Act and sterilization, Preconception and P.N.D.T. Act.
- Knowledge of importance of proper recording of facts about history, examination findings, investigation reports and treatment administered in all patients.
- Knowledge of steps recommended for examination and management of rape cases.
- Knowledge of steps taken in the event of death of a patient.

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 other colleagues to provide the best possible diagnosis or opinion.

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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.

C. Psychomotor domain

At the end of the course, the student should acquire following clinical & operative skills and be able to:

Operative Skills in Obstetrics and Gynaecology

- Adequate proficiency in common minor and major operations, post-operative management and management of their complications.
- Operative procedures which must be done by P G students during training period: ***(in graded manner - assisting, operating with senior person assisting, operating under supervision)***

(Operations MUST BE DONE/OBSERVED during PG training programme and log book maintained)

1. Obstetrics: Venesection, culdocentesis
Conduct normal deliveries
Episiotomy and its repair

- Application of forceps and ventouse (10).
- Carry out caesarian section delivery (10 must be done)
- Manual removal of placenta
- Management of genital tract obstetrical injuries.
- Post partum sterilization/Minilap tubal ligation (20 must be done)
- Medical termination of pregnancy - various methods (20 must be done)

2. Gynaecology: Endometrial / cervical biopsy.
Dilatation and curettage
Coldocentesis, Colpotomy

- Opening and closing of abdomen (10 must be done)
- Operations for pelvic organ prolapse
- Ovarian cyst operation
- Operation for ectopic pregnancy
- Vaginal and abdominal hysterectomy

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Operations must be OBSERVED and/or ASSISTED when possible:

- Internal podalic version
- Caesarea Hysterectomy
- Internal iliac artery ligation
- Destructive obstetrical operations
- Tubal microsurgery
- Radical operations for gynaec malignancies
- Repair of genital fistulae
- Operations for incontinence
- Myomectomy, Laparoscopic and hysteroscopic surgery

Diagnostic Procedures

- Interpretation of x-rays - Twins, common fetal malformations / mal-presentations, abnormal pelvis (pelvimetry), Hysterosalpingography
- Sonographic pictures at various stages of pregnancy - normal and abnormal pregnancies, Fetal biophysical profile, common gynaecological pathologies.
- Amniocentesis
- Fetal surveillance methods - Electronic fetal monitoring and its interpretation
- Post-coital test
- Vaginal Pap Smear
- Colposcopy
- Endoscopy - Laparo and Hystero-scopy.

Health of Adolescent Girls and Post-Menopausal Women

- Provide advice on importance of good health of adolescent and postmenopausal women.
- Identification and management of health problems of post-menopausal women.
- Planning and intervention program of social, educational and health needs of adolescent girls and menopausal women.
- Provide education regarding rights and confidentiality of women's health, specifically related to reproductive function, sexuality, contraception and safe abortion.
- Provide advice on geriatric problems.

Reproductive Tract and 'HIV' Infection

- Provide advice on management of RTI and HIV infections in Indian women of reproductive age group.

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- Provide advice on management of HIV infections in pregnancy, relationship of RTI and HIV with gynaecological disorders.
- Planning and implementation of preventive strategies.

Medico-legal Aspects

- Correct application of various Acts and Laws while practicing obstetrics and gynaecology, particularly MTP Act and sterilization, Preconception and P.N.D.T. Act.
- Implement proper recording of facts about history, examination findings, investigation reports and treatment administered in all patients.
- Implement the steps recommended for examination and management of rape cases.
- Follow proper procedures in the event of death of a patient.

Environment and Health

- Follow proper procedures in safe disposal of human body fluids and other materials.
- Follow proper procedures and universal precautions in examination and surgical procedures for the prevention of HIV and other diseases.

Syllabus

Course Contents:

Paper I

1. Basic Sciences

- Normal and abnormal development, structure and function (female and male) urogenital system and female breast.
- Applied Anatomy of genito-urinary system, abdomen, pelvis, pelvic floor, anterior abdominal wall, upper thigh (inguinal ligament, inguinal canal, vulva, rectum and anal canal).
- Physiology of spermatogenesis.
- Endocrinology related to male and female reproduction (Neurotransmitters).
- Anatomy and physiology of urinary and lower GI (Rectum / anal canal) tract.
- Development, structure and function of placenta, umbilical cord and amniotic fluid.
- Anatomical and physiological changes in female genital tract during pregnancy.
- Anatomy of fetus, fetal growth and development, fetal physiology and fetal circulation.
- Physiological and neuro-endocrinal changes during puberty, adolescence, menstruation, ovulation, fertilization, climacteric and menopause.

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- Biochemical and endocrine changes during pregnancy, including systemic changes in cardiovascular, hematological, renal hepatic, renal, hepatic and other systems.
- Biophysical and biochemical changes in uterus and cervix during pregnancy and labor.
- Pharmacology of identified drugs used during pregnancy, labour, post-partum period in reference to their absorption, distribution, excretion, (hepatic) metabolism, transfer of the drugs across the placenta, effect of the drugs (used) on labor, on fetus, their excretion through breast milk.
- Mechanism of action, excretion, metabolism of identified drugs used in the management of Gynaecological disorder.
- Role of hormones in Obstetrics and Gynaecology.
- ***Markers in Obstetrics & Gynaecology*** - Non-neoplastic and neoplastic diseases
- Pathophysiology of ovaries, fallopian tubes, uterus, cervix, vagina and external genitalia in healthy and diseased conditions.
- Normal and abnormal pathology of placenta, umbilical cord, amniotic fluid and fetus.
- Normal and abnormal microbiology of genital tract. Bacterial, viral and parasitical infections responsible for maternal, fetal and gynaecological disorders.
- Humoral and cellular immunology in Obstetrics & Gynaecology.
- Gametogenesis, fertilization, implantation and early development of embryo.
- Normal Pregnancy, physiological changes during pregnancy, labor and pauperism.
- Immunology of pregnancy.
- Lactation.

2. Medical Genetics

- Basic medical genetics including cytogenetics.
- Pattern of inheritance
- Chromosomal abnormalities - types, incidence, diagnosis, management and recurrence risk.
- General principles of Teratology.
- Screening, counseling and prevention of developmental abnormalities.
- Birth defects - genetics, teratology and counseling.

Paper II

Clinical obstetrics

1. Antenatal Care:

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- Prenatal care of normal pregnancy including examination, nutrition, immunization and follow up.
- Identification and management of complications and complicated of pregnancy – abortion, ectopic pregnancy, vesicular mole, Gestational trophoblastic Diseases, hyperemesis gravidarum, multiple pregnancy, antipartum hemorrhage, pregnancy induced hypertension, preeclampsia, eclampsia, Other associated hypertensive disorders, Anemia, Rh incompatibility, diabetes, heart disease, renal and hepatic diseases, preterm - post term pregnancies, intrauterine fetal growth retardation,
- Neurological, hematological, dermatological diseases, immunological disorders and other medical and surgical disorders/problems associated with pregnancy, Multiple pregnancies, Hydramnios, Oligoamnios.
- Diagnosis of contracted pelvis (CPD) and its management.
- High-risk pregnancy
- Pregnancy associated with complications, medical and surgical problems.
- Prolonged gestation.
- Preterm labor, premature rupture of membranes.
- Blood group incompatibilities.
- Recurrent pregnancy wastage.
- Evaluation of fetal and maternal health in complicated pregnancy by making use of diagnostic modalities including modern once (USG, Doppler, Electronic monitors) and plan for safe delivery for mother and fetus. Identifying fetus at risk and its management. Prenatal diagnostic modalities including modern ones.
- Infections in pregnancy (bacterial, viral, fungal, protozoan)
- Malaria, Toxoplasmosis.
- Viral – Rubella, CMV, Herpes, HIV, Hepatic viral infections (B, C etc)
- Sexually Transmitted Infections (STDs)
- Mother to fetal transmission of infections.
- Identification and management of fetal malpositions and malpresentations.
- Management of pregnancies complicated by medical, surgical (with other specialties as required) and gynecological diseases.
- Anemia, hematological disorders
- Respiratory, Heart, Renal, Liver, skin diseases.
- Gastrointestinal, Hypertensive, Autoimmune, Endocrine disorders.
- Associated Surgical Problems.

Acute Abdomen (surgical emergencies - appendicitis and GI emergencies). Other associated surgical problems.

- Gynaecological disorders associate with pregnancy - congenital genital tract developmental anomalies, Gynaec pathologies - fibroid uterus, Ca Cx, genital prolapse etc.
- Prenatal diagnosis (of fetal problems and abnormalities), treatment – Fetal therapy
- M.T.P, PC & P.N.D.T Act etc

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- National health MCH programs, social obstetrics and vital statistics
- Recent advances in Obstetrics.

2. Intra-partum care:

- Normal labor - mechanism and management.
- Partographic monitoring of labor progress, recognition of abnormal labor and its appropriate management.
- Identification and conduct of abnormal labor and complicated delivery - breech, forceps delivery, caesarian section, destructive operations.
- Induction and augmentation of labor.
- Management of abnormal labor - Abnormal pelvis, soft tissue abnormalities of birth canal, mal-presentation, mal-positions of fetus, abnormal uterine action, obstructed labor and other distocias.
- Analgesia and anaesthesia in labor.
- Maternal and fetal monitoring in normal and abnormal labor (including electronic fetal monitoring).
- Identification and management of intrapartum complications, Cord presentation, complication of 3rd stage of labor - retained placenta, inversion of uterus, rupture of uterus, post partum hemorrhage.

3. Post Partum

- Complication of 3rd stage of labor retained placenta, inversion of uterus, post partum hemorrhage, rupture of uterus, Management of primary and secondary post-partum hemorrhage, retained placenta, uterine inversion. Post-partum collapse, amniotic fluid embolism
- Identification and management of genital tract trauma - perineal tear, cervical/vaginal tear, episiotomy complications, rupture uterus.
- Management of critically ill woman.
- Post partum shock, sepsis and psychosis.
- Postpartum contraception.
  Breast feeding practice; counseling and importance of breast-feeding. Problems in breast-feeding and their management, Baby friendly practices.
- Problems of newborn - at birth (resuscitation), management of early neonatal problems.
- Normal and abnormal purpureum - sepsis, thrombophlebitis, mastitis, psychosis.
  Hematological problems in Obstetrics including coagulation disorders. Use of blood and blood components/products.

4. Operative Obstetrics:

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- Decision-making, technique and management of complications.
- Vaginal instrumental delivery, Caesarian section, Obst. Hysterectomy, destructive operations, manipulations (External/internal podalic version, manual removal of placenta etc)
- Medical Termination of Pregnancy - safe abortion - selection of cases, technique and management of complication. MTP law.

5. New Born

1. Care of new born: Normal and high risk new born (including NICU care).
2. Asphyxia and neonatal resuscitation.
3. Neonatal sepsis - prevention, detection and management.
4. Neonatal hyper - bilirubinemia - investigation and management.
5. Birth trauma - Detection and management.
6. Detection and management of fetal/neonatal malformation.
7. Management of common neonatal problems.

Paper III

Clinical Gynaecology and Fertility Regulation

- Epidemiology and etiopathogenesis of gynaecological disorders.
- Diagnostic modalities and management of common benign and malignant gynaecological diseases (diseases of genital tract):

Fibroid uterus

Endometriosis and adenomyosis

Endometrial hyperplasia

Genital prolapse (uterine and vaginal)

Cervical erosion, cervicitis, cervical polyps, cervical neoplasia.

Vaginal cysts, vaginal infections, vaginal neoplasia (VIN)

Benign Ovarian pathologies

Malignant genital neoplasia - of ovary, Fallopian tubes, uterus, cervix, vagina, vulva and Gestational Trophoblastic diseases, Cancer Breast.

- Diagnosis and surgical management of clinical conditions related to congenital malformations of genital tract. Reconstructive surgery in gynaecology.
- Intersex, ambiguous sex and chromosomal abnormalities.
- Reproductive endocrinology: Evaluation of Primary/secondary Amenorrhea, management of Hyperprolactinemia, Hirsutism, Chronic an-ovulation, PCOD, thyroid and other endocrine dysfunctions.
- Infertility - Evaluation and management
    - Methods of Ovulation Induction

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- Tubal (Micro) surgery
- Management of immunological factors of Infertility
- Male infertility
- Obesity and other Infertility problems.
- **(Introductory knowledge of)** Advanced Assisted Reproductive Techniques (ART)

- Reproductive tract Infections: prevention, diagnosis and treatment.
  - STD
  - HIV
  - Other Infections
  - Genital Tuberculosis.
- Principles of radiotherapy and chemotherapy in gynaecological malignancies. Choice, schedule of administration and complications of such therapies.
- Rational approach in diagnosis and management of endocrinal abnormalities such as: menstrual abnormalities, amenorrhea (primary/secondary), dysfunctional uterine bleeding, polycystic ovarian disease, hyperprolactinemia (galoctorrhea), hyperandrogenism, thyroid - pituitary - adrenal disorders, menopause and its treatment (HRT).
- Urological problems in Gynaecology - Diagnosis and management.
  - Urinary tract infection
  - Urogenital Fistulae
  - Incontinence
  - Other urological problems
- Orthopedic problems in Gynaecology.
- Menopause: management (HRT) and prevention of its complications.
- Endoscopy (Laparoscopy - Hysteroscopy)
  - Diagnostic and simple therapeutic procedures (PG students must be trained to do these procedures)
  - Recent advances in gynaecology - Diagnostic and therapeutic
  - Pediatric, Adolescent and Geriatric Gyanecology
  - **Introduction to Advance Operative procedures.**

Operative Gynaecology

- Abdominal and Vaginal Hysterectomy
- Surgical Procedures for genital prolapse, fibromyoma, endometriosis, ovarian, adenexal, uterine, cervical, vaginal and vulval pathologies.
- Surgical treatment for urinary and other fistulae, Urinary incontinence
- Operative Endoscopy

Family Welfare and Demography

- Definition of demography and its importance in Obstetrics and Gynaecology.

- Statistics regarding maternal mortality, perinatal mortality/morbidity, birth rate, fertility rate.
- Organizational and operational aspects of National health policies and programs, in relation to population and family welfare including RCH.
- Various temporary and permanent methods of male and female contraceptive methods.
- Knowledge of in contraceptive techniques (including recent developments).
    1. Temporary methods
    2. Permanent Methods.
    3. Recent advances in contraceptive technology
- Provide adequate services to service seekers of contraception including follow up.
- Medical Termination of Pregnancy: Act, its implementation, providing safe and adequate services.
- Demography and population dynamics.
- Contraception (fertility control)

Male and Female Infertility

- History taking, examination and investigation.
- Causes and management of male infertility.
- Indications, procedures of Assisted Reproductive Techniques in relation to male infertility problems.

TEACHING AND LEARNING METHODS

Postgraduate Training

Teaching methodology should be imparted to the students through:

- Lectures, seminars, symposia, Inter- and intra- departmental meetings (clinic-pathological, Radio-diagnosis, Radiotherapy, Anaesthesia, Pediatrics/ Neonatology), maternal morbidity/mortality meetings and journal club. ***Records of these are to be maintained by the department.***
- By encouraging and allowing the students to attend and actively participate in CMEs, Conferences by presenting papers.
- Maintenance of log book: Log books shall be checked and assessed periodically by the faculty members imparting the training.
- Writing thesis following appropriate research methodology, ethical clearance and good clinical practice guidelines.
- The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.

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- 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.
- Department should encourage e-learning activities.

Practical and Clinical Training

- Emphasis should be self learning, group discussions and case presentations.
- Student should be trained about proper History taking, Clinical examination, advising / ordering relevant investigations, their interpretation and instituting medical / surgical management by posting students in OPD, specialty clinics, wards, operation theaters, Labor room, family planning clinics and other departments like anesthesiology, neonatology, radiology/ radiotherapy. **Students should be able to perform and interpret ultra - sonography in Obstetrics and Gynaecology, NST, Partogram**

Rotations:

- Details of 3 years posting in the PG programme (6 terms of 6 months each)

a. Allied posts should be done during the course *– for 8 weeks*

i.	Neonatology	- 2 weeks
ii.	Anaesthesia	- 2 weeks
iii.	Radiology/Radiotherapy	- 2 weeks
iv.	Surgery	- 2 weeks
v.	Oncology	- 2 weeks

b. Details of training in the subject during resident posting

The student should attend to the duties (Routine and emergency):

Out patient Department and special clinics

Inpatients

Operation Theater

Labor Room

Writing clinical notes regularly and maintains records.

1st term - working under supervision of senior residents and teaching faculty.

2nd & 3rd term-	***Besides patient care in O.P.D., wards, Casualty and labor room, carrying out minor operations under supervision and assisting in major operation.***
4th 5th & 6th term -	***independent duties in management of patient including major operations under supervision of teaching faculty***

c. Surgeries to be done during PG training. **(Details in the Syllabus)**

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 surgical skills laboratories in medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, during the training includes

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.

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.

Quarterly assessment during the MS training should be based on following educational activities:

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, ie., assessment at the end of training

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

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Postgraduate Examination shall be in three parts:

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 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**.**

There should be four theory papers, as given below:

Paper I: Applied Basic sciences.
Paper II: Obstetrics including social obstetrics and Diseases of New Born
Paper III: Gynaecology including fertility regulation
Paper IV: Recent Advances in Obstetrics & Gynaecology

3. Clinical/Practical & oral/viva voce Examination: shall be as given below:

a) Obstetrics:

Clinical

Long Case: 1 case

2 cases with different problems Short

Case/ Spot Case: 1 case

Viva voce including:

- Instruments
- Pathology specimens
- Drugs and X-rays, Sonography etc.
- Dummy Pelvis

b) Gynaecology:

Clinical

Long Case: 1 case

2 cases with different problems Short

Case/ Spot Case: 1 case

Viva including:

- Instruments
- Pathology specimens
- Drugs and X-rays, Sonography etc.
- Family planning

Recommended Reading:

Books (latest edition)

Obstetrics

1. William Textbook of Obstetrics
2. High risk Obstetrics - James
3. High risk pregnancy - Ian Donal
4. Text book of Operative Obstetrics - Munro Kerr.
5. Medical disorder in pregnancy - De Sweit
6. High risk pregnancy - Arias
7. A text book of Obstetrics - Thrnbull
8. Text book of Obstetrics - Holland & Brews.
9. Manual of Obstetrics - Daftary & Chakravarty

Gynaecology

1. Text book of Gynaecology - Novak
2. Text book of Operative Gynaecology - Te-lindes
3. Text book of operative gynaecology - Shaws
4. Text book of Gynaecology and Reproductive Endocrinology - Speroft
5. Text book of Obstetrics & Gynaecology - Dewhurst
6. Manual of Gynaecological Oncology - Disai
7. Text book of Gynaecology – Jaeffcot

Journals

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

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Annexure I

Postgraduate Students Appraisal Form Pre / Para /Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM……TO……

Sr. No.	PARTICULARS	Not Satisfactory	Satisfactory	More Than Satisfactory	Remarks
		1 2 3	4 5 6	7 8 9	
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 CONSULTANT** **SIGNATURE OF HOD**

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GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MS IN OPHTHALMOLOGY

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.

The purpose of this programme is to standardize Ophthalmology teaching at post graduate level throughout the country so that it will benefit in achieving uniformity in post graduate and undergraduate teaching as well as result in creating competent ophthalmic surgeons with appropriate expertise.

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 Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. 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

Programme Objectives

The clinical post graduate training programmes are intended at developing in a student a blend of qualities that of a clinical specialist, a teacher and a researcher. These programmes are organized such that a post graduate student should possess the following qualities, knowledge and skills:

a. The student should possess basic knowledge of the structure, function and development of the human body as related to ophthalmology, of the factors which may disturb these mechanisms and the disorders of structure and function which may result thereafter.

b. The student should be able to practice and handle most day-to-day problems independently in ophthalmology. The student should recognize the limitations of his/her own clinical knowledge and know when to seek further help.

c. The student should understand the effects of environment on health and be familiar with the epidemiology of at least the more common diseases in the field of ophthalmology.

d. The student should be able to integrate the preventive methods with the curative and rehabilitative measures in the comprehensive management of the disease.

e. The student should be familiar with common eye problems occurring in rural areas and be able to deal with them effectively.

f. The student should also be made aware of Mobile Ophthalmic Unit and its working and components.

g. The student should be familiar with the current developments in Ophthalmic Sciences.

h. The student should be able to plan educational programmes in Ophthalmology in association with senior colleagues and be familiar with the modern methods of teaching and evaluation.

i. The student should be able to identify a problem for research, plan a rational approach to its solution, execute it and critically evaluate his/her data in the light of existing knowledge.

j. The student should reach the conclusions by logical deduction and should be able to assess evidence both as to its reliability and its relevance.

k. The student should have basic knowledge of medico-legal aspects of medicine.

l. The student should be familiar with patient counseling and proper consent taking.

SUBJECT SPECIFIC COMPETENCIES

A post graduate student upon successfully qualifying in the M.S. (Ophthalmology) examination should be able to:

a) Offer to the community, the current quality of 'standard of care' in ophthalmic diagnosis as well as therapeutics, medical or surgical, in most of the common situations encountered at the level of health services.

b) Periodically self assess his or her performance and keep abreast with ongoing advances in the field and apply the same in his/her practice.

c) Be aware of her/his own limitations to the application of the specialty in situations, which warrant referral to more qualified centers or individuals.

d) Apply research and epidemiological methods during his/her practice. The post graduate student should be able to present or publish work done by him/her.

e) Contribute as an individual/group towards the fulfillment of national objectives with regard to prevention of blindness.

f) Effectively communicate with patients or relatives so as to educate them sufficiently and give them the full benefit of informed consent to treatment and ensure compliance.

At the end of the course, the student should have acquired knowledge in the following:

A. Cognitive domain

Basic Medical Sciences:

- Attain understanding of the structure and function of the eye and its parts in health and disease.
- Attain understanding and application of knowledge of the structure and function of the parts of Central Nervous System and other parts of the body with influence or control on the structure and function of the eye.
- Attain understanding of and develop competence in executing common general laboratory procedures employed in diagnosis and research in Ophthalmology.

1. Clinical Ophthalmology:

Given adequate opportunity to work on the basis of graded responsibilities in outpatients, inpatient and operation theatres on a rational basis in the clinical sections from the day of entry to the completion of the training programme, the students should be able to:

- Acquire scientific and rational approach to the diagnosis of ophthalmic cases presented.
- Acquire understanding of and develop inquisitiveness to investigate to establish cause and effect of the disease.
- To manage and treat all types of ophthalmic cases.
- To competently handle and execute safely all routine surgical procedures on lens, glaucoma, lid, sac, adnexa, retina and muscle anomalies.
- To competently handle all ophthalmic medical and surgical emergencies.
- To be familiar with micro-surgery and special surgical techniques.
- To demonstrate the knowledge of the pharmacological (including toxic) aspects of drugs used in ophthalmic practice and drugs commonly used in general diseases affecting the eyes.

2. Refraction:

- Acquire competence in assessment of refractive errors and prescription of glasses for all types of refraction problems.
- Acquire basic knowledge of manufacture and fitting of glasses and competence of judging the accuracy and defects of the dispensed glasses.

3. Ophthalmic super-specialties:

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Given an opportunity to work on a rotational basis in various special clinics of sub-specialties of ophthalmology, if possible, the student should be able to:

- Examine, diagnose and demonstrate understanding of management of the problems of neuro-ophthalmology and refer appropriate cases to neurology and neuro-surgery.
- Examine, diagnose and demonstrate understanding of management of (medical and surgical) complicated problems in the field of (a) lens, (b) glaucoma, c) cornea, (d) retina, (e) pediatric ophthalmology, (f) oculoplasty, (g) uvea, and (I) genetic problems in ophthalmology.
- To demonstrate understanding of the manufacture, and competence in prescription and dispensing of contact lenses and ocular prosthesis.

5. Ophthalmic pathological/microbiological/biochemical sciences

- Be able to interpret the diagnosis in correlation with the clinical data and routine materials received in such cases.

6. Community Ophthalmology

Eye camps may be conducted where the PG students are posted for imparting training to according to a set methodology. The community and school surveys may also be conducted by the post graduate students.

The post graduate students are given an opportunity to participate in surveys, eye camps. They should be able to guide rehabilitation workers in the organisation and training of the blinds in art of daily living and in the vocational training of the blind leading to gainful employment.

7. Research :

- Recognise a research problem.
- State the objectives in terms of what is expected to be achieved in the end.
- Plan a rational approach with appropriate controls with full awareness of the statistical validity of the size of the material.
- Spell out the methodology and carry out most of the technical procedures required for the study.
- Accurately and objectively record on systematic lines results and observation made.
- Analyze the data with the aid of an appropriate statistical analysis.

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- Interpret the observations in the light of existing knowledge and highlight in what ways the study has advanced existing knowledge on the subject and what further remains to be done.
- Write a thesis in accordance with the prescribed instructions.
- Write at least one scientific paper as expected of International Standards from the material of this thesis.

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 other 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.

C. Psychomotor domain

At the end of the course, the student should acquire following clinical skills:

Essential diagnostic skills:

I. Examination techniques along with interpretation

1. Slit lamp Examination

i. Diffuse examination
ii. Focal examination
iii. Retroillumination – direct and indirect
iv. Sclerotic scatter
v. Specular reflection
vi. Staining modalities and interpretation

2. Fundus evaluation

- Direct/Indirect ophthamoscopy
- Fundus drawing
- 3-mirror examination of the fundus
- 78-D/90-D/60-D examination
- Amsler's charting

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II. Basic investigations along with their interpretation

1. Tonometry

Tonometry - Applanation/Identation/Non-contact

2. Gonioscopy

Gonioscopy grading of the anterior chamber angle

3. Tear/ Lacrimal function tests

i. Staining- fluorescein and Rose Bengal
ii. Schirmer test/tear film break up time
iii. Syringing
iv. Dacrocystography

4. Corneal

- Corneal scraping and cauterization
- Smear preparation and interpretation (Gram's stain /KOH)
- Media inoculation
- Keratometry - performance and interpretation
- Pachymetry
- Corneal topography - if available

5. Colour Vision evaluation

- Ishihara pseudoisochromatic plates
- Farnsworth Munsell, if available

6. Refraction

i. Retinoscopy- Streak/ Priestley Smith
ii. Use of Jackson's cross-cylinder
iii. Subjective and objective refraction
iv. Prescription of glasses

7. Diagnosis and assessment of Squint

i. Ocular position and motility examination
ii. Synoptophore usage
iii. Lees screen usage
iv. Diplopia charting
v. Assessment of strabismus - cover tests/prisms bars
vi. Amblyopia diagnosis and treatment
vii. Assessment of convergence, accommodation, stereopsis, suppression

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8. Exophthalmometry

Usage of Hertel's exophthalmometer - proptosis measurement

9. Contact lenses

- Fitting and assessment of RGP and soft lenses
- Subjective verification of over refraction
- Complications arising of contact lens use
- Educating the patient regarding CL usage and imparting relevant knowledge of the complications arising thereon

10. Low Vision Aids

- Knowledge of basic optical devices available and relative advantages and disadvantages of each.
- The basics of fitting with knowledge of availability & cost

III. The post graduate must be well versed with the following investigative modalities although the student may or may not perform it individually. But, she/he should be able to interpret results of the following tests:

1. Fundus photography
2. Fluorescein angiography
3. Ophthalmic ultrasound A-scan/B scan
4. Automated perimetry for glaucoma and neurological lesions
5. Radiological tests - X rays - Antero posterior/ Lateral view PNS (Water's view) / Optic canal views

Localisation of intra-ocular and intra-orbital FBs

Interpretations of -USG/ CT/ MRI Scans

6. OCT and UBM
7. ERG, EOG, and VEP

IV. Minor surgical procedures – Must know and perform independently

- Conjunctival and corneal foreign body removal on the slit lamp
- Chalazion incision and curettage
- Pterygium excision
- Biopsy of small lid tumours
- Suture removal- skin/conjunctival/corneal/ corneoscleral
- Tarsorrhaphy
- Subconjunctival injection
- Retrobulbar, parabulbar anaesthesia
- Posterior Sub-Tenon's injections

- Artificial eye fitting

V. Surgical procedures

1. Must know and can perform independently

a. Ocular anaesthesia:

- Retrobulbar anaesthesia
- Peribulbar anaesthesia
- Facial blocks- O'Brein / Atkinson/Van lint and modifications
- Frontal blocks
- Infra orbital blocks
- Blocks for sac surgery

2. Must be able to independently perform and deal with complications arising from the following surgeries :

- Lid Surgery - Tarsorrhaphy
  Ectropion and entropion
  Lid repair following trauma
  Epilation
- Destructive procedures
  Evisceration with or without implant Enucleation with or without implant

- Sac surgery
  i. Dacryocystectomy
  ii. Dacryocystorhinostomy
  iii. Probing for congenital obstruction of nasolacrimal duct

- Strabismus surgery
  Recession and resection procedures on the horizontal recti.
- Orbit surgery
  Incision and drainage via anterior orbitotomy for abscess
- Cyclocryotherapy/Cyclophotocoagulation

3. PG Students should be well conversant with use of operating microscope and must be able to perform the surgeries listed below competently under the same:

- Cataract surgery
  i. Standard ECCE (extracapsular cataract extraction; first year) with or without IOL implantation

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ii. Small incision ECCE with or without IOL implantation and/or Phacoemulsification with PC IOL implantation

iii. Intracapsular cataract extraction (second year)

iv. Cataract with Phacoemusification (third year)

v. Secondary AC or PC IOL implantation

- Vitrectomy/Scleral buckling
    - Intra-vitreal and intra-cameral (anterior chamber) injection techniques and doses of drugs for the same
    - Needs to know the basis of open sky vitrectomy (anterior segment) as well as management of cataract surgery complications.
    - Assisting vitrectomy and scleral buckling procedures
- Ocular surface procedures

Pterygium excision with modifications Conjunctival

cyst excision/foreign body removal Corneal

foreign body removal

Conjunctival flap/ peritomy

- Glaucoma

Trabeculectomy

- Corneal

Repair of corneo - scleral perforations

Corneal suture removal

Application of glue and bandage contact lens

4. Should have performed/assisted the following microscopic surgeries

i. Keratoplasty

Therapeutic and optical

ii Glaucoma surgery

Pharmacological modulation of trabeculectomy

Trabeculotomy

Goniotomy

Glaucoma valve implant surgery

5. Desirable to be able to perform following laser procedures
    - Yag Capsulotomy
    - Laser iridotomy
    - Focal and panretinal photocoagulation
6. Should have assisted/knowledge of Keratorefractive procedures

Operations:

The PG is provided with an opportunity to perform operations both extra-ocular and intra-ocular with the assistance of the senior post graduate students and/or under the direct supervision of a faculty member. The student is provided with an opportunity

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to learn special and complex operations by assisting the senior post graduate student or the faculty in operations of cases of the specialty and be responsible for the post-operative care of these cases.

In **first phase**, the post graduate student is given training in preparations of cases for operation, pre-medication and regional anaesthetic blocks. In the **next phase**, the post graduate student assists the operating surgeon during the operations. In the **third phase**, the post graduate student operates independently assisted by senior post graduate student or a faculty member. She/he is required to be proficient in some operations and show familiarity with others.

Syllabus

Course contents:

These are only broad guidelines and are illustrative, there may be overlap between sections.

I. Basic Sciences:

1. Orbital and ocular anatomy
    i. Gross anatomy
    ii. Histology
    iii. Embryology
2. Ocular Physiology
3. Ocular Pathology
4. Ocular Biochemistry
    General biochemistry, biochemistry applicable to ocular function
5. Ocular Microbiology
    General Microbiology, specific microbiology applicable to the eye
6. Immunology with particular reference to ocular immunology
7. Genetics in ophthalmology
8. Community Eye Health

II. Optics

a. Basic physics of optics
b. Applied ophthalmic optics
c. Applied optics including optical devices
d. Disorders of Refraction

III. Clinical Ophthalmology

i. Disorders of the lids
ii. Disorders of the lacrimal system
iii. Disorders of the Conjunctiva
iv. Disorders of the Sclera

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v. Disorders of the Cornea
vi. Disorders of the Uveal Tract
vii. Disorders of the Lens
viii. Disorders of the Retina
ix. Disorders of the Optic Nerve and Visual Pathway
x. Disorders of the Orbit
xi. Glaucoma
xii. Neuro-ophthalmology
xiii. Paediatric ophthalmology
xiv. Ocular involvement in systemic disease
xv. Immune ocular disorders
xvi. Strabismus and Amblyopia
xvii. Ocular oncology

TEACHING AND LEARNING METHODS

Teaching Methodology:

The theoretical knowledge is imparted to the post graduate student through distinct courses of lecture demonstrations, seminars, symposia and inter- and intra- departmental meetings. The students are exposed to recent advances through discussions in journal clubs and participation in CMEs, and symposia.

The post graduate students are imparted clinical training in several ways:

1. Group Discussion

The junior post graduate students may present the symposium to their senior postgraduates where it is fully discussed before finally being discussed in front of the faculty or senior eye specialists. A free and fair discussion is encouraged. These discussions enable the post graduate students to prepare for a general discussion in the class.

2. Clinical Case discussion

a. Bedside discussion on the rounds and outpatient teaching take their toll with patient management. Therefore in addition to these, clinical case discussions should form part of a department's schedule at a fixed time every week. This could range from 1-2 hours and could be held at least once a week. The choice and manner of presentation and discussion varies widely and is left to the discretion of the department. Every effort should be made to include as wide a variety of cases as possible over three years with multiple repetitions. Problem oriented approach is better as it aids in decision making skills.

b. In addition to bedside teaching rounds, at least 5-hr of formal teaching per week are necessary.

c. Consultant case presentation is another approach which should be encouraged as it aids in solving complex problems and also is forum for discussion of interesting cases.

d. Case discussions on the patient's records written by the student is to be encouraged as it helps exercise the student's diagnostic and decision making skills. It also helps the consultant in critical evaluation of the student's progress academically.

e. Case presentation at other in-hospital multidisciplinary forums.

f. The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.

g. Department should encourage e-learning activities.

3. Seminars

Seminars should be conducted at least once weekly. The duration should be at least one hour. The topics selected should be repeated once in 3 years so as to cover as wide a range of topics as possible. Seminars could be individual presentations or a continuum (large topic) with many post graduate students participating.

4. Journal clubs

Journals are reviewed in particular covering all articles in that subject over a 6 months period and are discussed by the post graduate student under the following headings.

1) Aim 2) Methods 3) Observations
4) Discussions and 5) Conclusions

The post graduate student to whom the journal is allotted presents the journal summaries to the senior postgraduates. They are expected to show their understanding of the aspects covered in the article and clarify any of the points raised in the article, offer criticisms and evaluate the article in the light of known literature.

5. 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.

6. Out-Patients: For the first six months of the training programme, post graduate students may be attached to a faculty member to be able to pick up methods of history taking and ocular examination in ophthalmic practice. During this period

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the post graduate student may also be oriented to the common ophthalmic problems. After 6 months, the clinical post graduate student may work independently, where he receives new and old cases including refractions and prescribes for them. The post graduate students are attached to a senior post graduate student and faculty member whom they can consult in case of difficulty.

7. **Wards:** Each post graduate student may be allotted beds in the in-patient section depending upon the total bed capacity and the number of the post graduates. The whole concept is to provide the post graduate student increasing opportunity to work with increasing responsibility according to seniority. A detailed history and case record is to be maintained by the post graduate student.

Relevance of beds and admissions in Ophthalmology has really gone down at present, as most of the surgical and special investigative procedures are being performed on out-patient basis. Most of the teaching has to be imparted in out-patients department and special Clinics.

8. **Rotations: Specialty clinics**

The student may rotate in the following subspecialty clinics:

- Anterior segment and cataract
- Glaucoma
- Oculoplastics
- Paediatric ophthalmology and strabismus
- Retina and Uvea
- Cornea, Contact lens and low vision
- Neuroophthalmology
- Refractive Clinic

9. **Practicals in Ocular Histopathology**

The post graduate students may be provided with fully stained slides of the ocular tissues along with relevant clinical data and discuss the diagnosis and differential diagnosis on the basis of the information provided

10. Attend accredited scientific meetings (CME, Symposia, and Conferences).

11. Additional sessions on basic sciences, biostatistics, research methodology, teaching methodology, hospital waste management, health economics, medical ethics and legal issues related to ophthalmology practice are suggested.

13. Maintenance of **log book**: Log books shall be checked and assessed periodically by the faculty members imparting the training.

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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 surgical skills laboratories in medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, ie, during the training

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.

FORMATIVE ASSESSMENT, ie., during the training

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.

Quarterly assessment during the MS training should be based on following educational activities:

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, ie., assessment at the end of training

The summative examination would be carried out as per the Rules given in **POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.**

The Post Graduate examination shall be in three parts:

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

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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. From regulations)

2. Theory 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.

There shall be four theory papers.

Paper I: Basic Sciences related to Ophthalmology, Refraction & Optics

Paper II: Clinical Ophthalmology

Paper III: Systemic Diseases in Relation to Ophthalmology

Paper IV: Recent Advances in Ophthalmology and Community Ophthalmology

3. Clinical/Practical and oral/viva voce examination

Clinical

1 long case

2 short cases with different problems 2

fundus Cases

1 refraction case

. Oral/Viva voce Examination shall be comprehensive enough to test the post graduate student**'s overall knowledge of the subject and shall include:**

i. Instruments
ii. Pathology specimens
iii. Drugs, X-rays, USG/OCT/CT/MRI Scans, etc.
iv. Visual fields and other ophthalmic diagnostic charts

Recommended Reading:

Books (latest edition)

1. Ophthalmic Surgery: Principles and Techniques. Blackwell Science. Albert DM.
2. Principles and Practice of Ophthalmology. Albert DM, Jakobiec. W B Saunders
3. Principles & Practice of Ophthalmology. Gholam A Paymen
4. The Current American Academy of Ophthalmology Basic and Clinical Science Course (13 volumes)
5. Duke Elder's Practice of Refraction. Abrams D. Churchill Livingstone.
6. Text book of Ophthalmology. Yanoff and Duker
7. Retina. Stephen J Ryan:
8. Ophthalmic Ultrasound: Sandra Byrne and Ronald Green.
9. Cornea: Fundamentals, Diagnosis, and Management. Krachmer JH, Mannis MJ, Holland EJ. Mosby Elsevier.
10. Ophthalmology. Yanoff N, Duker JS. Mosby Elsevier.
11. Review of Ophthalmology. Friedman NJ, Kaiser PK, Trattler WB. Elseview Saunders, Philadelphia.
12. Corneal Transplantation. Vajpayee RB. Jaypee Brothers Medical Publishers (P) Ltd, New Delhi.
13. Fundamentals of Clinical Ophthalmology Series. Coster D. Cornea. Blackwell Publishing Limited.
14. The Contact Lens Manual. A practical guide to fitting. Gasson A, Morris A J. Butterworth Heinemann Elsevier.
15. Steinert's cataract surgery.
16. Shields Text book of glaucoma
17. Smith and Nozik : Uvea
18. Rootman's diseases of the orbit
19. Eyelid, conjunctival and orbital tumors. An atlas and textbook. Shields JA, Shields CL. Philadelphia: Lippincott Williams & Wilkins.
20. Intraocular tumors. An atlas and textbook. Shields JA, Shields CL.
21. Pediatric Ophthalmology. Taylor and Hoyt: Saunders Ltd.
22. Management of Strabismus and Amblyopia. Pratt-Johnson and Tilson: Thieme Verlag.
23. Handbook of Pediatric Eye and Systemic disease. Wright, Spiegel and Thompson.
24. BinocularVision and Ocular Motility. Theory and Management of Strabismus. Von Noorden GK. Mosby.
25. Surgical Management of Strabismus. Helveston:
26. Strabismus: A Decision Making Approach. Von Noorden and Helveston:
27. Thyroid Eye Diseases. Char DR. Williams and Wilkins, Baltimore.

Medical Council of India

28. A Manual of Systematic Eyelid Surgery.Collin JRO (ed). Churchill Livingstone, Edinburgh.
29. Refractive Surgery. Agarwal A, Agarwal A, Jacob Soosan. Jaypee.
30. LASIK Complications, Prevention and management. Gimbel HV, Penno EEA. Slack Inc.
31. Management of Complications of Refractive Surgery. Alio JL, Azar DT. Springer.
32. Quality of Vision: Essential Optics for the Cataract and Refractive Surgeon. Holladay JT. Slack Inc.
33. Ocular Pharmacology: Havener
34. Anatomy: Wolff 's Anatomy of the Eye and Orbit
35. Physiology: Adler's Physiology of the Eye
36. Textbook of Ophthalmology (2 volumes). Easty DL, Sparrow JM.Oxford Oxford Medical Publications.
37. The Eye. Basic Sciences in Practice. Forrester JV, Dick AD, McMenamin PG, Lee WR. W B Saunders.
38. A Stereoscopic Atlas of Macular Diseases: Diagnosis and Treatment. Gass JDM.
39. Neuroophthalmology. Glaser JS. LipincottWilliams & Wilkins. .
40. Clinical Ophthalmic Pathology. Harry J, Misson G. Butterworth/Heinemann.
41. Inherited Retinal Diseases. A Diagnostic Guide. Jimenez Sierra JM, Ogden TE, Van Boemel GB. Mosby.
42. Clinical Ophthalmology. Kanski JJ. Butterworth/Heinemann.
43. ABC of Resuscitation. Colquhoun, M. C., Evans, T. R., Handley, A. J. BMJ Publishing Group.
44. Walsh and Hoyt's Clinical Neuroophthalmology (5 volumes). Miller NR, Newman NJ, Williams and Wilkins.
45. The human eye. Oyster CW Sinauer Associates. Sunderland. Massachusetts
46. Paediatric Ophthalmology. Taylor D. Blackwell Science.
47. Decision Making in Ophthalmology. Van Heuven WAJ, Zwann J. Mosby.
48. Parsons' Diseases of the eye. Sihota and Tandon.
49. Wills Eye Manual
50. International Council of Ophthalmology Residency Curriculum available at http://www.icoph.org/

Journals

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

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Annexure I

Postgraduate Students Appraisal Form Pre / Para /Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM……TO……

Sr. No.	PARTICULARS	Not Satisfactory	Satisfactory	More Than Satisfactory	Remarks
		1 2 3	4 5 6	7 8 9	
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 CONSULTANT** **SIGNATURE OF HOD**

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NATIONAL MEDICAL COMMISSION
Postgraduate Medical Education Board

D 11011/1/22/AC/Guidelines/17 **Date: 29-08-2022**

National Medical Commission

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MS IN ORTHOPEDICS

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MS IN ORTHOPAEDICS

Preamble

Competency based training programme in Orthopaedics aims to create postgraduate student who, after undergoing the requisite training, should be able to serve the needs of the community and should be competent to solve the problems pertaining to the speciality of Orthopaedics and Trauma.

A postgraduate undergoing training MS in Orthopaedics should be trained to identify and recognize various congenital, developmental, inflammatory, infective, traumatic, metabolic, neuromuscular, degenerative and oncologic disorders of the musculoskeletal system. She/he should be able to provide competent professional services to trauma and orthopaedic patients at a primary/ secondary/tertiary healthcare centres. The PG should acquire knowledge, skill and attitude to provide healthcare and education to the patients and students.

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 subject-content specialists. The Expert Group of the NMC had attempted to render uniformity without compromise to the purpose and content of the document. 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.

In order to achieve sustainable outcomes, certain competencies are essential to be achieved and assessed that will enable the qualified professional to perform the role in practice as an orthopaedic specialist. These roles would be to perform as a:

1. Clinical Expert
2. Professional
3. Scholar
4. Team Member

SUBJECT SPECIFIC OBJECTIVES

The goal of M.S. Orthopaedics is to produce a competent doctor who:

National Medical Commission

1. Is aware of contemporary advances & developments in medical sciences as related to Orthopaedics and Trauma.
2. Has acquired the competencies pertaining to the subject that are required to be practiced in the community and at all levels of health system.
3. Recognizes the health needs of the patient and family and carries out professional obligations in keeping with principles of the National Health Policy and professional ethics.
4. Is oriented to principles of research methodology.
5. Has acquired skills in educating medical and paramedical professionals.
6. Has acquired skills in effectively communicating with the person, family and the community.

There is need of competency based learning. Core competencies are the essential knowledge, values and skills vital to the successful performance of effective practice of Orthopaedic and Trauma care on patients. Competence-based training is distinctly different from traditional teaching process. Competence-based training focuses on learning by doing.

Competence in medicine has been defined as "the habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values, and reflection in daily practice for the benefit of the individuals and communities being served". Competence is not an achievement but rather a habit of lifelong learning.

Ideally, the assessment of competence (what the student or physician is able to do) should provide insight into actual performance (what he or she does habitually when not observed), as a well as the capacity to adapt to change, find and generate new knowledge, and improve overall performance. The specific learning objectives based on core competence are common to all specialities. As an example of designing learning objectives in the seven domains of core competence are described below:

1. Professionalism
2. Patient care
3. Medical Knowledge
4. Practice-based learning and improvement
5. Interpersonal and Communication skills
6. Systems-based practice
7. Academic skills

National Medical Commission

The **Goal** of the MS Orthopedics course is to train a doctor to become a competent teacher, surgeon and researcher in who has acquired competence / skills as given below:

1. *Professionalism*

1.1 Accepts personal responsibility for care of one's patients, consistent with good work ethics and empathy.

1.2 Demonstrates appropriate truthfulness and honesty with colleagues.

1.3 Recognizes personal beliefs, prejudices, and limitations. His / her personal beliefs and prejudices should not come in the way of providing service.

1.5 Respects patient confidentiality at all times in verbal and written communication with others.

2. *Patient Care*

2.1 History of and physical examination

2.1.1 Demonstrates ability to obtain a comprehensive and focused history of illness from patient/relatives.

2.1.2 Demonstrates ability to perform a comprehensive and problem-focused physical examination of the concerned human organ.

2.2 Information Management

2.2.1 Demonstrates mastery of the traditional organization of medical data in oral and written presentations.

2.2.2 Demonstrates use and interpretation of diagnostic procedures and data.

2.2.3 Demonstrate ability to use information to produce evidence for the diagnosis and treatment of relevant disease condition/s.

2.3 Procedural

2.3.1 Demonstrates mastery of adequate medical record keeping.

2.3.2 Demonstrates knowledge of accessing data and information systems.

2.3.3 Demonstrates the ability to perform a specific set of procedures identified by the faculty.

3. *Medical Knowledge*

3.1 Core Discipline

3.1.1 Competencies unique to the discipline,

3.1.2 Competencies derived from the clinical, pre-clinical and para-clinical disciplines.

3.2 Problem Solving

3.2.1 Demonstrates the ability to identify and find information relevant to a clinical problem, using consultation, texts, and the archival literature and electronic media.

National Medical Commission

3.2.2 Demonstrates the ability to generate an initial list of differential diagnoses given a specific chief complaint and patient characteristics.

3.2.3 Demonstrates the ability to re-rank the differential diagnoses based on information gathered from the history, physical, and auxiliary studies (investigations).

3.2.4 Demonstrates the ability to explain a mechanism for each aspect of a patient's problem, including biological, behavioural, and social aspects.

3.2.5 Demonstrates the ability to evaluate scientific / clinical information and critically analyze conflicting data and hypotheses.

3.2.6 Demonstrates an ability to counsel a patient providing an option of treatment, conservative or operative.

4. *Practice-Based Learning and Improvement*

4.1 Physician Scholar

4.1.1 Demonstrates the ability to analyze the quality and implications of medical literature and apply new knowledge in the delivery of health care.

4.1.2 Demonstrates an interest and ability to identify future areas of inquiry in medical research.

4.1.3 Demonstrates enthusiasm and positive attitude in the educational process and participates fully in educational activities.

5. *Interpersonal and Communication Skills*

5.1 Human Relationships

5.1.1 Demonstrates knowledge of or appropriate inquiry about family and support systems.

5.1.2 Demonstrates an effective system for identifying and addressing ethical, cultural, and spiritual issues associated with health care delivery.

5.1.3 Demonstrates knowledge or applies an understanding of psychological, social, and economic factors which are pertinent to the delivery of health care.

5.1.4 Accurately assesses a patient's exportations and assumptions in accessing the health care system.

5.1.5 Effectively engages the patient and / or family in verbal communications and counselling.

6. *System – Based Practice*

6.1 Health Care Management

6.1.1 Demonstrates a practical, efficient and cost effective approach to diagnosis and treatment planning and recognizes its social and economic impact.

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6.1.2 Demonstrates the ability to engage the patient family in diagnosis and therapeutic treatment planning.

6.1.3 Demonstrates the ability to recognize and outline initial treatment for patient with life threatening emergencies regardless of aetiology.

6.1.4 Demonstrates knowledge of alternative medicine options and understands their role in health care delivery (AYUSH).

6.2 Health Service Delivery

6.2.1 Demonstrates knowledge of health care financing and applies it in assisting patient to access the best possible care.

6.2.2 Utilizes knowledge of population-based and evidence-based medicine in making patient management decisions.

6.2.3 Utilizes knowledge of managed care systems in making patient treatment plans and health care maintenance plans.

6.3 Health Care Team approach to health care delivery.

6.3.1 Demonstrates an understanding of the roles and competencies of other health care providers.

6.3.2 Demonstrates the ability to engage other health care professionals.

6.3.3 Demonstrates the ability to follow and lead in a team approach to health care delivery.

7. *Academic Skills (Scholarly activity)*

7.1 Familiarity with basic research methodology, epidemiology, basic information technology skills.

7.2 Planning the protocol of a thesis, its execution and final report.

7.3 Skills to review of relevant literature and asking relevant research question with hypothesis development.

7.4 Conducting clinical sessions for undergraduate medical students, nurses and paramedical workers.

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SUBJECT SPECIFIC COMPETENCIES

1. *Predominant in cognitive domain:*

1.1. Describe the principles of injury and its mechanism and mode, its clinical presentation, plan appropriate investigations and interpret the results, and institute the management of musculoskeletally injured patient, different forces resulting in fractures, biomechanical principles of fracture fixation.

1.2. Identify and describe the surface anatomy and relationship within of the various bones, joints, ligaments, major arteries, veins and nerves of the musculoskeletal system of the spine, upper limb, lower limb and the pelvis, chest, abdomen and head & neck. Identify structural peculiarities of specific bony components and structural speciality of clinical importance during fixation.

1.3. Define and describe the pathophysiology of shock (circulatory failure), types of shock and principles of management.

1.4. Define and describe, types of respiratory failure, the pathophysiology of respiratory failure and management.

1.5. Describe the principles and stages of bone and soft tissue healing, types of bone healing and different intrinsic and extrinsic factors which influence fracture healing.

1.6. Understand and describe the metabolic, nutritional, endocrine, and social impact of trauma, critical illness and biomechanical principles involved in each.

1.7. Enumerate, classify and describe the various bony/soft tissue injuries affecting the axial and appendicular skeletal system in adults and children.

1.8. Describe the principles of internal and external fixation for stabilization of bone and joint injuries.

1.9. Describe the mechanism of homeostasis, fibrinolysis and methods to control haemorrhage and rationale for each management.

1.10. Describe the physiological coagulation cascade and its abnormalities.

1.11. Describe different techniques of pain management as well as recovery of function in specific disease and trauma scenario.

1.12. Describe the pharmacokinetics and pharmacodynamics of drug metabolism and excretion of analgesics, anti-inflammatory agents, antibiotics, disease - modifying agents and chemotherapeutic agents and biologicals.

1.13. Understand the principles of Early Total Care and Damage Control Orthopaedics and planning of definitive orthopaedic management.

National Medical Commission

1.14. Understand the principles of biostatistics and research methodology.

1.15. Understand the principles of Angiography, CT/MR angiography, Doppler Ultrasound, Sinogram.

1.16. Acquire the ability to order investigations.

2. Describe the clinical presentation, plan investigations, interpret results and institute steps for the management and prevention of the following disease conditions:
   2.1. Nutritional deficiency diseases affecting the bones and joints,
   2.2. Depositional arthropathies,
   2.3. Endocrine abnormalities of the musculoskeletal system,
   2.4. Metabolic abnormalities of the musculoskeletal system,
   2.5. Congenital anomalies of the musculoskeletal system,
   2.6. Developmental skeletal disorder of the musculoskeletal system,
   2.7. Bone and soft tissue tumours affecting the musculoskeletal system.

3. Describe the pathogenesis and clinical features of the following conditions in adults and children, plan appropriate investigations, interpret the results and institute appropriate management of:
   3.1. Tubercular infections of bone and joints (musculoskeletal system),
   3.2. Pyogenic infections of musculoskeletal system,
   3.3. Mycotic infections of musculoskeletal system,
   3.4. Autoimmune disorders of the musculoskeletal system (HIV),
   3.5. Rheumatoid arthropathy, Ankylosing spondylitis, seronegative arthropathy.
      3.5.1. Osteoarthrosis and spondylosis

4. Describe the pathogenesis and clinical presentation, plan and interpret results of investigations and institute appropriate treatment in the following conditions:
   4.1. Post-polio residual paralysis
   4.2. Cerebral palsy
   4.3. Muscular dystrophies and myopathies
   4.4. Nerve injuries
   4.5. Entrapment neuropathies
   4.6. Spinal dysraphism
   4.7. Spinal anomalies.

National Medical Commission

5. Diagnose musculoskeletal manifestation of AIDS and HIV infection and its management.
6. Describe the aetiopathogenesis and clinical presentation, plan and interpret results of investigations and institute appropriate treatment for the management of osteonecrosis of bones.
7. Identify situations requiring rehabilitation services, prescribe suitable orthotic and prosthetic appliances and act as a member of the team providing rehabilitation care.
8. Identify and manage emergency situation in disorders of the musculoskeletal system.
9. Understand the basics of diagnostic imaging in orthopaedics like how and when to order and how to interpret the results of:
    9.1. Plain x-ray
    9.2. Ultrasonography
    9.3. Computerised axial tomography
    9.4. Magnetic resonance imaging
    9.5. PET scan
    9.6. Radio Isotope bone scan
    9.7. Digital Subtraction Angiography (DSA)
    9.8. Dual energy x-ray Absorptiometry
    9.9. Arthrography.
10. Describe the aetiopathogenesis, clinical presentation, identification, plan investigation/s and institute appropriate treatment for oncologic problems of musculoskeletal system (both benign and malignant: primary and secondary).
11. Understand the basics and principles of biomaterials and orthopaedic metallurgy.
12. Describe the principles of normal and abnormal gait and understand the biomedical principles of posture and replacement surgeries.
13. Describe social, economic, environmental, biological and emotional determinants of health in a given patient with a musculoskeletal problem.
14. Identify a research problem, prepare a research protocol, conduct a study, record observations, analyse data, interpret the results, discuss and disseminate the findings

II. *Predominant in the Psychomotor domain*

1. **At the end of the first year of M.S. Orthopaedics programme, the student should be able to:**

National Medical Commission

1.1. Elicit a clinical history from a patient, do a physical examination, document in a case record, order appropriate investigations and make a clinical diagnosis. (Records of all competencies achieved should be documented in log book/E-Portfolio)

1.2. Impart wound care, where applicable, including different types of wound, and different chemotherapeutic agents for wound care, including VAC application and its care, and local antibiotic delivery system.

1.3. Apply all types of POP casts/slabs, splints and tractions as per need. Learn different types of bandaging.

1.4. Identify shock and provide resuscitation.

1.5. Perform aspiration of joints and local infiltration of appropriate drugs.

1.6. Perform appropriate wound debridement.

1.7. Perform arthrotomy of knee joint and also assist in arthrotomy of hip, anklet and shoulder.

1.8. Perform incision and drainage of abscess.

1.9. Perform split thickness skin grafting.

1.10. Perform fasciotomies.

1.11. Apply external fixators.

1.12. Apply skeletal tractions including skull tongs.

1.13. Triage a disaster situation and multiple trauma patients in an emergency room.

1.14. Perform on bone models, interfragmentary compression screws, external fixation, Tension band wiring and Broad plating.

1.15. Perform closed reduction of common dislocations like shoulder and common fractures like collar fracture, supracondylar fracture.

1.16. Perform on a cadaver standard surgical approaches to the musculo-skeletal system.

2. At the end of the second year of M.S. Orthopaedics course, the student should be able to:

2.1. Take an informed consent for standard orthopaedic procedures.

2.2. Perform closed/open biopsies for lesions of bone, joints and soft tissues.

2.3. Perform split thickness skin grafting and local flaps.

2.4. Perform on bone models, internal fixation with k-wires, screws, plates, Dynamic hip/condylar screws/nailing.

2.5. Perform sequestrectomy and saucerisation.

2.6. Perform arthrotomy of joints like hip/shoulder, ankle, elbow.

2.7. Perform repair of open hand injuries including tendon repair.

National Medical Commission

2.8. Perform arthodesis of small joints.

2.9. Perform diagnostic arthroscopy on models and their patients.

2.10. Perform carpal tunnel/tarsal tunnel release.

2.11. Apply Ilizarov external fixator.

2.12. Perform soft tissue releases in contractures, tendon lengthening and correction of deformities.

2.13. Perform amputations at different levels.

2.14. Perform corrective surgeries for Congenital talipes equino-varus (CTEV), DDH, Perthes/ skeletal dysplasia.

2.15. Perform cadaver based procedures, arthroscopy, arthrotomy.

3. At the end of the third year of M.S. Orthopaedics programme, the student should be able to:

3.1. Assist in the surgical management of poly trauma patient.

3.2. Assist in Arthroplasty surgeries of hip, knee, shoulder and the ankle.

3.3. Assist in spinal decompressions and spinal stabilizations.

3.4. Assist in operative arthroscopy of various joints.

3.5. Assist /perform arthrodesis of major joints like hip, knee, shoulder, elbow.

3.6. Assist in corrective osteotomies around the hip, pelvis, knee, elbow, finger and toes.

3.7. Assist in surgical operations on benign and malignant musculoskeletal tumour including radical excision and custom prosthesis replacement.

3.8. Assist in open reduction and internal fixations of complex fractures of acetabulam, pelvis, IPSI lateral floating knee/elbow injuries, shoulder girdle and hand.

3.9. Assist in spinal deformity corrections.

3.10. Independently perform closed/open reduction and internal fixation with DCP, LCP, intra- medullary nailing, LRS.

3.11. Assist in limb lengthening procedures.

3.12. Assist in revision surgeries.

3.13. Provide pre- and post- OP care. This care should be exercised from first year.

3.14. Perform all clinical skills as related to the speciality.

III. *Predominant in 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 other colleagues to provide the best possible diagnosis or opinion.

National Medical Commission

1.1. 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.

1.2. 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.

IV. *Attitudes including Communication skills and Professionalism*

1. Communication skills: The PG student should:

1.1. Exhibit participation in honest, accurate health related information sharing in a sensitive and suitable manner.

1.2. Recognize that being a good communicator is essential to practice effectively.

1.3. Exhibit effective and sensitive listening skills.

1.4. Recognise the importance and timing of breaking bad news and know how to communicate.

1.5. Exhibit participation in discussion of emotional issues.

1.6. Exhibit leadership in handling complex and advanced communication.

1.7. Recognize the importance of patient confidentiality and the conflict between confidentiality and disclosure.

1.8. Be able to establish rapport in therapeutic bonding with patients, relatives and other stakeholders through appropriate communication.

1.9. Able to obtain comprehensive and relevant history from patients/relatives.

1.10. Able to counsel patients on their condition and needs. Add counselling of diagnosis, prognosis, complications as well as planning for the management.

2. **Team work**: Seek cooperation. Coordination and communication among treating specialties and paramedical staff.
3. **Counselling of relatives**: regarding patient's condition, seriousness, bereavement and counselling for organ donation in case of brain stem death.
4. **Leadership**: Trauma prevention, education of the public, paramedical and medical persons.
5. **Advocacy**: with the government and other agencies towards cause of trauma care.
6. **Ethics**: The Code of Medical Ethics as proposed by National Medical Commission of India will be learnt and observed.

National Medical Commission

SUBJECT SPECIFIC PRACTICE-BASED OR PRACTICAL COMPETENCIES

Name/ Description of practice based competencies	Expected quantum
1. Taking a Clinical History from a patient with appropriate physical exam a. Hip-pain, Limp, Deformity, Instability, Both in child and adult b. Knee-pain, Deformity, Instability in child and adult c. Ankle, Foot d. Shoulder e. Elbow f. Wrist g. Head h. Spine	At least 3 clinical encounters in each region
2. In the Bone Skills Lab **<u>Basic</u>** 1. Introduction and tension band wiring 2. Lag screw interfragmentary compression 3. Broad plating 4. Narrow plating 5. Ex-Fix 6. Cancellous screw fixation 7. Umex **<u>Intermediary</u>** 1. DHS 2. DCS 3. Tibia nailing 4. Femur nailing 5. Tibia condyle 6. Elbow 7. Ankle **<u>Advanced:</u>** 1. Pelvis 2. Pubic symphysis 3. Acetabulum 4. MIPPO 5. Hemiarthroplasty 6. Spine posterior 7. Spine anterior	Practice at least twice on bone models and record

National Medical Commission

3. On Patients i. **At the end of the first year of M.S. Orthopaedics programme, the student will be able to perform:** a. Wound care - different types of wound, and different chemotherapeutic agents for wound care, including VAC application b. POP casts/slabs, splints and tractions as per need. Learning of different types of bandaging. c. Identify shock and provide resuscitation d. Aspiration of joints and infiltration of appropriate drugs e. wound debridement f. Arthrotomy of knee joint and assist in arthrotomy of Hip, anklet, shoulder. g. Incision and drainage of abscess h. Split thickness skin grafting i. Fasciotomes j. External fixators k. Skeletal tractions including skull tongs l. Triage a disaster situation and multiple trauma patients in an emergency room m. Perform on bone models, interfragmentary compression screws, external fixation, Tension band wiring and Broad plating n. Closed reduction of common dislocations like shoulder and common fractures like collar fracture, supracondylar fracture. o. Perform on a cadaver standard surgical approaches to the musculo skeletal system. **ii. At the end of the second year of M.S. Orthopaedics course, the student should be able to:** a. Perform closed/open biopsies for lesions of bone, joints and soft tissues b. Perform split thickness skin grafting and local flaps	As per the clinical volume available in each institution

National Medical Commission

c. Perform on bone models, internal fixation with k-wires, screws, plates. Dynamic hip/condylar screws/nailing. d. Perform sequestrectomy and saucerisation e. Perform arthrotomy of joints like hip/shoulder, ankle, elbow f. Perform repair of open hand injuries including tendon repair g. Perform arthodesis of small joints h. Perform diagnostic arthroscopy on models and their patients i. Perform carpal tunnel/tarsal tunnel release j. Apply ilizarov external fixator k. Perform soft tissue releases in contractures, tendon lengthening and correction of deformities l. Perform amputations at different levels m. Perform corrective surgeries for CTEV, DDH, perthes/ skeletal dysplasia n. Perform cadaver based procedures, Arthroscopy, Arthrotomy.	As per the clinical volume available in each institution
iii. At the end of the third year of M.S. Orthopaedics programme, the student should be able to: a. Assist in the surgical management of poly trauma patient b. Assist in Arthroplasty surgeries of hip, knee, shoulder and the ankle c. Assist in spinal decompressions and spinal stabilizations d. Assist in operative arthroscopy of various joints e. Assist /perform arthrodesis of major joints like hip, knee, shoulder, elbow f. Assist in corrective osteotomies around the hip, pelvis, knee, elbow, finger and toes g. Assist in surgical operations on benign and malignant musculoskeletal tumour including radical excision and custom prosthesis replacement. h. Assist in open reduction and internal fixations of complex fractures of acetabulam, pelvis, IPSI lateral floating knee/elbow injuries, shoulder girdle and hand	As per the clinical volume available in each institution

National Medical Commission

i. Assist in spinal deformity corrections	

j. Independently perform closed/open reduction and internal fixation with DCP, LCP, intra meduallary nailing, LRS k. Assist in limb lengthening procedures l. Assist in Revision surgeries m. Provide pre and post OP care This care should be exercised from first year n. Perform all clinical skills as related to the speciality.	

SYLLABUS

I. COGNITIVE DOMAIN

At the end of the M.S. Orthopaedics programme, the post graduate student should be competent and show sufficient understanding of Basic Sciences as applicable to Orthopaedics and Trauma through a problem based approach.

National Medical Commission

1. Basic Sciences as related to Orthopaedics and Trauma

a) Embryogenesis of all organ systems
b) Structure and function of Central Nervous System
c) Structure and function of the peripheral Nervous System
d) Structure and function of the arterial and venous system
e) Structure and functions of the head & neck, abdomen, thorax and extremities.

2. Physiological basis and Pathophysiology in Health and Disease

a) Physical Growth
b) Temperature regulation
c) Acid Base Balance
d) Fluid Balance
e) Hematopoiesis
f) Hemostasis
g) Electrolyte balance
h) Bone mineralization: Calcium-Phosphate balance
i) Renal functions

j) Hepatic function

k) Respiratory functions

l) Cardiac functions

m) Gastrointestinal functions

n) Endocrine functions

o) Developmental Milestones

p) Nutritional Needs of Orthopaedic/Trauma Patients

q) Allergy

3. *Clinical Microbiology as related to Orthopaedic infections*

a) Virology

b) Bacteriology

c) Mycology

d) Parasitology (Protozoology and Helminthology)

e) Waste disposal, Sterilization, Disinfection

4. *Clinical Pharmacology as related to Orthopaedics & Trauma*

a) Pharmacokinetics – of common medications used in Orthopaedics & Trauma

b) Antimicrobials

c) Analgesia, Sedation

d) Drug Interactions

e) Adverse effects

f) Antidotes for Poisons

g) Drug induced disease

5. *Professionalism and Ethics*

a) Professionalism

b) Ethics

c) Medico legal essentials

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6. *Wound healing principles*

a) Types of wounds
b) Stages of wound healing
c) Biochemical & Molecular factors in wound healing
d) Chemotherapeutic and other Pharmaceuticals in wound care
e) Host, Environment and agent factors

7. *Bone Healing*

a) Principles of bone healing
b) Biological bone healing
c) Factors influencing bone healing
d) Biomechanism of bone healing

TEACHING AND LEARNING METHODS

General principles

Acquisition of competencies being the keystone of doctoral medical education, such training should be skills oriented. Learning in the program, essentially autonomous and self-directed, and emanating from academic and clinical work, shall also include assisted learning. The formal sessions are meant to supplement this core effort.

All students joining the postgraduate (PG) courses shall work as full-time (junior) residents during the period of training, attending not less than 80% of the training activity during the calendar year, and participating in all assignments and facets of the educational process. They shall maintain a log book for recording the training they have undergone, and details of the procedures done during laboratory and clinical postings in real time.

Teaching-Learning methods

This should include a judicious mix of demonstrations, symposia, journal clubs, clinical meetings, seminars, small group discussion, bed-side teaching, case-based learning, simulation-based teaching, self-directed learning, integrated learning, interdepartmental meetings and any other collaborative activity with the allied departments. Methods with exposure to the applied aspects of the subject relevant to basic/clinical sciences should also be used. **The suggested examples of teaching-learning methods are given below but are not limited to these. The frequency of various below mentioned teaching-learning methods**

National Medical Commission

can vary based on the subject's requirements, competencies, work load and overall working schedule in the concerned subject.

A. Lectures: Didactic lectures should be used sparingly. A minimum of 10 lectures per year in the concerned PG department is suggested. Topics to be selected would be as per subject requirements. All postgraduate trainees will be required to attend these lectures. Lectures can cover topics such as:

1. Subject related important topics as per specialty requirement
2. Recent advances
3. Research methodology and biostatistics
4. *Salient features of Undergraduate/Postgraduate medical curriculum*
5. Teaching and assessment methodology.

Topic numbers 3, 4, 5 can be done during research methodology/biostatistics and medical education workshops in the institute.

B 1. Journal club: Minimum of twice a month is suggested.

Topics will include presentation and critical appraisal of original research papers published in peer reviewed indexed journals. The presenter(s) shall be assessed by faculty and grades recorded in the logbook.

B 2. ORTHO RADIOLOGY MEETS: Twice a month discussions amongst Ortho & Radiology Residents under facilitation of faculty on various imaging modalities used and its interpretation.

B.3. ORTHO SURGICAL PATHOLOGICAL MEET: Special emphasis on the surgical pathology radiological aspect of the case in the pathology department. Clinician (Ortho resident) presents the clinical details of the case, radiology PG student describes the Radiological findings and its interpretation and Pathology student describes the morbid anatomy and histopathology of the same case.

B.4. SKILLS LAB SESSIONS: Once a fortnight for first 2 years.

C. Student Seminar: Minimum of twice a month is suggested.

Important topics should be selected as per subject requirements and allotted for in-depth study by a postgraduate student. A teacher should be allocated for each seminar as faculty moderator to help the student prepare the topic well. It should aim at comprehensive evidence-based review of the topic. The student should be graded by the faculty and peers.

National Medical Commission

D. Student Symposium: Minimum of once every 3 months.

A broad topic of significance should be selected, and each part shall be dealt by one postgraduate student. A teacher moderator should be allocated for each symposium and moderator should track the growth of students. The symposium should aim at an evidence- based exhaustive review of the topic. All participating postgraduates should be graded by the faculty and peers.

E. Laboratory work / Bedside clinics/case presentation: Case presentation once a week in the ward, outpatient department/special clinics.

Laboratory work/Clinics/bedside teaching should be coordinated and guided by faculty from the department. Various methods like DOAP (Demonstrate, Observe, Assist, Perform), simulations in skill lab, and case-based discussions etc. are to be used. Faculty from the department should participate in moderating the teaching-learning sessions during clinical rounds.

F. Interdepartmental colloquium

Faculty and students must attend monthly meetings between the main Department and other department/s on topics of current/common interest or clinical cases; eg., combined clinical round with Radiology, Pathology etc.

G. a) Rotational clinical / community / institutional postings

Depending on local institutional policy and the subject specialty needs, postgraduate trainees may be posted in relevant departments/ units/ institutions. The aim would be to acquire more in-depth knowledge as applicable to the concerned specialty. Postings would be rotated between various units/departments and details to be included in the specialty-based Guidelines. Few examples are listed below:

1. *Clinical postings*

A major portion of posting should be in Orthopaedics department. It should include in- patients, out-patients, ICU, trauma, emergency room and speciality clinics.

Rotation of posting

- Inter-unit rotation in the department should be done for a period of up to one year.
- Rotation in appropriate related subspecialties for a total period not exceeding 06 months.

National Medical Commission

- Medical Education Unit (MEU) or Department of Medical Education (DOME) (optional)

T/L Education

- Bone Skills Lab sessions – Twice a week
- Surgical Audit sessions – Once every week
- Cadaver based education – Twice a month
- Web based e-learning sessions – Once a fortnight
- Simulated environment learning – Two sessions in a week
- *Mortality & Morbidity meetings with SURGICAL AUDIT: Once a month*

G b. Posting under "District Residency Programme" (DRP):

All postgraduate students pursuing MS/MS in broad specialities in all Medical Colleges/Institutions shall undergo a compulsory rotation of three months in District Hospitals/District Health System as a part of the course curriculum, as per the Postgraduate Medical Education (Amendment) Regulations (2020). Such rotation shall take place in the 3rd or 4th or 5th semester of the Postgraduate programme and the rotation shall be termed as "District Residency Programme" and the PG medical student undergoing training shall be termed as "District Resident".

Every posting should have its defined learning objectives. It is recommended that the departments draw up objectives and guidelines for every posting offered in conjunction with the collaborating department/s or unit/s. This will ensure that students acquire expected competencies and are not considered as an additional helping hand for the department / unit in which they are posted. The PG student must be tagged along with those of other relevant departments for bedside case discussion/basic science exercises as needed, under the guidance of an assigned faculty.

Opportunities to present and discuss infectious disease cases through bedside discussion and ward/grand rounds with specialists / clinicians in different hospital settings must be scheduled to address antimicrobial resistance issues and strategies to deal with it.

H. Teaching research skills

National Medical Commission

Writing a thesis should be used for inculcating research knowledge and skills. All postgraduate students shall conduct a research project of sufficient depth to be presented to the University as a postgraduate thesis under the supervision of an eligible faculty member of the department as guide and one or more co-guides who may be from the same or other departments.

In addition to the thesis project, every postgraduate trainee shall participate in at least one additional research project that may be started or already ongoing in the department. It is preferable that this project will be in an area different from the thesis work. For instance, if a clinical research project is taken up as thesis work, the additional project may deal with community/field/laboratory work. Diversity of knowledge and skills can thereby be reinforced.

I. Training in teaching skills

MEU/DOME should train PG students in education methodologies and assessment techniques. The PG students shall conduct UG classes in various courses and a faculty shall observe and provide feedback on the teaching skills of the student.

J. Log book

During the training period, the postgraduate student should maintain a Log Book indicating the duration of the postings/work done in Wards, OPDs, Casualty and other areas of posting. This should indicate the procedures assisted and performed and the teaching sessions attended. The log book entries must be done in real time. The log book is thus a record of various activities by the student like: (1) Overall participation & performance, (2) attendance, (3) participation in sessions, (4) record of completion of pre-determined activities, and (5) acquisition of selected competencies.

The purpose of the Log Book is to:

a) help maintain a record of the work done during training,
b) enable Faculty/Consultants to have direct information about the work done and intervene, if necessary,
c) provide feedback and assess the progress of learning with experience gained periodically.

National Medical Commission

The Log Book should be used in the internal assessment of the student, should be checked and assessed periodically by the faculty members imparting the training. The PG students will be required to produce completed log book in original at the time of final practical examination. It should be signed by the Head of the Department. A proficiency certificate from the Head of Department regarding the clinical competence and skillful performance of procedures by the student will be submitted by the PG student at the time of the examination.

The PG students shall be trained to reflect and record their reflections in log book particularly of the critical incidents. Components of good teaching practices must be assessed in all academic activity conducted by the PG student and at least two sessions dedicated for assessment of teaching skills must be conducted every year of the PG program. The teaching faculty are referred to the MCI Logbook Guidelines uploaded on the Website.

K. **Course in Research Methodology**: All postgraduate students shall complete an online course in Research Methodology within six months of the commencement of the batch and generate the online certificate on successful completion of the course.

Other aspects

- The Postgraduate trainees must participate in the teaching and training program of undergraduate students and interns attending the department.
- Trainees shall attend accredited scientific meetings (CME, symposia, and conferences) at least once a year.
- Department shall encourage e-learning activities.
- The Postgraduate trainees should undergo training in Basic Cardiac Life Support (BCLS) and Advanced Cardiac Life Support (ACLS).
- The Postgraduate trainees must undergo training in information technology and use of computers.

During the training program, patient safety is of paramount importance; therefore, relevant clinical skills are to be learnt initially on the models, later to be performed under supervision followed by independent performance. For this purpose, provision of skills laboratories in medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, ie., assessment to improve learning

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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.

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 practical/clinical examination, should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills.

Quarterly assessment during the MS 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
6. Mini Cex encounter – at least 4
7. Clinical encounter cards - at least -4
8. Direct observation of procedural skills – at least 6 including Cadaver dissection
9. OSCE/Theory, Essay, Short notes
10. MCQS
11. Bone Skill Lab performance assessment

Note: These sessions may be organized and recorded as an institutional activity for all postgraduates.

- Attendance at Scientific meetings, CME programmes (at least 02 each)

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

SUMMATIVE ASSESSMENT, ie., assessment at the end of training

Essential pre-requisites for appearing for examination include:

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1. **Log book** of work done during the training period including rotation postings, departmental presentations, and internal assessment reports should be submitted.

2. At least **two presentations** at national level conference. One research paper should be published / accepted in an indexed journal**. (It is suggested that the local or University Review committee assess the work sent for publication).**

The summative examination would be carried out as per the Rules given in the latest POSTGRADUATE MEDICAL EDUCATION REGULATIONS. The theory examination shall be held in advance before the Clinical and Practical examination, so that the answer books can be assessed and evaluated before the commencement of the clinical/Practical and Oral examination**.**

The postgraduate examination shall be in three parts**:**

1. *Thesis*

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 in broad specialty shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners**.**

2. *Theory examination*

The examinations shall be organized 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, as given in the latest POSTGRADUATE MEDICAL EDUCATION REGULATIONS. 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./ M.S shall be held at the end of 3rd academic year.

There shall be four theory papers (as per PG Regulations).

Paper I: Basic sciences as applied to the subject

Paper II: Traumatology and Rehabilitation

Paper III: Orthopaedic diseases

Paper IV: Recent advances in Orthopaedic surgery & General Surgery as applied to Orhopaedics

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3. *Practical/clinical and Oral/viva voce examination Practical examination*

Practical examination should be spread over **two** days and include various major components of the syllabus focusing mainly on the psychomotor domain.

Oral/Viva voce examination on defined areas should be conducted by each examiner separately. Oral examination shall be comprehensive enough to test the post graduate student's overall knowledge of the subject focusing on psychomotor and affective domain. It should include:

- Stations for clinical, procedural and communication skills
- Log Book Records and reports of day-to-day observation during the training
- Should test the post graduate student's overall knowledge of the subject in:
    - Ortho Radiology
    - Ortho Pathology
    - Histopathology & Gross anatomy
    - Instruments
    - Orthotics and Prosthotics

Recommended Reading:

1. Campbell's Operative Orthopaedics, Vols 1, 2, 3 & 4 Campbell's Operative Orthopaedics, 4-Volume Set, 14th Edition by Frederick M Azar, MD, S. Terry Canale, MD and James H. Beaty, MD
2. Mercer's Orthopaedic Surgery Vol. 1 & 2, Author(s) : Robert B Duthie Edition: Nineth, Year of Publication: 2003
3. Rockwood And Greens – Fractures in Adults, Vol 1& 2 Rockwood and Green's Fractures in Adults Author(s): Paul Tornetta , William Ricci MD, FAAOS, Charles M. Court-Brown MD, FRCS Ed (Orth), Margaret M. McQueen MD, Michael McKee MD, FRCS (C)Publication Date: March 27, 2019
4. Fractures in Children – Rockwood & Wilkins - Rockwood and Wilkins Fractures in Children Edition: 9. Author(s): Peter M Waters MD, David L. Skaggs MD, John M. Flynn. Publication Date: March 19, 2019

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5. Paediatric Orthopaedics – Tachidjian, Vol 4 Tachdjian's Pediatric Orthopaedics: From the Texas Scottish Rite Hospital for Children, 6th edition - November 27, 2020 Author: John Herring
6. Concise System Of Orthopaedics And Fractures – Graham Apley Apley's Concise System of Orthopaedics and Fractures Louis Solomon, David Warwick, Selvadurai Nayagam CRC Press, 31-Mar-2005
7. Textbook of Orthopaedics and Trauma – Kulkarni, Vol 1 Textbook of Orthopedics and Trauma (4 Volumes) GS Kulkarni, Sushrut Babhulkar, Publish Year 2016
8. B.D. Chaurasia's Human Anatomy, Vol1,Vol 2, Vol 3 B D Chaurasia's Handbook of Anatomy English Editions 2022 Eighth Editions Volume 2 (paperpack, CHAURASIAS), Author: CHAURASIAS, Publisher: CBS Publishers, Publishing Date 2022
9. Pharmacology and Pharmacotherapeutics – Satoskar- Pharmacology and Pharmacotherapeutics, 24th Edition - June 30, 2015, Authors: RS Satoskar, Nirmala Rege, SD Bhandarkar
10. Orthopaedics Anatomy and Surgical Approaches Frederick Wreckling Orthopaedic Anatomy and Surgical Approaches Edited by Frederick W. Reckling, Jo Anne B. Reckling and Melvyn P. Mohn, S. P. Frostick, First Published August 1, 1991
11. Green's Operative Hand Surgery-Vol. 1&. 2, Green, David P; Hotchkiss, Robert N Green's Operative Hand Surgery, 2-Volume Set 7th Edition - February 24, 2016, Authors: Scott W. Wolfe, William C. Pederson, Scott H. Kozin, Mark S. Cohen
12. Surgical Exposures in Orthopedics: The Anatomic Approach, Hoppenfeld, Stanley; De Boer, Piet Surgical Exposures in Orthopaedics: The Anatomic Approach, Edition: 6, Author(s): Piet de Boer MD, Richard Buckley MD, FRCSC, Stanley Hoppenfeld MD, Publication Date: October 7, 2021
13. Text Book of Ilizarov Surgical Techniques Bone Correction And Lengthening, Golyakhovsky, Vladimir; Frankel, Victor H Textbook of Ilizarov Surgical Techniques: Bone Correction and Lengthening by Vladimir Golyakhovsky, Victor H Frankel, Publishing Year 2010
14. Applied Orthopaedic Biomechanics, Dutta, Santosh; Datta, Debasis Applied Orthopaedic Biomechanics, by Debasis Datta Santosh K Dutta Publisher : B.I.Publications, Year 2008.

Journals

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

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Annexure 1

Student appraisal form for MS in Orthopedics										
	Element	**Less than Satisfactory**			**Satisfactory**			**More than satisfactory**			**Comments**
		1	2	3	4	5	6	7	8	9	
1	**Scholastic Aptitude and Learning**										
1.1	Has Knowledge appropriate for level of training										
1.2	Participation and contribution to learning activity (e.g., Journal Club, Seminars, CME etc.)										
1.3	Conduct of research and other scholarly activity assigned (e.g Posters, publications etc.)										
1.4	Documentation of acquisition of competence (eg. Log book)										
1.5	Performance in work based assessments										
1.6	Self- directed Learning										
2	**Care of the patient**										
2.1	Ability to provide patient care appropriate to level of training										
2.2	Ability to work with other members of the health care team										
2.3	Ability to communicate appropriately and empathetically with patients families and care givers										

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2.4	Ability to do procedures appropriate for the level of training and assigned role										
2.5	Ability to record and document work accurately and appropriate for level of training										
2.6	Participation and contribution to health care quality improvement										
3	**Professional attributes**										
3.1	Responsibility and accountability										
3.2	Contribution to growth of learning of the team										
3.3	Conduct that is ethical appropriate and respectful at all times										
4	**Space for additional comments**										
5	**Disposition**										
	Has this assessment been discussed with the trainee?	Yes	No								
	If not explain										
	Name and Signature of the assesse										
	Name and Signature of the assessor										
	Date										

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Subject Expert Group members for preparation of REVISED Guidelines for competency based postgraduate training programme for MS in Orthopaedics

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Postgraduate Medical Education Board

D 11011/1/22/AC/Guidelines/22 Date: 02-11-2022

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GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR M.D. IN PATHOLOGY

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN PATHOLOGY

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.

This programme is meant to standardize Pathology teaching at postgraduate level throughout the country in order to achieve uniformity in teaching and create suitable manpower with appropriate expertise. The postgraduate student in pathology should be sufficiently trained, professionally competent and confident in handling, ~~and~~ processing, and diagnosis related to histopathology (surgical pathology), cytopathology, and hematology with reasonable working knowledge in blood banking, laboratory medicine, medical statistics, and ancillary techniques with understanding of general principles and methodology.

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 Reconciliation Board cum Expert group of NMC has attempted to render uniformity without compromise to the purpose and content of the document. 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".

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SUBJECT SPECIFIC LEARNING OBJECTIVES

At the end of the MD training programme in Pathology, the student should achieve the following goals:

1. Knowledge of Pathology

1.1. Make a diagnosis based on histopathology (surgical pathology) and cytopathology specimens, blood and bone marrow examination and various tests of Laboratory Medicine (clinical pathology, clinical biochemistry) as well as Blood Banking (Transfusion Medicine).

1.2. Interpret clinical and laboratory data with reasonable accuracy and prepare a succinct and lucid report

1.3. Compose reports following standard protocols including synoptic reporting

1.4. Interpret and correlate clinical and laboratory data so that clinical manifestations of diseases can be explained.

1.5. Advise on the selection of appropriate specimens and tests necessary to arrive at a diagnosis in a problematic case including molecular tests.

1.6. Correlate clinical and laboratory findings with pathology findings at autopsy, identify miscorrelations and the causes of death due to diseases (apart from purely metabolic causes).

1.7. Maintain quality control of all tests by being part of Internal Quality Control Monitoring program.

1.8. Make and record observations systematically and maintain accurate records of tests and their results for reasonable periods of time. Identify problems in the laboratory, offer solutions thereof and maintain a high order of quality control.

1.9. Should be aware of safe and effective disposal of laboratory waste and ensure minimization risk of exposure to infection and accidents to laboratory personnel.

2. Teaching and training

2.1. Should be able to teach Pathology to undergraduates, postgraduates, nurses and paramedical staff including laboratory personnel.

2.2. The postgraduate student should be able to teach effectively and assess undergraduate medical and allied health science students so that they become competent healthcare professionals.

3. Research

3.1. Plan, execute, analyze, and present research work independently or as part of a team.

3.2. The postgraduate student in Pathology should acquire knowledge and skills to be able to conduct a research project from the planning to the publication stage and become a life-long learner.

4. Professionalism, Ethics and Communication skills

4.1. The postgraduate student should learn and apply principles of professionalism, ethics, and effective communication in conduct of routine pathology services, research, and routine work.

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SUBJECT SPECIFIC COMPETENCIES

A. COGNITIVE DOMAIN

A postgraduate student upon successfully qualifying the MD (Pathology) examination should have acquired the following <u>BROAD</u> theoretical competencies and should be:

- Capable of offering an accurate diagnostic opinion in a given clinical situation with an appropriate and relevant sample of tissue, blood, body fluid, etc. for the purpose of diagnosis.
- Conversant with the standard operating procedures of various laboratories including histopathology, cytopathology, hematology and laboratory medicine
- Able to teach and share his knowledge and competence with others. The student should be imparted training in teaching methods in the subject which may enable the student to take up teaching assignments in Medical Colleges/Institutes.
- Capable of pursuing clinical and laboratory-based research. He/she should be introduced to basic research methodology so that he/she can conduct fundamental and applied research.

At the end of the course, **the student should have acquired the following competencies as a <u>diagnostician:</u>**

Surgical pathology

- Be conversant in the histogenesis and pathophysiological processes associated with various diseases.
- Should be able to identify problems in the histopathology laboratory and offer viable solutions.
- Possess the background knowledge necessary for the evaluation and reporting of Surgical Pathology.
- Conversant with the various equipment used in the histopathology laboratory.
- Should have knowledge of automation and quality assurance in histopathology.

Cytopathology

- Possess the background knowledge necessary for the evaluation and reporting of Cytopathology.

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- Demonstrate familiarity with, and guide clinical/radiology residents in keeping with the clinical information on the choice of site, collection, preservation, transport, type of preparation and method of obtaining various cytological specimens.
- Conversant with the various equipment used in the cytopathology laboratory.
- Should have knowledge of automation and quality assurance in cytopathology.

Hematology

- Demonstrate ability to utilize the principles of the practice of Hematology for the planning of tests, interpretation, and diagnosis of diseases of the blood and bone marrow.
- Conversant with the various equipment used in the hematology laboratory.
- Should have knowledge of automation and quality assurance in hematology.

Laboratory medicine

- Demonstrate familiarity with the normal range of values of the chemical content of body fluids, significance of altered values, and interpretation thereof.
- Possess knowledge of the following specialized organ function tests and relative utility and limitations of each and significance of altered values:
  (i) Renal function test
  (ii) Liver function test
  (iii) Endocrine function test
  (iv) Tests for malabsorption
- Principles, advantage and disadvantages, scope, and limitation of automation in laboratory.
- Learn the principle and methodology of quality control in the laboratory.

Transfusion medicine

- Possess knowledge of basic immunology, ABO and Rh groups, minor blood groups and their clinical significance, transfusion therapy, pre-transfusion testing, transfusion related infections, transfusion reactions and quality control in blood bank.

Autopsy pathology

- Conversant with the technique of autopsy.
- Possess sufficient understanding of the various disease processes so that meaningful clinico-pathological correlation can be made.

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Immunopathology

- Demonstrate familiarity with current concepts of structure and function of the immune system, its aberrations, and mechanisms thereof.
- Demonstrate familiarity with the scope, principles, limitations, and interpretations of the results of ELISA techniques, HLA typing, immunofluorescence, and immunoelectrophoresis.

Immunohistochemistry and flow cytometry

- Demonstrate familiarity with the principles and procedures of performing immunohistochemistry including automation in procedure and interpretation.
- Demonstrate familiarity with the principles and procedures of performing flow cytometry.

Cytogenetics and Molecular biology

- Demonstrate familiarity with the principles of molecular biopsy especially related to the understanding of disease processes and its use in various diagnostic tests at least including but not limited to in-situ hybridization, polymerase chain reaction, Sanger Sequencing and Next generation sequencing.

Electron microscopy

- Demonstrate familiarity with the principles and techniques of electron microscopy and the working of the electron microscope.
- Demonstrate familiarity with the tissue processing and staining methods for electron microscopy, including immune-labelling techniques and use of semi-thin sections.

Enzyme histochemistry

- Demonstrate familiarity with the principles, use and interpretations of common enzyme histochemical procedures.

Quality Control

- Demonstrate familiarity with various quality control programmes running in the department, both internal and external quality.
- Demonstrate familiarity with inert and intra assay variations, batch variations, validation of chemicals and instruments.

Laboratory Safety and Good clinical lab practices

- Demonstrate familiarity with good lab practices and safety, record maintenance of capital equipment and consumables, purchase specifications, approximate costs of reagents and equipment, maintenance of store logbooks, etc.

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Biomedical Waste Management

- Demonstrate familiarity with disposal methods for each specimen, reagents, instruments, autoclaving techniques, recycling of products and e-waste.

At the end of the course, **the student should have acquired the following competencies as a <u>teacher:</u>**

- Demonstrate familiarity with different modes, methods, and principles of teaching including microteaching.

At the end of the course, **the student should have acquired the following competencies as a <u>researcher:</u>**

- Conversant with the principles of basic and applied research methodology, literature search, study design, sample size estimation, selection of controls, and appropriate application of medical statistics.
- Possess knowledge about the methods of writing thesis and/or a research paper with the prescribed instructions, as expected of international standards.
- Conversant with the use of digital slide imaging, algorithms to evaluate findings in imaging, morphometry, and application of artificial intelligence.

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B. AFFECTIVE DOMAIN

1. The student will show integrity, accountability, respect, compassion and dedicated patient care. The student will demonstrate a commitment to excellence and continuous professional development.
2. The student should demonstrate a commitment to ethical principles relating to providing patient care, confidentiality of patient information and informed consent.
3. The student should show sensitivity and responsiveness to patients' culture, age, gender and disabilities.
4. The student should demonstrate a commitment to ethical principles relating to research conduct and research publication.

C. PSYCHOMOTOR DOMAIN

1. Able to perform grossing of biopsy and surgical specimens including gross diagnosis and taking appropriate sections/ samples necessary for diagnosis, comprehensive staging, and ancillary testing.
2. Conversant in histopathology tissue processing techniques and troubleshooting, cutting of paraffin and frozen sections, making imprint smears, and staining, and immunohistochemistry.
3. Able to collect specimens by routinely performing non-invasive out-patient procedures such as venipuncture, finger-prick, fine needle aspiration of superficial lumps and bone-marrow aspirates, making smears and staining, and provide appropriate guidance to colleagues performing procedure such as a biopsy or an imaging guided biopsy including on-site microscopic assessment of specimen adequacy.
4. Perform an autopsy, dissect various organ complexes and display the gross findings.
5. Conversant with the function, handling, and routine care of equipment in the laboratory and quality assurance.
6. Able to teach and share his knowledge and competence with others. The student should be imparted training in teaching methods in the subject which may enable the student to take up teaching assignments in Medical Colleges/Institutes.
7. Able to pursue clinical and laboratory-based research. He/she should be introduced to basic research methodology so that he/she can independently conduct fundamental and applied research.

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Syllabus

Course contents:

It is difficult to give a precise outline of the Course Contents for post graduate training. A postgraduate is supposed to acquire not only the professional competence of a well-trained specialist but also academic maturity, a capacity to reason and critically analyze scientific data as well as to keep himself abreast of the latest developments in the field of Pathology and related sciences. The study of Anatomic Pathology includes all aspects of Pathology as encompassed in the branches of General and Systemic Pathology. Only the broad outlines are provided.

A. COGNITIVE DOMAIN

A) General Pathology:

Normal cell and tissue structure and function:

- The changes in cellular structure and function in diseases.
- Causes of disease, its pathogenesis, reaction of cells, tissues, organ systems, and the body to various sub lethal and lethal injuries.
- Cellular adaptation, cell injury, and cell death.
- Mechanism, morphology and examples of cell injury, necrosis, apoptosis, autophagy, and newer forms of cell death including necroptosis and pyroptosis.
- Sub cellular and cellular responses and adaptation to injury.
- Intracellular and intercellular accumulations, pathological calcification, and cell aging.

Acute and chronic inflammation:

- Vascular and cellular events in acute inflammation, chemical mediators, outcome, and morphological patterns of acute inflammation.
- Chronic inflammation with special reference to granulomatous inflammation.
- Systemic effects and effects of deranged inflammation.
- Tissue renewal and repair: Regeneration healing and fibrosis.
- Control of normal cell proliferation and tissue growth, mechanism of tissue regeneration, repair by healing and fibrosis.
- Extracellular matrix and cell matrix interactions.

Hemodynamic disorders, thromboembolic disease, and shock:

- Edema, hyperemia, congestion, and hemorrhage.
- Normal Hemostasis, thrombosis, DIC, embolism, infarction, and shock.

Genetic Disorders

- Principles of genetics, normal karyotyping.
- Mutations, Mendelian disorders, disorders with multifactorial inheritance cytogenetic disorders involving autosomes and sex chromosomes.
- Single gene disorders with nonclassic inheritance.
- Diagnosis of genetic disorders involving molecular and genetic techniques.

Neoplasia

- Definition, nomenclature, and biology of tumor growth
- Molecular basis of cancer with special reference to carcinogenic agents and molecular basis of multistep carcinogenesis.
- Epidemiology and clinical features of tumors.

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- Grading, staging and laboratory diagnosis of cancer.

Infectious Diseases

- Pathology and general principles of microbial pathogenesis, special techniques for diagnosing bacterial, fungal, parasitic, and viral infections.

Environmental and nutritional pathology

- Common environmental and occupational exposures leading on to diseases.
- Nutritional deficiencies and obesity related disorders.

Disease of Infancy and Childhood

- Congenital anomalies, birth injuries, diseases of neonates, inborn errors of metabolism, tumor, and tumor like lesions of infancy and childhood.

Immunopathology

- Innate immunity- Role of phagocytic cells, complement, mast cells & humoral mechanisms.
- Specific Acquired Immunity- Details about antibody production & action, Brief principles about memory, Ag specificity & vaccination.
- Cell involved in Immune response- T- Lymphocytes, B-lymphocytes, macrophages, dendritic cells, and natural-killer cells.
- Cytokines with details about their properties and functions.
- Structure and function of histocompatibility molecules and disease association.
- Disorders of the immune system.
- All hypersensitivity reactions.
- Autoimmune disorders with special reference to SLE, Rheumatoid arthritis, Sjogren's syndrome, systemic sclerosis, polyarteritis nodosa and other vasculitides, Mixed connective tissue disorders and inflammatory disorders.
- Immunodeficiency syndrome – Acquired with emphasis on AIDS.
- Amyloidosis including pathogenesis, special stains & clinical correlation.
- Transplant rejection in detail.
- Graft vs Host Disease.

B) Systemic Pathology:

The study of normal structure and function of various organ systems and the etiopathogenesis, gross and microscopic alterations of structure of these organ systems in disease and functional correlation with clinical features.

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Blood vessels, lymphatic and veins

- Normal morphology, congenital anomalies, atherosclerosis, hypertensive vascular disease.
- Inflammatory and neoplastic diseases of all the vessels.

Heart

- Normal morphology, its blood supply and effect of aging on heart.
- Ischemic, Hypertensive, valvular, congenital heart diseases.
- Cardiomyopathies
- Myocardial disorders
- Pericardial diseases.
- Tumors of the heart.

Lungs and Mediastinum

- Congenital anomalies
- Obstructive and restrictive pulmonary diseases
- Diseases of vascular origin
- Infections of Lung
- Infections of Mediastinum
- Tumors of lung
- Lung transplantation
- Diseases of pleura
- Thymus – Developmental, autoimmune, and inflammatory disorder and tumors.

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Head and Neck

- Oral cavity: - inflammatory disease, Preneoplastic lesions and tumors.
- Diseases of teeth and supporting structures.
- Upper airways and ear – congenital anomalies, infections, and tumors.
- Salivary glands – Infections autoimmune disorders and tumors.

Gastrointestinal Tract

- Congenital anomalies, infections, inflammatory and vascular disorders and tumors of esophagus, stomach, small and large intestines, appendix, and anal canal.
- Diseases of the peritoneum, Omentum and Mesentery Retroperitoneum.
- Inflammatory and neoplastic lesions.

Liver

- Normal morphology with general features of hepatic disease including LFTs.
- Infectious, autoimmune drug induced metabolic and circulatory disorders of liver.

- Hepatic diseases associated with pregnancy, neonates, organ and bone marrow transplantation.
- Liver transplantation pathology.
- Cysts, Nodules, and tumors of liver.

Biliary tract

- Congenital anomalies, injuries, Infection, inflammation, of Gallstones and tumors of gall bladder and extra hepatic bile ducts. Pancreas.
- Congenital anomalies, pancreatitis, and neoplasms of pancreas.

Kidney

- Clinical manifestations of renal diseases
- Congenital anomalies
- Diseases affecting glomeruli, tubules, interstitium and blood vessels.
- Cystic diseases of kidney
- Nephrolithiasis
- Tumors of kidney
- Kidney Transplant pathology

Lower urinary tract and male genital system

- Congenital anomalies, inflammation and tumors of bladder, ureter, urethra, penis, testis, epididymis, and Scrotum.
- Inflammation, enlargement, and tumors of prostate.

Female genital tract

- Physiology, cytology and histology of female genital tract, menstrual disorders, and hormonal abnormalities.
- Congenital anomalies, inflammation, preneoplastic and neoplastic lesions of vulva, vagina, cervix, uterus, fallopian tubes, ovaries and mesonephron.
- Gestational and placental disorders.

Breast

- Inflammations, benign epithelial lesions, and tumors of the breast.
- Diseases of male breast.

Endocrine System

- Normal hormonal levels and functions of all the endocrine glands.
- Hypo and hyperactivity of glands of endocrine system i.e., pituitary, thyroid, parathyroid, pancreas, adrenals, and pineal gland.

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- Autoimmune diseases, inflammations and tumors affecting these glands,
- Neuroendocrine tumors,

Skin and Subcutaneous tissue

- Disorders of pigmentation and melanocytes,
- Inflammatory, vesiculobullous, and infectious disease,
- Proliferative lesions and Tumors of the epidermis, dermis, and skin appendage.

Musculoskeletal system

- Bone Modelling, growth, and development, genetic and acquired abnormalities in bone cells, matrix and structure, factures, necrosis and infections of bones, tumors and tumor-like lesions,
- Joints: Arthritis, tumor, and tumor-like lesions.
- Soft tissue: Tumors and tumor=like lesions.

Peripheral nerves and skeletal muscles

- General reactions of motor units.
- Inflammatory, infectious, hereditary, metabolic, and traumatic neuropathies.
- Atrophy, dystrophy, myopathies of the skeletal muscles.
- Diseases of neuromuscular junction.
- Tumors of peripheral nerves and skeletal muscles.

Skull and Central Nervous System

- Degenerative, metabolic, toxic, demyelinating, infectious, cerebrovascular malformations, and traumatic injuries.
- Tumors.

Eye and Orbit

- Infections, inflammatory, congenital diseases and neoplasms of orbit, eyelid, conjunctiva sclera, uvea, cornea, retina, and optic nerves.

C) Hematology and Transfusion medicine

The study of Hematology includes all aspects of the diseases of the blood and bone marrow. This would involve the study of the normal, and the causes of diseases and the changes thereof.

Biology of stem cell and Hematopoiesis

- Overview of stem cell biology and cellular biology of hematopoiesis.
- Transcription factors and humoral regulation in normal and malignant hematopoiesis.
- Interaction between hematopoietic stem cells, progenitor cell and stromal compartment of bone marrow.

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- Stem cell homing & mobilization.

Erythroid maturation, differentiation, and abnormality

- Pathobiology of human erythrocyte & Hemoglobin Anemia.
- Approach to anemia in adults and children in: Clinical correlation & diagnostic modalities.
- Classification of anemias (Morphological, pathophysiological, and based on erythropoiesis i.e., proliferative vs non-proliferative).
- Iron deficiency anemia including iron metabolism and differential diagnosis from other microcytic hypochromic anemias.
- Disorder of iron metabolism including iron overload.
- Anemia of chronic disorders with special reference to infections, collagen vascular disorders, inflammation etc.
- Megaloblastic anemia and other causes of megaloblastosis.
- Definition, approach, and classification of hemolytic anemia.
- Lab diagnosis of Hemoglobin disorders and hereditary anemia like Thalassemia and related hemoglobinopathies, sickle cell anemia.
- Hemoglobin associated with altered Oxygen affinity.
- Red blood cell enzymopathy, membrane disorder, autoimmune hemolytic anemia, non-immune hemolytic anemia, paroxysmal nocturnal hemoglobinuria.
- Approach to Pancytopenia/ Cytopenia.
- Bone marrow failure syndrome.
- Porphyria.

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WBC disorders, complement and immunoglobin biology

- Normal granulopoiesis.
- Acquired and congenital disorders of phagocytosis (neutrophil, monocyte, eosinophil, and macrophages.
- Disorder of leukocyte number, function, and morphology.

Storage disorder

Hematological responses to Infections

- Viral disorders - Infectious mononucleosis, Hepatitis, and dengue.
- Parasitic infections - Malaria, Kala azar.

Hematological malignancies

- Conventional & molecular cytogenetic and immunohistochemical basis of hematological malignancies.

- Classification (WHO, ICC).
- Their basis and diagnostic approach to various hematological malignancies.
- Pathophysiology, prognostic factors, cytochemistry, cytogenetics of various leukemias.
- Pathophysiology and classification of MDS, MPN/MDS, myeloproliferative disorders.
- Pathophysiology of Non-Hodgkin's lymphoma, Clinical staging of Hodgkin's lymphoma.
- Role of molecular cytogenetics and immunohistochemistry in Hodgkin's and Non-Hodgkin's lymphoma and lymphoproliferative disorders.
- AIDS related and Transplant related lymphomas.
- Plasma cell dyscrasias and gammopathies.
- Mastocytosis.
- Role of chemotherapy and antineoplastic agents based on molecular mechanism of hematological malignancies, clinical use of hematopoietic growth factors.

Hematopoietic stem cell transplantation

- Role and indications of HST, immunodeficiency state, hematological Malignancies and Non-hematological disorders.
- Practical aspect of umbilical cord stem cells transplantation.
- Peripheral stem cell collection.
- Role of stem cell in tissue repair.
- Complications of Hematopoietic stem cell transplant.
- Gene therapy and genetic engineering.

Prenatal diagnosis of genetic hematological diseases

Hemostasis & Thrombosis

- Megakaryocyte and platelet structure.
- Molecular basis of platelet function, activation.
- Role of blood vessel, coagulation system and fibrinolytic system in hemostasis.
- Clinical and lab evaluation of bleeding and coagulation disorders.
- Clinical & diagnostic aspects of factor deficiencies including hemophilia, von Willebrand disease, DIC, Vitamin K deficiency.
- Thrombotic and non-thrombotic purpura.
- Hereditary and acquired platelet disorders and its management.
- Thrombophilia (Inherited & acquired).
- Lab evaluation and management of hypercoagulable states.

National Medical Commission

Human blood group antigen and antibody and Immuno-hematology

- Selection of donor and screening..
- Principle, indication and storage of red blood cells, WBC, platelet, and plasma transfusion.
- Various methods of component separation and plasma derivatives with special reference to Fresh frozen plasma, cryo-precipitates, platelet concentrate, single donor plasma, albumin, and Immunoglobulin.
- Graft Rejection, GVH diseases, Transfusion Reactions, Blood grouping & cross matching.
- Blood bank audit.
- Apheresis

Hematological manifestations of systemic diseases

- Liver disorders, renal disorders, infections, cancers, parasitic diseases, AIDS, pregnancy, and surgical patients.

Spleen and its disorders

D) Laboratory Medicine (Clinical Pathology including Parasitology)

- Principles of testing, indications, values with ranges in normal and diseased states in relation to:
    - Liver function tests
    - Renal function tests
    - Endocrine function tests
    - Body fluid analysis including stool, urine, semen, CSF, etc.
- Principles of laboratory automation, trouble shooting, and quality assurance.

D) Special techniques

The student is expected to acquire a general acquaintance of techniques and principles and to interpret data in the following fields:

- Immunopathology,
- Electron microscopy,
- Histochemistry,
- Immunohistochemistry,
- Cytogenetics and in-situ hybridization,
- Molecular Biology,
- Digital Pathology and image analysis,

National Medical Commission

- Maintenance of records,
- Information retrieval, use of Computer and Internet in medicine.

E) Instrumentation and automation

- Principles, indications, working, maintenance, and troubleshooting of equipment used in various laboratories:
    - Histopathology laboratory – Histopathology tissue processor, microtome, water batch, embedding station, Stainer, IHC Stainer, ultramicrotome, etc.
    - Microscopes – Immunofluorescence, FISH, Confocal, Electron, etc.
    - Cytopathology Laboratory – Centrifuge, Cytocentrifuge, Cytospin apparatus, liquid-based cytology, etc.
    - Hematology Laboratory – automated cell counter, flow cytometer, coagulometer, HPLC, Electrophoresis apparatus, immunoblot, etc.
    - Clinical Pathology –Photoelectric colorimeter, Spectrophotometer, pH meter, Centrifuge, Electrophoresis apparatus, ELISA Reader, chemiluminescence, etc.
    - Digital pathology – Whole slide scanners
    - Molecular pathology – PCR, Sanger sequencer, NGS sequencers, etc.
- Automation in Pathology.
- Good lab practices and safety, record maintenance of capital equipment and consumables, purchase specifications, approximate costs of reagents and equipment, maintenance of store logbooks, etc.

F) Quality assurance program

- Internal and external quality assurance methods.
- Intra assay variations, batch variations, validation of chemicals and instruments.

G) Establishment Act and Rules and regulations formed by Govt. or regulatory bodies

H) Biomedical Waste management

- Disposal methods for each specimen, reagents, instruments, autoclaving techniques, recycling of products and e-waste.

I) Biostatistics, Research Methodology and Clinical Epidemiology

J) Ethics and Medico legal aspects relevant to Pathology

K) Current topics and recent advances in pathology

B. PSYCHOMOTOR DOMAIN

National Medical Commission

Demonstrate following predominant Psychomotor domain competencies		
Sr. No.	Competency	Perform under supervision, perform independently/ Observation only
I.	HISTOPATHOLOGY (SURGICAL PATHOLOGY)	
1.	Given the clinical and operative data, identify and systematically and accurately describe the chief gross anatomic alterations in the surgically removed specimens and be able to correctly diagnose common lesions received on an average day from the surgical service of an average teaching hospital	Independently
2.	Perform a systematic gross examination of the tissues including the taking of appropriate tissue sections and in special cases as in intestinal mucosal biopsies, muscle biopsies and nerve biopsies, demonstrate the orientation of tissues in paraffin blocks.	Independently
3.	Identify and systematically and accurately describe the chief histo-morphological alterations in the tissue received in the surgical pathology service. He/she should also correctly interpret and correlate with the clinical data to diagnose routine surgical material received on an average day.	Independently
4.	Identify common problems in histopathology processing techniques (poor fixation, delayed fixation, poor staining, etc.,) including automated tissue processing machine troubleshooting and rectify common problems	Independently
5.	Operate and maintain common equipment in the histopathology laboratory such as microtome, water bath, cryostat, tissue processor, auto Stainer, etc.	Perform under supervision
6.	Process a tissue, make a paraffin block and cut sections of good quality on a rotary microtome	Perform under supervision

National Medical Commission

7.	Stain paraffin sections with hematoxylin and eosin stain and common special stains needed for diagnosis	Independently
8.	Cut a frozen section, stain and interpret the slide in correlation with the clinical data provided	Independently

9.	Standardize and validate new antibodies for immunohistochemistry with understanding of controls, clones, and dilutions	Independently
10.	Perform immunohistochemistry on paraffin sections using manual method	Independently
11.	Identify common problems in immunohistochemistry procedure (artifacts, inadequate retrieval, section floating, IHC failure, etc.,) and rectify such problems	Independently
12.	Decide on the appropriate immunohistochemical panels for diagnosis, prognosis and predictive purposes in common disease conditions based on standard recommendations and interpret their results	Independently
13.	Write histopathology reports, including synoptic reports, wherever needed, following protocols and international standards. The reports should be succinct and lucid, with clinical notes and advice, as necessary.	Independently
II	CYTOPATHOLOGY	
1.	Perform fine needle aspiration of superficial lumps and make good quality smears including collection of material for cell block preparation and decide on the type of fixative and stain in a given case	Independently
2.	Prepare and stain good quality smears for cytopathological examination	Independently
3.	Provide appropriate guidance to colleagues performing procedure such as a biopsy or an imaging guided biopsy including on-site microscopic assessment of specimen adequacy.	Independently
4.	Decide on the technique of collection, preservation, transport and concentration of various exfoliative cytology specimens (such as filters, centrifuge, liquid-based cytology, cytospin, etc.)	Independently

National Medical Commission

5.	Perform on-site adequacy assessment in image guided sampling procedures and decide on sample triage for routine diagnosis (type of preparation, stain, etc.) and ancillary tests including microbiological and molecular tests	Independently
6.	Diagnose common cases received in a routine cytopathology laboratory and categorize them into negative, inconclusive and positive, using the correct technique of screening and dotting the slides	Independently
	for suspicious cells, correctly identify the type of tumor, if present, and the presence of organisms, fungi and parasites, if present	
7.	Perform preparations (cytospin smears, liquid-based cytology, cell blocks, etc.) of common cytological samples using equipment such as centrifuge, cytocentrifuge and liquid based cytology apparatus	Observation only
III	HEMATOLOGY	
1.	Perform venipuncture for peripheral blood collection and decide on appropriate collection tubes, storage, and anticoagulant based on indication	Independently
2.	Prepare good quality peripheral blood smears, stain and report peripheral blood counts and other findings including reticulocyte and platelet counts on cell counter and manually	Independently
3.	Perform bone marrow aspirates and biopsy, prepare good quality smears and imprints	Perform unde supervision
4.	Perform bone marrow aspirate staining including stain for iron	Independently
5.	Perform cytochemical characterization of leukemia with special stains on bone marrow aspirates	Perform unde supervision
6.	Perform and interpret coagulation profile including PT, APTT and FDP	Independently
7.	Perform and interpret sickling test and osmotic fragility test	Independently

National Medical Commission

8.	Describe accurately the morphologic findings in the peripheral and bone marrow smears, identifying and quantitating the morphologic abnormalities in disease states and arriving at a correct diagnosis in at least common cases referred to the Hematology clinic, given the relevant clinical data	Independently
9.	Given the clinical data, interpret the results of i. Red cell indices ii. Plasma hemoglobin iii. Hemosiderin in urine iv. Hemolytic anemia profile including HPLC, Hb electrophoresis etc. v. Hemoglobin and serum protein electrophoresis vi. Clotting time and other point of care tests for bleeding	Independently
	vii. G6PD enzyme estimation viii. Platelet function tests including platelet aggregation and adhesion and PF3 release ix. Russell's viper venom time (RVVT) x. Coagulation Factor assays xi. Serum Fibrinogen xii. Screening for coagulation factor inhibitor, Bethesda Assay, xiii. Fibrin Degradation Products (FDP), D-Dimers xiv. Monitoring of anti-coagulant therapy xv. Thrombophilia profile (Lupus anticoagulant (LAC), Anticardiolipin Antibody (ACA), Activated Protein C Resistance (APCR), Protein C (Pr C), Protein S (Pr S) and Antithrombin III (AT III)) xvi. Serum ferritin, Serum iron and total iron binding capacity	
10.	Interpret flow cytometry findings in the immunophenotyping of leukemia, CD34 enumeration, CD 3/CD 19 enumeration, PNH work up, etc.	Independently
11.	Interpret results of cytogenetics and molecular diagnostics in the work up of hematological diseases	Independently

National Medical Commission

12.	Prepare samples as appropriate for the indication, and operate equipment such as automated cell counter, flow cytometry, coagulometers, HPLC and electrophoresis apparatus	Observation only
IV	LABORATORY MEDICINE	
1.	Plan a strategy of laboratory investigation of a given case, given the relevant clinical history and physical findings in a logical sequence, with a rational explanation of each step; be able to correctly interpret the laboratory data of such studies, and discuss their significance with a view to arrive at a diagnosis.	Independently
2.	Perform urine analysis including physical, chemical and microscopic, examination of the sediment as well as by Dipstick methods.	Independently
3.	Perform macroscopic and microscopic examination of feces and identify the ova and cysts of common parasites.	Independently
4.	Perform a complete examination: physical, chemical and cell content of Cerebrospinal Fluid (C.S.F), pleural and peritoneal fluid	Independently
5.	Perform semen analysis and interpret results in the context of clinical and hormone findings	Independently
6.	Perform quantitative estimation of blood/serum by automated techniques for common biochemical tests	Independently
7.	Prepare standard solutions and reagents relevant to common biochemical tests including the preparation of normal solution, molar solution and buffers	Independently
8.	Interpret and report common laboratory biochemical tests (LFT, KFT, endocrine function tests) with understanding of clinical implications	Independently
9.	Operate, maintain and troubleshoot common equipment used such as photoelectric colorimeter, Spectrophotometer, pH meter, Centrifuge, Electrophoresis apparatus, ELISA Reader, PCR, chemiluminescence, etc.	Perform under supervision
V	TRANSFUSION MEDICINE	

National Medical Commission

1.	Perform selection and bleeding of donors, ABO and Rh grouping and cross match, antibody screening and titer, selection of blood for exchange transfusion	Independently
2.	Resolve ABO grouping problems and outline measures for investigation of transfusion medicine	Independently
3.	Perform and interpret anti-globulin test in antenatal and neonatal work up	Independently
4.	Prepare blood components such as cryoprecipitates, platelet concentrates, fresh frozen plasma, single donor plasma, red blood cell concentrates, etc. and test blood for presence of pathogens including HBV, HCV, HIV, VDRL, Malaria, etc.	Observation only
VI	AUTOPSY	
1.	Perform an autopsy, dissect various organ complexes, and display the gross findings (Note: An improvised autopsy may also be arranged in places where full autopsy is not possible. Relevant organs from wet specimens in the museum with appropriate clinical history may be arranged for a detailed description and diagnosis. At least ten such	Independently (see Note)
	improvised autopsies may be discussed by each candidate during the entire duration of the course)	
2.	Provide Provisional and Final Anatomic Diagnosis report, major findings correctly and systematically at autopsy, and the Autopsy Protocol as per prescribed instructions.	Independently
VII	MOLECULAR BIOLOGY	
1.	Interpret results of Polymerase Chain Reaction (PCR), real time PCR, Sanger Sequencing in a given clinical context.	Independently
2.	Interpret results of in-situ hybridization (fluorescent and chromogenic) in a given clinical context	Independently
3.	Prepare sample by appropriate methods and perform Polymerase Chain Reaction (PCR), real time PCR, Sanger Sequencing, and in-situ hybridization including troubleshooting	Observation only

National Medical Commission

VIII	IMMUNOPATHOLOGY	
1.	Interpret direct/ indirect immunofluorescence results in the context of common diseases of the skin, medical renal diseases and autoimmune diseases	Independently
2.	Prepare sample by appropriate methods and perform indirect immunofluorescence on a frozen section from skin/ renal biopsy	Perform unde supervision
IX	ELECTRON MICROSCOPY	
1.	Interpret transmission electron microscopy results in common non-neoplastic and neoplastic diseases	Independently
2.	Prepare specimen by appropriate methods and process tissue for electron microscopy, interpret semi-thin sections and view ultra-thin sections under electron microscope	Observation only
X.	DIGITAL PATHOLOGY	
1.	Navigate and annotate whole slide scanned images	Independently
2.	Select and scan slides for digitalization and perform basic image analysis functions such as length measurements, enumeration, etc.	Observation only
XI.	TEACHING	
1.	Demonstrate different methods of teaching-learning and assessments	Independently
2.	Engage and teach undergraduates and paramedical staff in the form of small group teaching and demonstrations	Independently
3.	Engage in peer teaching in the form of presenting seminars and journal clubs and be able to use different modes of teaching including PowerPoint projections and charts	Independently
XII.	RESEARCH	
1.	Write the thesis (and/or a scientific paper) in accordance with the prescribed instructions, as expected of international standards	Independently

National Medical Commission

TEACHING AND LEARNING METHODS

General principles

Acquisition of competencies being the keystone of doctoral medical education, such training

should be skills oriented. Learning in the program, essentially autonomous and self-directed, and emanating from academic and clinical work, shall also include assisted learning. The formal sessions are meant to supplement this core effort.

All students joining the postgraduate (PG) courses shall work as full-time (junior) residents/demonstrators during the period of training, attending not less than 80% of the training activity during the calendar year, and participating in all assignments and facets of the educational process. They shall maintain a logbook for recording the training they have undergone, and details of the procedures done during laboratory and clinical postings in real time. Maintenance of e-records of such procedures is encouraged.

The three-year training programme for the MD degree may be arranged in the form of postings to different assignments/laboratories for specified periods as outlined below. The period of such assignments/postings is recommended for 36 months with breaks only for examinations and mandatory postings. Posting schedules may be modified depending on needs, feasibility and exigencies. For facilities not available in the parent institution as well as for additional knowledge and skill, extramural postings may be undertaken. Departments may vary the postings slightly based on the clinical profile of the hospital, within the time period bands given below, however at least the lower limit for each of the four main components of the course must be covered during postings.

Posting schedule is given below:

S. No	Section/ Subject	Duration in months
(i)	Surgical Pathology, Autopsy, Immunohistochemistry	11-16
(ii)	Hematology, Laboratory Medicine, and Blood bank	8-10
(iii)	Cytopathology	6-9
(iv)	Basic Sciences, Immunopathology, Cytogenetics, Electron microscopy, Molecular Biology etc. and Research Techniques including Thesis	2-6
	Total	**36 (including exam)**

Teaching-Learning methods

This should include a judicious mix of demonstrations, symposia, journal clubs, clinical meetings, seminars, small group discussion, case-based learning, simulation-based teaching, self-directed learning, integrated learning, interdepartmental meetings, and any other collaborative activity with the allied departments. Methods with exposure to the applied aspects of the subject relevant to basic/clinical sciences should also be used. **The suggested examples of teaching-learning methods are given below but are not limited to these. The frequency of various below mentioned teaching-learning methods can vary based on the subject's requirements, competencies, workload and overall working schedule in the concerned subject. The Pathology resident is expected to sit in reporting every day, having seen the slides the previous day with written descriptions, which should be evaluated daily by the reporting faculty. This is the mainstay of training in all disciplines of Pathology.**

National Medical Commission

A. Lectures: Didactic lectures should be used sparingly. A minimum of 10 lectures per year in the concerned PG department is suggested. Topics to be selected as per subject requirements All postgraduate trainees will be required to attend these lectures. Lectures can cover topics such as:

1. Subject related important topics as per specialty requirement
2. Recent advances
3. Research methodology and biostatistics
4. Salient features of Undergraduate/Postgraduate medical curriculum
5. Teaching and assessment methodology.

Topic numbers 3, 4, 5 can be done during research methodology/biostatistics and medical education workshops in the institute.

B. Journal club: Minimum of once in 1-2 weeks is suggested.

Topics will include presentation and critical appraisal of original research papers published in peer reviewed indexed journals. The presenter(s) shall be assessed by faculty and grades recorded in the logbook.

C. Student Seminar: Minimum of once every 1-2 weeks is suggested.

Important topics should be selected as per subject requirements and allotted for in-depth study by a postgraduate student. A teacher should be allocated for each seminar as faculty moderator to help the student prepare the topic well. It should aim at comprehensive evidence-based review of the topic. The student should be graded by the faculty and peers.

D. Student Symposium: Minimum of once every 3 months.

A broad topic of significance should be selected, and each part shall be dealt by one postgraduate student. A teacher moderator should be allocated for each symposium and moderator should track the growth of students. The symposium should aim at an evidence-based exhaustive review of the topic. All participating postgraduates should be graded by the faculty and peers.

E. Laboratory work/ Interactive slide and gross sessions: Minimum - once every 1-2 weeks.

Laboratory work, slide and gross specimen teaching sessions should be coordinated and guided by faculty from the department. Various methods like case-based discussions, oral or written quiz, etc. are to be used. Faculty from the department should participate in moderating the teaching-learning sessions.

F. Interdepartmental colloquium

Faculty and students must attend monthly meetings between the main Department and other department/s on topics of current/common interest or clinical cases. This includes institutional activities such as clinical combined rounds (CCR), clinic-pathological correlation conferences (CPC), and departmental activities like autopsy conferences.

G. a. Rotational clinical / community / institutional postings

Depending on local institutional policy and the subject specialty needs, postgraduate trainees may be posted in relevant departments/ units/ institutions. The aim would be to acquire more in-depth knowledge as applicable to the concerned specialty. Postings would be rotated

National Medical Commission

between various units/departments and details to be included in the specialty-based Guidelines. Few examples are listed below:

- Laboratory-based specialty units/departments e.g. Biochemistry / Microbiology/ Infection control unit/Laboratory Medicine, Hematology, Blood bank, Transplantation Immunology, Forensic Medicine, Proteomics, etc.
- Medical Education Unit (MEU) or Department of Medical Education (DOME): optional

G. b. Posting under "District Residency Programme" (DRP):

All postgraduate students pursuing MS/MS in broad specialties in all Medical Colleges/Institutions shall undergo a compulsory rotation of three months in District Hospitals/District Health System as a part of the course curriculum, as per the Postgraduate Medical Education (Amendment) Regulations (2020). Such rotation shall take place in the 3rd or 4th, or 5th semester of the Postgraduate programme and the rotation shall be termed as "District Residency Programme" and the PG medical student undergoing training shall be termed as "District Resident".

Every posting should have its defined learning objectives. It is recommended that the departments draw up objectives and guidelines for every posting offered in conjunction with the collaborating department/s or unit/s. This will ensure that students acquire expected competencies and are not considered as an additional helping hand for the department / unit in which they are posted. The PG student must be tagged along with those of other relevant departments for bedside case discussion/basic science exercises as needed, under the guidance of an assigned faculty.

Opportunities to present and discuss infectious disease cases through bedside discussion and ward/grand rounds with specialists / clinicians in different hospital settings must be scheduled to address antimicrobial resistance issues and strategies to deal with it.

H. Teaching research skills

Writing a thesis should be used for inculcating research knowledge and skills. All postgraduate students shall conduct a research project of sufficient depth to be presented to the University as a postgraduate thesis under the supervision of an eligible faculty member

National Medical Commission

of the department as guide and one or more co-guides who may be from the same or other departments.

In addition to the thesis project, every postgraduate trainee shall participate in at least one additional research project that may be started or already ongoing in the department. It is preferable that this project will be in an area different from the thesis work. For instance, if a clinical research project is taken up as thesis work, the additional project may deal with community/field/laboratory work. Diversity of knowledge and skills can thereby be reinforced.

I. Training in teaching skills

MEU/DOME should train PG students in education methodologies and assessment techniques. The PG students shall conduct UG classes in various courses and a faculty shall observe and provide feedback on the teaching skills of the student.

J. Logbook

During the training period, the postgraduate student should maintain a Logbook indicating the duration of the postings/work done in Wards, OPDs, Casualty and other areas of posting. This should indicate the procedures assisted and performed and the teaching sessions attended. The logbook entries must be done in real time. The logbook is thus a record of various activities by the student like: (1) Overall participation & performance, (2) attendance, (3) participation in sessions, (4) record of completion of pre-determined activities, and (5) acquisition of selected competencies.

The purpose of the Logbook is to:

a) help maintain a record of the work done during training,
b) enable Faculty/Consultants to have direct information about the work done and intervene, if necessary,
c) provide feedback and assess the progress of learning with experience gained periodically.

The Logbook should be used in the internal assessment of the student, should be checked and assessed periodically by the faculty members imparting the training. The PG students will be required to produce completed logbook in original at the time of final practical examination. It should be signed by the Head of the Department. A proficiency certificate from the Head

National Medical Commission

of Department regarding the clinical competence and skillful performance of procedures by the student will be submitted by the PG student at the time of the examination.

The PG students shall be trained to reflect and record their reflections in logbook particularly of the critical incidents. Components of good teaching practices must be assessed in all academic activity conducted by the PG student and at least two sessions dedicated for assessment of teaching skills must be conducted every year of the PG program. The teaching faculty are referred to the MCI Logbook Guidelines uploaded on the Website.

K. Course in Research Methodology

All postgraduate students shall complete an online course in Research Methodology within six months of the commencement of the batch and generate the online certificate on successful completion of the course.

National Medical Commission

Other aspects

- The Postgraduate trainees must participate in the teaching and training program of undergraduate students and interns attending the department.
- Trainees shall attend accredited scientific meetings (CME, symposia, and conferences) at least once a year.
- Department shall encourage e-learning activities.
- The Postgraduate trainees should undergo training in Basic Cardiac Life Support (BCLS) and Advanced Cardiac Life Support (ACLS).
- The Postgraduate trainees must undergo training in information technology and use of computers.

During the training program, patient safety is of paramount importance; therefore, relevant clinical skills are to be learnt initially on the models, later to be performed under supervision followed by independent performance. For this purpose, provision of skills laboratories in medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, i.e., assessment to improve learning

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.

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 practical/clinical examination, should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills.

Quarterly assessment during the MD training should be based on:

- Case presentation, case work up, case handling/management : once a week
- Laboratory performance : twice a week
- Journal club : once a week
- Seminar : once a fortnight
- Case discussions : once a fortnight/month
- Interdepartmental case or seminar : once a month

Note: These sessions may be organized and recorded as an institutional activity for all postgraduates.

- Attendance at Scientific meetings, CME programmes (at least 02 each)

National Medical Commission

The student to be assessed periodically as per categories listed in appropriate (non-clinical/clinical) postgraduate student appraisal form (Annexure I).

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

Essential pre-requisites for appearing for examination include:

1. **Logbook** of work done during the training period including rotation postings, departmental presentations, and internal assessment reports should be submitted.

2. At least **two presentations** at state/national level conference. One paper (thesis or non-thesis related work) should be published /accepted/publication draft in an indexed journal.

The summative examination would be carried out as per the Rules given in the latest POSTGRADUATE MEDICAL EDUCATION REGULATIONS. The theory examination shall be held in advance before the Clinical and Practical examination, so that the answer books can be assessed and evaluated before the commencement of the clinical/Practical and Oral examination**.**

The postgraduate examination shall be in three parts**:**

1. Thesis

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 in broad specialty shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners**.**

2. Theory examination

The examinations shall be organized based on '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, as given in the latest POSTGRADUATE MEDICAL EDUCATION REGULATIONS. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination. The examination for M.D./ M.S shall be held at the end of 3rd academic year.

There shall be four theory papers (as per PG Regulations).

Paper I: Basic sciences as applied to the subject (general pathology, pathophysiology, immunopathology, and molecular biology).

Paper II: (Systemic pathology – surgical and cytopathology).

Paper III: (Hematology, transfusion medicine and laboratory medicine including instrumentation and quality control).

Paper IV: Recent advances in the subject.

National Medical Commission

The papers should have ideally one (01) structured long answer question which will evaluate comprehensive in-depth knowledge and 6-8 short answer questions.

3. Practical/clinical and Oral/viva voce examination

Practical examination

Practical examination should be spread at least over **two** days for each student and include various major components of the syllabus focusing mainly on the psychomotor domain.

Oral/Viva voce examination on defined areas should be conducted by each examiner separately. Oral examination shall be comprehensive enough to test the post graduate student's overall knowledge of the subject focusing on psychomotor and affective domain.

The final clinical examination in broad specialty clinical subjects should include:

- Cases pertaining to major systems (e.g., one long case and three short cases),
- Stations for laboratory, procedural and communication skills,
- Logbook Records and reports of day-to-day observation during the training,
- It is emphasized that Oral/viva voce examination shall be comprehensive enough to test the post graduate student's overall knowledge of the subject.

National Medical Commission

The practical examination in Pathology should follow general guidelines outlined below which may be modified according to local university guidelines and should be spread over at least two days. The following marks distribution is suggested:

Practical 500 marks (including 100 marks for internal assessment)

Section I: Histopathology: 150 marks

- Slides (12-15)
- Grossing/autopsy
- Long case (write a full description with clinical information provided) and/or 2 biopsy cases with ancillary tests reporting (written work only, no viva)

Section II: Cytopathology and histo/cyto techniques: 80 marks

- Slides (5-8)
- Histo/Cyto techniques
- Special stain exercise

- Immunopathology, OSPE, EM

Section III: Hematology, transfusion medicine and clinical pathology: 120 marks

- Slides
- Exercises
- Case study
- Blood bank
- Clinical pathology exercises and OSPE

Section IV: Viva, basic sciences, and communication skills: 50 marks

- Pedagogy/thesis presentation
- Oral viva
- Basic Sciences

Details of exercises in individual sections are given below:

I. Clinical Pathology:

- Discussion of a clinical case history.
- Plan relevant investigations of the above case and interpret the biochemistry findings.
- Two investigations should be performed including at least one clinical pathology exercise like CSF, pleural tap etc. analysis and complete urinalysis.

II. Haematology:

- Discuss hematology cases given the relevant history. Plan relevant investigations.
- Perform complete hemogram and at least two tests preferably including one coagulation exercise.
- Identify electrophoresis strips, osmotic fragility charts etc., interpretation of data from auto analyzers, HPLC and flow cytometry.
- Examine, report, and discuss around ten cases given the history and relevant blood smears and/or bone marrow aspirate smears and bone marrow biopsy interpretation.

III. Transfusion Medicine:

- Perform blood grouping
- Perform the necessary exercise like cross matching.
- Coomb's test, gel cards interpretation.

National Medical Commission

IV. Histopathology and cytopathology:

- Examine, report, and discuss 12-15 cases histopathology and 5-8 cytopathology cases, given the relevant history and slides.
- Perform a Hematoxylin and Eosin stain and any special stain on a paraffin section. Should be conversant with histopathology techniques including cryostat.
- Long case (write a full description with clinical information provided) and/or 2 biopsy cases with ancillary tests reporting

V. Autopsy:

- Given a case history and relevant organs (with or without slides), give a list of anatomical diagnosis in an autopsy case.

VI. Gross Pathology

- Describe findings of gross specimens, give diagnosis, and identify the sections to be processed. The post graduate student should perform grossing in front of the examiners for evaluation.

VII. Basic Sciences:

- 10-15 spots based on basic sciences be included
- Identify electron micrographs
- Identify gels, results of PCR, immunological tests including interpretation of Immunofluorescence pictures, etc.
- Identify histochemical and immuno-histochemistry stains

VIII. Teaching exercise

- Teach on a small topic for about 10 min or present dissertation and research
- General Viva-Voce (Grand Viva) – structured viva may be done separately or combined with above exercises

National Medical Commission

Recommended Reading:

Books (latest edition)

1. Histology for Pathologists. Stephen S. Sternberg (Ed), Raven Press, New York.
2. Robbin's Pathologic Basis of Disease Ramzi S.Cotran, Vinay Kumar, Stanley L Robbins WB Saunders Co., Philadelphia.
3. Ackerman's Surgical Pathology. Juan Rosai Mosby. St. Louis.
4. Diagnostic Surgical Pathology. Stephen S Sternberg. Lippincott, William Wilkins. Philadelphia.

5. Diagnostic Histopathology of Tumours. Christopher DM Fletcher (Ed). Churchill Livingstone. Edinburgh.
6. Manual & Atlas of Fine Needle Aspiration Cytology. Svante R Orell, et al London.
7. Theory and Practice of Histological Techniques, Bancroft JD, Stevens A, Turner DR, Churchill Livingstone, Edinburgh.
8. Diagnostic Cytology and its Histopathologic Basis, Koss LG, J.B. Lippincott, Philadelphia.
9. Comprehensive Cytopathology, Bibbo M, W.B. Saunders Co., Philadelphia.
10. Wintrobe's Clinical Hematology, Lee GR, Foerster J, Lupeus J, Paraskevas F, Gveer JP, Rodgers GN, Williams & Wilkins, Baltimore.
11. Atlas and Text of Hematology 4th edition. Singh T. Avichal Publishing Company.
12. Dacie and Lewis Practical Hematology, Bain BJ, Bates I, Laffan MA. Elsevier.
13. Bone Marrow Pathology, Bain BJ, Clark DM, Lampert IA, Blackwell Science, Oxford.
14. Henry's clinical diagnosis and management by laboratory methods.
15. WHO classification of tumors. IARC Lyon.

Journals

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

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Annexure I

Student appraisal form for broad specialty non-clinical disciplines

	Elements	Less than Satisfactory			Satisfactory			More than satisfactory			Comments
		1	2	3	4	5	6	7	8	9	
1	**Scholastic aptitude and learning**										
1.1	Has knowledge appropriate for level of training										
1.2	Participation and contribution to learning activity (e.g., Journal Club, Seminars, CME etc)										
1.3	Conduct of research and other scholarly activity assigned (e.g Posters, publications etc)										
1.4	Documentation of acquisition of competence (eg Log book)										
1.5	Performance in work based assessments										
1.6	Self-directed Learning										
2	**Work related to training**										
2.1	Practical skills that are appropriate for the level of training										
2.2	Respect for processes and procedures in the work space										
2.3	Ability to work with other members of the team										
2.4	Participation and compliance with the quality improvement process at the work										

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	environment										

2.5	Ability to record and document work accurately and appropriate for level of training										
3	**Professional attributes**										
3.1	Responsibility and accountability										
3.2	Contribution to growth of learning of the team										
3.3	Conduct that is ethically appropriate and respectful at all times										
4	**Space for additional comments**										
5	**Disposition**										
	Has this assessment pattern been discussed with the trainee?	Yes	No								
	If not explain.										
	Name and Signature of the assesse										
	Name and Signature of the assessor										
	Date										

National Medical Commission

Subject Expert Group members for preparation of REVISED Guidelines for competency based postgraduate training programme for MD in Pathology

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National Medical Commission

NATIONAL MEDICAL COMMISSION
Postgraduate Medical Education Board

D 11011/1/22/AC/Guidelines/14 **Date: 05-08-2022**

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN PAEDIATRICS

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN PAEDIATRICS

PREAMBLE

The purpose of any postgraduate (PG) education is to train an individual, in this case a qualified MBBS doctor, to achieve competencies across all domains that enables the student to perform the professional role as an expert and specialist practicing a specialty in the community (Newborn to adolescent care; ambulatory and in-patient care; Well child/Healthy and Ill child; health promotion, disease prevention and curative care; individual and family centered care; emergency care, Intensive and routine Care). The shift towards competency-based medical education by Medical Council of India and continued by the National Medical Commission (NMC) focuses education to be outcome based, emphasizing abilities, balancing domains of learning and promoting a learner centered ownership of the curriculum.

The practice of medicine has and will continue to change. Existing changes in the environment and practice have included an explosion of information, stress on knowledge at the expense of skills/attitudes/critical thinking, increased access of information and health delivery systems by lay public, development and access to sub-specialties, technological and IT advances, costs of management (diagnostic and therapeutic), changes in disease trends (non-communicable diseases, behavioral/developmental disorders, malignancies, immunology, etc.), medico-legal litigations, emphasis on quality standards, improved patient safety, violence/anger against health personnel and the emergence of professional- ethical dilemmas to name a few.

The NMC's competency based education is organized using a framework of competencies (predefined abilities) that forms the backbone of the curriculum as defined outcomes. These competencies are defined as observable abilities of a health professional, integrating multiple components across all domains, cognitive, psychomotor skills, and affective. Identified competencies are to be measured and assessed to ensure their acquisition which in turn determines competence. Defined competencies in each domain facilitates education progressing from being a novice towards mastery with formative assessments (feedback) vital for success. Every domain will have weightage and the phenomenon of allowing the ability in one should not be allowed to compensate the lack of ability in another.

These changes are reflected in the review of Core Competencies keeping them mostly aligned with CBME Undergraduate efforts. Each competency will require Sub-competencies/milestones enabling both student and teacher monitor progress that is transparent making both accountable. Specific Learning Objectives that will be necessary to achieve (and assess) outcomes are certainly also required to complete the process. This document has been prepared by subject-content specialists of NMC. The Expert Group of the NMC had attempted to render uniformity without compromise to the purpose and content of the document. 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 OBJECTIVES

Goal

The goal of the MD Paediatrics post-graduate course on successful completion, is to mould the individual into a qualified Pediatrician who is a specialist doctor with the ability (competence) to assess the state of health; promote health; and diagnose as well as manage disease (acute or chronic, emergency or routine) in children of all ages from newborn to the adolescent.

Their expertise includes dealing with medical and surgical conditions of varied degrees of complexities providing a spectrum of care from prevention, promotion, resuscitation, emergency care, acute care, chronic care and procedures (diagnostic and therapeutic) including providing palliative care. Unlike in most adults, children go through changes in growth and development leading to anatomical, behavioral, and developmental changes that emphasizes that the Specialist incorporates this dynamic requirement into screening, assessments, diagnostic and therapeutic decisions. They will continue to play an important part in the health of the family and community especially through education and support of prevention of disease and health promotion since Paediatrics is child-centered and family-focused given the relationships and social structures of families. Pediatricians will also continue to provide consultative services to many other physicians across the specialties including Emergency, Burns, Plastic Surgery, Anesthesiologist, Surgeons, Infectious Disease, Community and Family Medicine.

SUBJECT SPECIFIC OBJECTIVES

The objectives of the postgraduate course (MD) in Paediatrics are to produce a competent pediatrician who:

- Acquires competencies relevant to all aspects of Paediatrics (newborn to adolescent) that are essential to function as a clinical expert in providing newborn and pediatric health services for the community at all levels.
- Recognizes the holistic health needs of healthy neonates, infants, children, and adolescents
- Performs responsibilities of the provision of clinical care in keeping with principles of the National Health Policy.
- Performs responsibilities in a professional and ethical manner.
- Acquires skills in effectively communicating not only with the health team but with the child, family, and the community
- Is actively involved in keeping oneself up to date with scientific advances in Paediatrics and Medicolegal aspects of practice.
- Is oriented to principles of research methodology enabling critical appreciation of published scientific evidence and contributing through scholarship
- Acquires skills to enable education of all stakeholders including health team members
- Acquires skills and understanding of dealing with health team members enabling optimizing system-based practice.

SUBJECT SPECIFIC COMPETENCIES

Towards achieving suitable outcomes certain Competencies are essential to be achieved, assessed that will enable the qualified professional to perform the role of a Paediatric Specialist.

Aligned with the NMC's existing Undergraduate CBME, the following are refined and identified as themes or roles mandatory to perform the responsibility as a Pediatric Specialist in the community after acquiring an MD Paediatric post-graduation:

1. Clinical Expert
2. Communicator

3. Professional
4. Scholar
5. Team Member

Core Competencies

(The term 'children' is hereby used to include all age groups from birth to 18 years - newborn, neonates, infants, toddlers, children and adolescents)

To perform each of these above roles as a Paediatrician, every role determines competencies which in turn requires Specific Learning Objectives covering all the domains of learning.

By the end of the MD Paediatric course, the postgraduate student should be able to:

1. *Clinical Expert*

1.1. Appreciate and recognize maternal and child health needs in the context of the health priority of the country at all levels ie. Individual, Community, Local, Regional, and National.

1.2. Apply an understanding of the determinants of child health at individual, community, and population levels in practice of disease prevention, health promotion and clinical care of all children.

1.3. Understand the existing inequities in accessibility to child friendly health, economics of child health and existing status of child health across gender, communities, region, and nation (eg. NHFS survey).

1.4. Participate in population/community efforts towards prevention, promotion, and disease control relevant and with implications for child health (ie. National Health Programs).

1.5. Appreciate and recognize the importance of nurturing care for the early growth and development as the very foundation of Paediatrics and help each child realize her/his optimal growth and development potential.

1.6. Actively support the optimization of quality of growth, development, and holistic health of children in care through education enhancing the promotive, preventive, and curative measures.

1.7. Provide continuum of care and rehabilitation for children afflicted by chronic disease.

1.8. Scientific Knowledge and Evidence

1.8.1. Apply an understanding of scientific basis, concepts, principles, and advances as the basis of health and disease in the screening, diagnosis, and management of all children including growth and development.

1.9. Clinical History/Examination

1.9.1. Demonstrate appropriate proficiency in basic clinical skills appropriate for children, ie. History, Physical Examination and Assessments of Growth/ Development/ Behavior, in arriving at the most likely clinical differential; in identifying precipitating or predisposing factors; prioritizing high risk versus low-risk conditions; and, those in need of emergency versus routine care.

1.9.2. Organize and analyze an authentic history and relevant examination towards a valid clinical assessment of health of all children including growth, development, and behavioral assessments.

1.10. Investigations

1.10.1. Order rational Investigations and interpret results keeping in mind cost effectiveness and purpose in child health (ie., confirming diagnosis that impacts management decisions).

1.11. Procedures/Interventions

1.11.1. Order, perform with safety and interpret results of procedures/ interventions that are cost-effective for diagnostic and therapeutic purposes in child health.

1.12. Critical Thinking

1.12.1. Demonstrate a logical clinical approach to diagnose children in health and disease in all settings.

1.12.2. Manage using appropriate resources all children in health and disease in settings not less than secondary level facilities

1.12.3. Demonstrate clinical reasoning at every step from gathering, organization, prioritization, analysis and creating logical diagnostic hypothesis from clinical data relevant to childhood (history to examination to investigations)

1.12.4. Formulate rational, judicious, and cost-effective plans (Investigation, Therapeutic and Counseling/Education plans) for all children in health and disease (acute and chronic) taking into consideration individual/ family circumstances, interpersonal dynamics, socioeconomic status, vulnerabilities, epidemiology, and population health factors.

1.12.5. Choose investigations and prescribes medications/interventions that are rational and cost-effective balancing benefits and costs in child health in the context of family status.

1.12.6. Critically appreciate scientific literature especially relevant to children under their care.

1.13. Responsiveness

1.13.1. Rapidly assess/screen, recognize and manage critically ill sick children prioritized for immediate attention.

1.13.2. Demonstrate sensitivity and appreciate the emotional and behavioral characteristics and needs of children while dealing with them

1.14. Quality of Care

1.14.1. Demonstrate practices that maximize child safety

1.14.2. Optimize safe working practices in child health delivery settings

1.14.3. Participate in incident reporting of adverse events and errors enabling quality improvement of child health

1.14.4. Participate in continuous Child Health Care related Quality Improvement measures especially patient related audits, recognition of gaps and implementation of interventions to improve quality

1.15. Advocacy

1.15.1. Responding to a Child's health needs by advocating for them

1.16. Documentation

1.16.1. Maintain Child health records of relevant demographic details clinical details, progress, interpretations, educational, monitoring and management decisions accurately and neatly organized

1.16.2. Provide relevant concise summaries and certification in completeness to authorized legal guardians of children

1.16.3. Maintain childhood morbidity and mortality data for audit purposes.

2. *Communicator*

2.1. Effective Communication

2.1.1. Demonstrate all aspects of effective and empathetic communication during most encounters with children and parents/guardians (listening skills, culturally appropriate verbal and non-verbal cues, simple understandable

language, allow questions, clarify answers and concise written communications for prescriptions and patient education)

2.1.2. Demonstrate mutually respectful communications with children/parents/guardians (verbal, telephonic, electronic and written) that is collaborative and effective between health system colleagues of all levels.

2.2. Effective Counselling

2.2.1. Provide professional assistance and guidance in assisting children/parents/ authorized legal guardians determine their autonomous decisions regarding their own health (especially related Diagnostic Interventions and Therapeutic options).

3. *Professional*

3.1. Responsibility

3.1.1. Demonstrate responsibility for all aspects of the conduct of child care, academic tasks and research in children undertaken.

3.1.2. Demonstrate social accountability consistent with community and professional expectations through active participation in child health relevant Community Outreach programs

3.1.3. Demonstrate an understanding of one's own limits and seeks assistance appropriately in dealing with children in health and disease.

3.2. Integrity

3.2.1. Demonstrate commitment with honesty for consistent and uncompromising adherence to moral and ethical principles and values in protecting child rights and wellbeing during care, academics, and research.

3.3. Compassion and empathy

3.3.1. Demonstrate the ability to understand and share the feelings of children and families while dealing with them as care providers.

3.3.2. Demonstrate the ability to understand and share the feelings of health team members while working with them for the good of children.

3.4. Stigma and Discrimination

3.4.1. Demonstrate ability to comprehend the differences in values and beliefs while respectfully continuing child health care without discrimination

3.5. Ethical principles

3.5.1. Recognize ethical conflicts specific for child health between principles of ethics and justifies options/decisions while discussing within health care team discussions.

3.5.2. Demonstrate respect for confidentiality in issues related to child health.

3.5.3. Demonstrate ability to honor the doctor-child/parent/legal guardian relationship in all dealings with respect ensuring due care especially avoiding all inappropriate behavior and activities that lead to conflicts of interest.

3.5.4. Demonstrate mutual respect for all members on the child health team and behaves equitably and collaboratively while dealing with them.

3.5.5. Demonstrate prioritization of child's welfare and community benefits over self when appropriate.

3.6. Medicolegal Law and Code of Ethics

3.6.1. Practice within the NMC's standards as prescribed by the Code of Ethics especially in dealings with children.

3.6.2. Practice within the Law of the land fulfilling legal requirements during the provision of care especially relevant to children.

4. *Scholar*

4.1. Research

4.1.1. Refer to evidence-based guidelines in the decision-making process for child care justifying limitations.

4.1.2. Understand research methodology and the creation of a research studies for child health.

4.1.3. Demonstrate the ability to critically appreciate the quality and implications of scientific literature justifying its application in the delivery of child health care.

4.1.4. Demonstrate an ability to identify pertinent research questions relevant to child health through active participation and involvement in research.

4.2. Academics

4.2.1. Demonstrate features of active adult learning through enthusiasm and displaying a positive attitude in the educational process while participating in educational activities to build child health care capacities (Intra- and inter-institutional).

4.2.2. Use appropriate educational techniques to promote health education amongst children/parents/legal guardians/community

4.2.3. Use appropriate educational techniques to facilitate learning of other child health care team members including undergraduates, nurses, paraclinical staff and peers

4.2.4. Maintain competency by keeping up to date with child health guidelines through continued medical education with scientific knowledge and skills to enable quality practice

4.3. Application

4.3.1. Apply child health expertise in an area of study that is published in academic journals

4.3.2. Apply child health expertise while participating in health education and community efforts

5. *Team Member*

5.1. Teams

5.1.1. Demonstrate an understanding of the roles and competencies of other health care providers dealing with child health.

5.1.2. Demonstrate the ability to engage and collaborate with all child health care team members keeping the patient at the center of all such collaboration.

5.1.3. Recognize and discuss in a non-judgmental way the roles of informal stakeholders as extended teams especially in child care planning (especially mature adolescent, extended family, alternative medicine practitioners, support networks, etc.)

5.1.4. Demonstrate knowledge of health care financing, implications for management and its application in assisting patient to access the best possible care through extended team networking while dealing with child health.

5.1.5. Maintain personal health and wellbeing not only of self but of team members.

5.2. Leaders

5.2.1. Demonstrate leadership and management skills enabling effective working as a child health team

5.2.2. Lead, manage, and participate as a member of an effective and efficient child health care team while collaborating respectfully either as leader or member.

5.2.3. Facilitate child health team capacity building of competencies by leading through conduct of effective education sessions for members of the health team learning.

5.2.4. Manage time and human resources efficiently and effectively to deliver optimal child health care.

SYLLABUS

Syllabus gives an outline and summary of topics to be covered in the MD Paediatric Course.

In Competency Based Education, outcomes are required to be defined, taught, learnt, and assessed that determines competence at the end of the course. Defined Outcomes should focus on what is expected practically in the "real world" by the professional performing roles of the expert physician. This syllabus is focused on all age group of children from neonates to toddlers to children to adolescents as per existing practice. The syllabus thus stresses on "real world presentation of symptoms and signs" and is categorized under the following:

A. Cognitive Domain
   a. Basic Sciences
   b. Approaches/Management of common symptoms/signs inclusive of analysis, interpretation, and application of investigations
   c. Specific Topics classified as per traditional systems
B. Psychomotor Domain
C. Affective Domain
D. Pedagogic and Research Skills

A) Predominant in Cognitive (Knowledge) Domain

a. Basic Sciences

- *Should be able to justify and apply in the practice of Paediatrics, an understanding of the fundamentals of basic sciences as listed below:*

1. *Applied Anatomy*

1.1. Embryogenesis of all organ systems
1.2. Central Nervous System

1.2.1. Structures, Functions, Clinical considerations

1.2.1.1. Cerebral Cortex
1.2.1.2. Corticospinal tracts
1.2.1.3. Extrapyramidal tracts
1.2.1.4. Cerebellar connections
1.2.1.5. Sensory tracts
1.2.1.6. Ventricles

1.3. Spinal Cord, Peripheral Nerves

1.3.1. Structures, Functions, Clinical considerations

1.3.1.1. Lower Motor Neuron

1.4. Bladder and Bowel control
1.5. Vascular supply – Principal arteries and veins
1.6. Extremities, Abdomen, Thorax, Head and Neck
1.7. Fetal circulation

2. *Physiological basis and Pathophysiology in Health and Disease*

2.1. Physical Growth
2.2. Temperature regulation
2.3. Acid Base Balance
2.4. Fluid Balance
2.5. Hematopoiesis
2.6. Hemostasis
2.7. Electrolyte balance
2.8. Bone mineralization: Calcium-Phosphate balance
2.9. Puberty
2.10. Renal function
2.11. Hepatic function
    2.11.1. Bilirubin
    2.11.2. Drug metabolism
2.12. Respiratory function
2.13. Cardiac function
2.14. Gastrointestinal
2.15. Endocrine functions
2.16. Developmental Milestones
2.17. Adolescence
2.18. Placenta functions
2.19. Fetal to Infant Transitions (Cardio-respiratory)
2.20. Nutrition
2.21. Allergy

3. *Biochemical basis of health and disease*

3.1. Cell biology
    3.1.1. Cell cycle
    3.1.2. Cell signaling
3.2. CHO metabolism
3.3. Lipid metabolism
3.4. Protein metabolism
3.5. TCA Cycle
3.6. Hemoglobin
3.7. Clinical Chemistry
    3.7.1. Vitamins
    3.7.2. Minerals
3.8. Plasma Proteins
3.9. Coagulation Pathway

4. *Genetics and Molecular Medicine*

4.1. Human Genome
4.2. Nucleic acids

4.2.1. Protein synthesis

4.3. Recombinant DNA Technology

4.3.1. Basic techniques
4.3.2. Applications

4.4. Chromosomal abnormalities

4.4.1. Pedigree charting

4.5. Prenatal/Postnatal diagnosis
4.6. Immunogenetics

4.6.1. HLA

5. *Clinical Microbiology*

5.1. Virology

5.1.1. Classifications
5.1.2. Diagnostics
5.1.3. Therapeutics
5.1.4. Resistance

5.2. Bacteriology

5.2.1. Classification
5.2.2. Endo/Exotoxins
5.2.3. Diagnostics
5.2.4. Therapeutics
5.2.5. Resistance
5.2.6. Antibiotic Stewardship

5.3. Mycology

5.3.1. Classification
5.3.2. Diagnostics
5.3.3. Therapeutics
5.3.4. Resistance

5.4. Parasitology (Protozoology and Helminthology)

5.4.1. Classification
5.4.2. Diagnostics
5.4.3. Therapeutics
5.4.4. Resistance

5.5. Waste disposal, sterilization, disinfection

5.5.1. Infection Control

6. *Immunology*

6.1. Immune response system

6.1.1. Innate, Adaptive
6.1.2. Cellular
6.1.3. Antibodies
6.1.4. Cytokines
6.1.5. Clinical considerations

6.2. Immunoglobulins

6.2.1. Types
6.2.2. Clinical considerations

6.3. Complement

6.3.1. Components
6.3.2. Pathways
6.3.3. Deficiencies
6.3.4. Clinical considerations

6.4. Hypersensitivity reactions

6.5. Blood group Immunology

6.5.1. ABO
6.5.2. Rh
6.5.3. Minor groups

6.6. Immunological assays

6.7. Science of Vaccinology

6.7.1. Vaccines
6.7.2. Classification
6.7.3. Schedule
6.7.4. Indications, contraindications
6.7.5. Adverse effects
6.7.6. Catch up doses

6.8. Immunodeficiency

6.8.1. Primary
6.8.2. Secondary

6.9. Autoimmune disease

6.9.1. Basis
6.9.2. Autoantibodies
6.9.3. Clinical considerations

6.10. Transplant Immunology

6.10.1. Stem cell
6.10.2. GVH disease
6.10.3. Solid organ transplant

6.11. Cancer Immunology

7. *Pharmacology*

7.1. Pharmacokinetics – common medications
7.2. Antimicrobials
7.3. Analgesia, sedation
7.4. Drug interactions
7.5. Adverse effects
7.6. Antidotes for poisons
7.7. Drug induced disease

8. *Epidemiology*

8.1. Rates
8.2. Principles of study design
8.3. Measures of effects
8.4. Association and causation
8.5. Diagnostic tests

9. *Statistics*

9.1. Distribution of data
9.2. Measures of Central tendency
9.3. Measures of dispersion
9.4. Probability distributions
9.5. Sampling
9.6. Statistical significance

10. *Professionalism and Ethics*

10.1. Professionalism

10.1.1. Clinical competencies
10.1.2. Effective communication
10.1.3. Understanding of Ethics
10.1.4. Accountability
10.1.5. Altruism
10.1.6. Excellence
10.1.7. Humanism

10.2. Ethics

10.2.1. Code of ethics
10.2.2. Principles of Ethics
10.2.3. Ethical workup
10.2.4. Doctor-Patient relationship
10.2.5. Confidentiality and privacy
10.2.6. Doctor-Doctor relationship

10.3. Medico-legal essentials

10.3.1. POSCO
10.3.2. Certifications
10.3.3. Documentation
10.3.4. Informed consent
10.3.5. MLC formalities

11. *Pedagogy*

11.1. How adults learn
11.2. Competencies and Specific Learning Objectives
11.3. Teaching Learning Methodologies
11.4. T-L Media including Power Point Presentations
11.5. Assessments- Formative and Summative

12. *Management*

12.1. Time Management
12.2. Conflict Management
12.3. Communication especially Listening

12.4. How to study – Lectures? Wards? Journal club?
12.5. Fundamentals of Counselling
12.6. Stress Management
12.7. Teamwork
12.8. Leadership

b. *Approaches/Management of common symptoms/signsinclusive of analysis, interpretation, and application of investigations* *(In every age group from newborn to adolescent)*

- ***Approaches*** *(Clinical and Investigation) of the following clinical symptoms/ signs* ***Management*** *plans (Investigation, Treatment, Care, Counselling, Education, Follow Up, Rehabilitation Plans) of healthy children (section 1.1) and children with the following clinical symptoms/signs.*

1.1. Healthy Children

1.1.1. Healthy neonate
1.1.2. Healthy infant
1.1.3. Healthy child
1.1.4. Healthy adolescent

1.2. Cardiovascular Symptoms/Signs

1.2.1. Murmurs
1.2.2. Cyanosis
1.2.3. Syncope
1.2.4. Dizziness
1.2.5. Breathlessness
1.2.6. Palpitations
1.2.7. Chest Pain

1.3. Development (and Behavioral) Symptoms/ Signs

1.3.1. Normal development
1.3.2. Delayed milestones
1.3.3. Regression of milestones
1.3.4. Unusual behaviors
1.3.5. Poor scholastic performance
1.3.6. Deviations in sexuality
1.3.7. Dysmorphic features
1.3.8. Suicide attempt
1.3.9. Behavioral issues -disinterest, isolation, poor social interaction
1.3.10. Substance abuse
1.3.11. Abnormal eating behavior
1.3.12. Sleep disturbance
1.3.13. Breath holding spells
1.3.14. Multiple unexplained unrelated complaints
1.3.15. Technology dependence
1.3.16. Speech abnormalities

1.4. Dermatology

1.4.1. Neonatal skin lesions
1.4.2. Infantile skin lesions
1.4.3. Acquired skin rashes in childhood
1.4.4. Urticaria
1.4.5. Neurocutaneous presentations

1.5. Emergencies

1.5.1. Dehydration
1.5.2. Respiratory distress
1.5.3. Hypoxia
1.5.4. Shock
1.5.5. Incessant crying
1.5.6. Sick looking
1.5.7. Status epilepticus
1.5.8. Acute Severe Asthma
1.5.9. Trauma
1.5.10. Animal/human bite
1.5.11. Abuse
1.5.12. Cardio-pulmonary failure
1.5.13. Oliguria/Anuria
1.5.14. Raised intracranial pressure
1.5.15. Coma
1.5.16. Traumatic Brain Injury
1.5.17. Acute poisoning
1.5.18. Envenomation
1.5.19. Medico-legal conditions

1.6. Endocrine Symptoms

1.6.1. Abnormal stature
1.6.2. Hypoglycemia
1.6.3. Delayed puberty
1.6.4. Precocious puberty
1.6.5. Goiter

***1.7.** Gastrointestinal (and Hepatic) Symptoms*

1.7.1. Tongue tie
1.7.2. Vomiting and regurgitation
1.7.3. Diarrhea – Acute
1.7.4. Diarrhea – Chronic, persistent, recurrent
1.7.5. Abdominal pain – Acute
1.7.6. Abdominal Pain - Recurrent
1.7.7. Constipation
1.7.8. Jaundice
1.7.9. Gastrointestinal bleed
1.7.10. Hepatomegaly
1.7.11. Splenomegaly
1.7.12. Hepatosplenomegaly
1.7.13. Encopresis
1.7.14. Abdominal distention

1.7.15. Abnormal Liver Function tests

1.8. Genital Symptoms

1.8.1. Atypical or ambiguous genitalia
1.8.2. Menstrual abnormalities
1.8.3. Injuries to genitalia
1.8.4. Foreskin, penile problems
1.8.5. Labial adhesions

1.9. Growth (and Nutrition related) Symptoms

1.9.1. Normal growth
1.9.2. Normal diet
1.9.3. Poor feeding in Infancy
1.9.4. Undernutrition
1.9.5. Failure to thrive
1.9.6. Overweight and obesity

1.10. Hematological Symptoms

1.10.1. Pallor
1.10.2. Bleeding manifestations
1.10.3. Lymphadenopathy
1.10.4. Thrombotic manifestations
1.10.5. Abnormal Hematological parameters including Pancytopenia

***1.11.** Infectious (and Immunological) Symptoms*

1.11.1. Fever with focus
1.11.2. Fever without focus
1.11.3. Fever - persistent or recurrent
1.11.4. Exanthematous Fever
1.11.5. Recurrent infections
1.11.6. Hospital acquired infection
1.11.7. Vaccination Issues– complete, incomplete

1.12. Metabolic Symptoms

1.12.1. Acidosis – metabolic, respiratory
1.12.2. Alkalosis – metabolic, respiratory
1.12.3. Mixed Acid-Base disturbance
1.12.4. Dyselectrolytemia – Hypo/Hypernatremia, Hypo/Hyperkalemia, Hypo/hypercalcemia
1.12.5. Hyperammoniaemia
1.12.6. Hypoglycemia

***1.13.** Musculoskeletal Symptoms*

1.13.1. Joint pains with or without swelling
1.13.2. Low back pain
1.13.3. Deformities of bone growth
1.13.4. Scoliosis

1.13.5. Growing Pains involving lower limbs

1.14. Neonatology

1.14.1. Term gestation
1.14.2. Prematurity
1.14.3. Low birth weight
1.14.4. Neonatal Jaundice
1.14.5. Ill/Sick
1.14.6. Neonatal seizures
1.14.7. Neonatal respiratory distress
1.14.8. Neonatal Apnea
1.14.9. Neonatal Shock
1.14.10. Metabolic/electrolyte disturbances – Glucose, Sodium, Potassium, Calcium, Bicarbonate, Lactate, Ammonia
1.14.11. Feed Intolerance
1.14.12. Spinal/Cranial abnormalities
1.14.13. Post NICU follow up
1.14.14. HIV-HepB-Syphilis exposure/infection
1.14.15. Inadequate breast milk
1.14.16. Antenatal detected renal abnormalities

1.15. *Neurological Symptoms*

1.15.1. Seizures
1.15.2. Altered sensorium/Coma
1.15.3. Motor weakness
1.15.4. Incessant Irritability
1.15.5. Headache
1.15.6. Abnormal Head circumference
1.15.7. Sensory abnormalities
1.15.8. Abnormal gait
1.15.9. Ataxia
1.15.10. Facial weakness
1.15.11. Involuntary movements

1.16. *Ophthalmological Symptoms*

1.16.1. Red eye
1.16.2. Watering of eye
1.16.3. Discharge from eye
1.16.4. Poor vision
1.16.5. White reflex
1.16.6. Deviation of eyes

1.17. *Otorhino-laryngology Symptoms*

1.17.1. Nasal discharge, Nasal congestion, Sneezing
1.17.2. Sore Throat
1.17.3. Ear Pain/discharge
1.17.4. Tonsillar hypertrophy
1.17.5. Epistaxis
1.17.6. Impaired hearing

1.18. Renal and Urological Symptoms

1.18.1. Enuresis
1.18.2. Dysuria
1.18.3. Proteinuria
1.18.4. Hematuria
1.18.5. Edema
1.18.6. Hypertension
1.18.7. Dyselectrolytemia
1.18.8. Polyuria
1.18.9. Scrotal and Inguinal swelling
1.18.10. Oliguria/Anuria

1.19. Respiratory Symptoms

1.19.1. Cough
1.19.2. Breathlessness
1.19.3. Noisy breathing - snoring, stridor, wheeze
1.19.4. Hemoptysis

1.20. Community Situations

1.20.1. Vaccination camps
1.20.2. School Health Checkups
1.20.3. Outbreaks of childhood diseases

1.21 *Analysis, interpretation, and application of Investigations*

1.21.1. Radiology X-rays (Chest AP/PA/Lateral, abdomen, spine, extremities)
1.21.2. Contrast X-rays (Micturating cystourethrogram)
1.21.3. Ultrasound (Lung: Consolidation, Left Heart failure, effusion; Circulation: Intravascular Volume; Neonatal Brain: Hydrocephalus, Intracranial Collections; Central veins: Patency for US guided central lines; Lymphadenopathy: For US guided FNAC aspirations)
1.21.4. CT scan with/without contrast (Brain: Cerebral edema, Midline shift, Meningitis, Encephalitis, ADEM, Hemorrhage, Infarction, SOLS, Hydrocephalus)
1.21.5. MRI scan (Brain: Gross White vs Grey matter degeneration)
1.21.6. HIDA Scan

1.22. Microbiology

1.22.1. Grams stain of CSF, Pus, Peritoneal fluid
1.22.2. Ziehl Neilson Stain of Sputum, Pus
1.22.3. Hanging drop for motile cholera
1.22.4. PCR reports for infectious disease diagnosis
1.22.5. Culture and sensitivity reports of body fluids

1.23. Pathology

1.23.1. Pathology reports of human tissue

1.24. Routine labs

1.24.1. Hematology reports of Blood counts, peripheral smear, Bleeding and Coagulation parameters, basic immunology
1.24.2. Urine routine analysis

1.25. Biochemical

1.25.1. Biochemical routine (Electrolytes, Calcium-Phosphate, Renal, Liver profiles, Arterial/venous Blood Gases)
1.25.2. Inborn error of metabolism newborn screening reports
1.25.3. Endocrine (Glucose related, Thyroid related, Hormonal assays, Lipid profiles)

1.26. Electrophysiological Studies

1.26.1. Electrocardiogram

1.27. Lung Function Tests
1.27.1. Spirometry

C. Specific Topics

Understanding the definition, epidemiology, etiopathogenesis, clinical presentation, investigations, complications, differential diagnosis, treatment, prognosis, prevention, follow up and rehabilitation, if required, of the following, but not limited to:

1. Overview

1.1. History of Paediatrics
1.2. State of Health of Children – Global, Regional and India
1.3. Evidence-based Care in Pediatrics
1.4. WHO's Sustainable Development Goals
1.5. National Programs relevant to Child Health
1.6. Ethics in the Care of Children
1.7. Medico-legal aspects relevant to Paediatrics including:
Documentation (Initial History/Examination/Differential Sheet, Progress (SOAP, Problem Oriented), Death and other Certification, Informed Consent, Wound Certificates, POSCO, Financial Receipts, Outpatient/In Patient Registers)

2. Genetics

2.1. Inheritance Patterns
2.2. Genetic Counseling
2.3. Prevention of Genetic Disorders
Management of Genetic Disorders

3. Metabolic Disorders

3.1. Approach to Inborn Errors of Metabolism
3.2. Approach to Hypoglycemia
3.3. Defects of Amino Acid Metabolism

3.3.1. Phenylalanine
3.3.2. Urea Cycle Disorders

3.4. Defects of Lipid Metabolism

- 3.4.1. Organic Acidemias
- 3.4.2. Fatty Acid Oxidation
- 3.4.3. Mitochondrial Disorders
- 3.4.4. Peroxisomal Disorders
- 3.4.5. Lysosomal Storage Disorders
- 3.4.6. Gaucher Disease
- 3.4.7. Niemann-Pick Disease

3.5. Defects of Carbohydrate Metabolism

- 3.5.1. Glycogen Storage Disease

3.6. GM1 and GM2 Gangliosidosis
3.7. Mucopolysaccharidoses
3.8. Porphyrias
3.9. Newborn Screening

4. Immunology

4.1. Laboratory Diagnosis of Immune-mediated Diseases
4.2. Primary Immunodeficiency Disorders

- 4.2.1. Antibodies
- 4.2.2. Cellular
- 4.2.3. Multiple types
  - 4.2.3.1. SCID (Severe combined immunodeficiency)

4.3. Phagocytic system

- 4.3.1. Neutrophils
- 4.3.2. Leukopenia
- 4.3.3. Leuocyctosis

4.4. Complement pathway

- 4.4.1. Complement deficiencies

4.5. Intravenous Immunoglobulin
4.6. Multisystem Inflammatory Syndrome of Childhood

5. Allergy

5.1. Basis of Allergy
5.2. Allergic rhinitis
5.3. Atopic dermatitis
5.4. Urticaria, Angioedema
5.5. Anaphylaxis
5.6. Asthma
5.7. Serum sickness
5.8. Drug allergies
5.9. Food allergies

6. Fluid and Electrolytes

6.1. Body Fluids – Composition, Osmolality

6.2. Fluid Therapy - Maintenance, Replacement
6.3. Sodium
6.4. Potassium
6.5. Calcium
6.6. Magnesium
6.7. Phosphorus
6.8. Acid-base Abnormalities

7. Therapeutics

7.1. Principles of Drug Therapy
7.2. Administration of Medications
7.3. Pre-anesthesia Checkup
7.4. Procedural sedation
7.5. Analgesia

8. Acutely Ill

8.1. Assessment and Triage
8.2. Cardiopulmonary Resuscitation

8.2.1. Basic Life Support
8.2.2. Pediatric Advanced Life Support

8.3. Minor Injuries – Abrasions, Lacerations

9. Pediatric Intensive Care

9.1. Shock
9.2. Respiratory Failure
9.3. Pediatric Acute Respiratory Distress Syndrome
9.4. Ventilation – Non-Invasive and Invasive
9.5. Sedation, Analgesia and Paralysis
9.6. Nutrition in Intensive Care
9.7. ECMO
9.8. Concepts of Futility, Do not Resuscitate, Withdrawal of Care
9.9. Palliative Care
9.10. Death

10. Toxins

10.1. Clinical Approach to a Poisoned Child
10.2. Poisonings by Common Drugs
10.3. Hydrocarbon Poisoning
10.4. Poisoning in the Household
10.5. Corrosive Poisoning
10.6. Snakebite
10.7. Insect Stings including Bee, Wasp, Scorpion Sting

11. Injuries

11.1. Poly Trauma: Stabilization, Triage, and Transport
11.2. Drowning/Submersion Injuries
11.3. Animal-related Injuries

11.4. Burn Injuries
11.5. Cold Injuries

12. Neonatology

12.1. Neonatal Mortality and Morbidities
12.2. Fetal Physiology and Growth
12.3. Maternal Influences on Fetus
12.4. Transition of the Fetus to Newborn
12.5. Intrauterine diagnosis and management of Fetal disease
12.6. Organization of Neonatal Care

13. Normal Newborn

13.1. Delivery Room Care of the Newborn
13.2. Newborn Resuscitation
13.3. Assessment of the Newborn
13.4. Care of the Normal Newborn
13.5. Maintenance of Temperature
13.6. Breastfeeding and Lactation Management

14. Disorders of Weight and Gestation in Neonates

14.1. Low Birthweight

14.1.1. Feeding of Low-birth weight
14.1.2. Intrauterine Growth Restriction

14.2. Prematurity
14.3. Post term
14.4. Large for Gestational Age

15. High-risk Newborn

15.1. Recognition of High-risk neonate
15.2. Multiple-gestational pregnancies
15.3. Birth Injuries
15.4. Perinatal Asphyxia
15.5. Jaundice in the newborn
15.6. Infant of Diabetic Mother
15.7. Neonatal Hypoglycemia
15.8. Anemia and Polycythemia
15.9. The Bleeding Neonate
15.10. Hemorrhagic Disease of the
15.11. Thrombocytopenia in the Newborn
15.12. Cyanosis in the Newborn
15.13. Necrotizing Enterocolitis
15.14. Retinopathy of Prematurity
15.15. Dyselectrolytemia, Hypocalcemia, Hypermagnesemia
15.16. Neonatal Transport
15.17. Follow-up of the High-risk Neonate

16. Neonatal Infections

16.1. Neonatal Sepsis – Early and Late
16.2. Superficial Infections in Neonates
16.3. Neonatal Meningitis
16.4. Deep-seated Infections in Neonates
16.5. Neonatal Tetanus
16.6. Intrauterine Infections

17. Neonatal Neurological Problems

17.1. Seizures in the Neonates
17.2. Hypoxic Ischemic Encephalopathy
17.3. Intra-cranial/ventricular Hemorrhage
17.4. Peripheral nerve injuries

18. Neonatal Respiratory Problems

18.1. Approach to a Neonate with Respiratory Distress
18.2. Neonatal Apnea Neonatal Ventilation
18.3. Hyaline Membrane Disease
18.4. Transient Tachypnea of the Newborn
18.5. Meconium Aspiration Syndrome
18.6. Pulmonary Air Leaks in the Newborn
18.7. Persistent Pulmonary Hypertension (PPHN)
18.8. Pulmonary Hemorrhage
18.9. Bronchopulmonary Dysplasia
18.10. Extra pulmonary air leaks

19. Neonatal Cardiac Problems

19.1. Neonate with a murmur
19.2. Patent ductusarteriosus
19.3. Ductus dependent shunts

20. Hematological disorders in Neonates

20.1. Anemia in Neonate
20.2. Hemolytic Disease
20.3. Polycythemia
20.4. Hemorrhagic Disease

21. Congenital Malformations

21.1. Esophageal Atresia and Tracheoesophageal Fistula
21.2. Diaphragmatic Hernia and Eventration
21.3. Gastrointestinal and Abdominal Malformation
21.4. Genitourinary Malformations
21.5. CNS Malformations
21.6. Single Umbilical Artery, Polydactyly, Skin Tags

22. Growth: Normal and Abnormal

22.1. Normal Growth
22.2. Factors Affecting Growth

22.3. Assessment of Physical Growth
22.4. Disorders of Growth (Failure to Thrive, Overweight and Obesity)
22.5. Abnormalities of Stature

23. Development and Developmental Delay

23.1. Theories of Development and Behaviour
23.2. Laws of Development
23.3. Factors Affecting Development
23.4. Normal Development
23.5. Screening of Development and Behaviour
23.6. Approach to Diagnosis of Developmental Delay: Developmental Screening and Surveillance
23.7. Global Developmental Delay
23.8. Specific Developmental Delays
23.9. Cerebral Palsy
23.10. Intellectual Disability
23.11. Learning disabilities
23.12. Hearing Impairment
23.13. Mental Retardation

24. Behavior and Learning

24.1. Evaluation of Mental Well-Being
24.2. Psychosocial assessments
24.3. Technology Dependence
24.4. Bulling
24.5. Common Behavioral Problems
24.6. Tantrums and Breath-Holding
24.7. Enuresis and Encopresis
24.8. Sleep Medicine
24.9. Common Speech, Language, and Communication Disorders
24.10. Learning Disorders
24.11. Dyslexia
24.12. Attention-Deficit Hyperactivity Disorder
24.13. Oppositional Defiant and Conduct Disorders
24.14. Autism Spectrum Disorder
24.15. Rett Syndrome
24.16. Anorexia Nervosa and Bulimia
24.17. Anxiety Disorders
24.18. Suicide
24.19. Management of Psychological Illness

25. Nutrition and Nutritional Disorders

25.1. Nutritional Requirements
25.2. Nutritive Values of Indian Foods
25.3. Infant and Young Child Feeding
25.4. Adolescent Feeding
25.5. Feeding during Childhood and Food Allergy
25.6. Undernutrition: Prevalence and Etiology

25.7. Pathophysiology of Undernutrition
25.8. Malnutrition – Moderate and Severe Acute
25.9. Vitamin A
25.10. Vitamin B Complex
25.11. Vitamin C and Scurvy
25.12. Vitamin D, Nutritional Rickets, and Hypervitaminosis D
25.13. Iodine Deficiency Disorders
25.14. Zinc in Child Health
25.15. Trace Elements in Nutrition and Health
25.16. Fluorosis
25.17. Nutritional Rehabilitation including Diet Prescription
25.18. Enteral and Parenteral Nutrition
25.19. National Nutrition Programs

26. Immunization

26.1. Basic Concepts of Vaccination
26.2. Vaccine Administration Practices
26.3. Scheduling of Vaccines
26.4. Vaccine Storage and Cold Chain
26.5. Adverse Events following Immunization
26.6. BCG Vaccine
26.7. Poliovirus Vaccines
26.8. Diphtheria, Tetanus, and Pertussis Vaccines
26.9. Hepatitis B Vaccine
26.10. HaemophilusInfluenzae Type B (HIB) Vaccines
26.11. Measles Vaccine
26.12. Rubella Vaccines
26.13. Mumps Vaccine
26.14. Typhoid Fever Vaccines
26.15. Japanese Encephalitis Vaccine
26.16. Rabies Vaccines
26.17. Pneumococcal Vaccines
26.18. Rotavirus Vaccines
26.19. Cholera Vaccines
26.20. Varicella Vaccine
26.21. Hepatitis A Vaccine
26.22. Meningococcal Vaccine
26.23. Seasonal and Pandemic Influenza Vaccines
26.24. Human Papillomavirus Vaccines
26.25. Dengue Vaccines
26.26. Yellow Fever Vaccine
26.27. Combination Vaccines
26.28. Covid-19 Vaccines
26.29. Immunization in Special Situations

27. Adolescence

27.1. Gender, Sexual Identity and Sexuality
27.2. Psychosocial Development

28. Health Issues in Adolescence

- 28.1. Factors Influencing Adolescent Health
- 28.2. Adolescent Nutrition
- 28.3. Mental Health
- 28.4. Injuries, Violence, and Suicide
- 28.5. Menstrual Disorders
- 28.6. Polycystic Ovary Syndrome
- 28.7. Teenage Pregnancy
- 28.8. Sexually Transmitted Infections
- 28.9. Substance Abuse
  - 28.9.1. Alcohol
  - 28.9.2. Tobacco
  - 28.9.3. Other substances

29. Care of the Adolescents

- 29.1. Adolescent Counseling
- 29.2. Promoting Health of Adolescents
- 29.3. Adolescent Friendly Health Services

30. Infectious Diseases

- 30.1. Epidemiology of Infectious Diseases
- 30.2. Laboratory Diagnosis of Infection
- 30.3. Microbiome and Child Health
- 30.4. Antimicrobial Resistance
- 30.5. Infection Control and Prevention

31. Fever

- 31.1. Fever: General Principles of Management
- 31.2. Fever with/without focus
- 31.3. Fever of Unknown Origin
- 31.4. Infections in Immunocompromised conditions

32. Bacterial Infections

- 32.1. Natural History of Bacterial Infection
- 32.2. Principles of Antibiotic Therapy
- 32.3. Gram Positive Infections
  - 32.3.1. Streptococcal Infections
    - 32.3.1.1. Pneumococcal Infections
    - 32.3.1.2. Streptococcal Group A
    - 32.3.1.3. Streptococcal Group B
    - 32.3.1.4. Streptococcal Non A, Non B
  - 32.3.2. Staphylococcal Infections
  - 32.3.3. Enterococcus
  - 32.3.4. Diphtheria
  - 32.3.5. Nocardiosis
  - 32.3.6. Listeria monocytogenes
  - 32.3.7. Actinomycosis

32.4. Gram Negative Infections

32.4.1. Haemophilusinfluenzae
32.4.2. Neisseria
32.4.3. Pseudomonas
32.4.4. Pertussis
32.4.5. Salmonella

32.4.5.1. Nontyphoidal Salmonellosis
32.4.5.2. Enteric Fever

32.4.6. Shigella
32.4.7. Escherichia coli
32.4.8. Cholera
32.4.9. Campylobacter
32.4.10. Yersina
32.4.11. Aeromonas
32.4.12. Brucella
32.4.13. Moraxella catarrhalis
32.4.14. Helicobacter pylori

32.5. Anaerobic Bacterial

32.5.1. Clostridium tetani
32.5.2. Clostridium botulinum
32.5.3. Clostridium difficile

32.6. Spirochetal Infections

32.6.1. Treponemapallidum
32.6.2. Leptospirosis
32.6.3. Borrelia

32.6.3.1. Lyme
32.6.3.2. Relapsing Fever

32.7. Mycoplasma

32.7.1. Mycoplasma pneumoniae

32.8. Chlamydia

32.8.1. Chlamydia pneumonia
32.8.2. Chlamydia trachomatis
32.8.3. Psittacosis

32.9. Rickettsia

32.9.1. Spotted Fever
32.9.2. Scrub Typhus
32.9.3. Typhus
32.9.4. Ehrlichiosis
32.9.5. Q fever

33. Mycobacterial Infections

33.1. Childhood Tuberculosis: Epidemiology, Pathogenesis, Clinical Features, and Prevention

33.2. Diagnostic Tools for Tuberculosis in Children
33.3. Antitubercular Drugs and RNTCP
33.4. Guidelines for Childhood Tuberculosis
33.5. Drug Resistant Tuberculosis
33.6. Atypical Mycobacterial Infections
33.7. Leprosy

34. Viral Diseases

34.1. Epidemiology of Viral Infections
34.2. Principles of Antiviral Drugs
34.3. Measles
34.4. Mumps
34.5. Rubella
34.6. Roseola
34.7. Epstein-Barr
34.8. Cytomegalovirus
34.9. Influenza
34.10. Parainfluenza
34.11. Respiratory syncytial virus
34.12. Human metapneumovirus
34.13. Rhinovirus
34.14. Adenovirus
34.15. Coronavirus
34.16. Rotavirus
34.17. Human Papillomavirus
34.18. Arbovirus

34.18.1. Japanese Encephalitis
34.18.2. Other Encephalitis
34.18.3. Tick-borne Encephalitis
34.18.4. Chikungunya
34.18.5. Zika

34.19. Varicella-zoster
34.20. Herpes Simplex
34.21. Rabies
34.22. Parvovirus Infections
34.23. NonpolioEnteroviral Infections
34.24. Poliomyelitis
34.25. Viral Hepatitis
34.26. HIV
34.27. Human Lymphotrophic 1 and 2
34.28. Dengue
34.29. Yellow Fever
34.30. Ebola, Hanta
34.31. Rabies
34.32. Viral Hemorrhagic Fevers
34.33. Covid-19

35. Protozoal Disease

35.1. Epidemiology of Parasitic Infections
35.2. Principles of Antiparasitic therapy
35.3. Malaria
35.4. Leishmaniasis
35.5. Giardiasis
35.6. Amebiasis
35.7. Filariasis
35.8. Cryptosporidiosis
35.9. Toxoplasmosis
35.10. Helminthiasis

35.10.1. Hookworm Infestation
35.10.2. Ascariasis
35.10.3. Trichuriasis
35.10.4. Enterobiasis
35.10.5. Strongyloidiasis
35.10.6. Tapeworm Diseases
35.10.7. Cysticercosis
35.10.8. Trichinosis
35.10.9. Toxocara
35.10.10. Intestinal, Liver, and Lung Flukes
35.10.11. Hydatid Disease: Echinococcosis
35.10.12. Schistosomiasis

36. Fungal Infections

36.1. Fungi
36.2. Principles of Antifungal Therapy
36.3. Candidiasis
36.4. Aspergillosis
36.5. Malassezia
36.6. Cryptococcosis
36.7. Coccidioidomycosis
36.8. Blastomycosis
36.9. Histoplasmosis
36.10. Mucormycosis
36.11. Pneumocystis Jirovecii

37. Diarrheal Illnesses

37.1. Acute Watery Diarrhea
37.2. Dysentery
37.3. Cholera
37.4. Persistent Diarrhea
37.5. Chronic Diar*rhea*
37.6. Antibiotic Associated Diarrhea

38. Gastrointestinal Disorders

38.1. Anatomy and Physiology
38.2. Common Symptoms of Gastrointestinal Diseases
38.3. Oral Cavity disorders

38.3.1. Malocclusion
38.3.2. Dental Caries
38.3.3. Periodontal disease
38.3.4. Common lesions of soft palate
38.3.5. Cleft Lip and Cleft Palate
38.3.6. Diseases of Salivary Glands

38.4. Esophageal atresia, Tracheoesophageal Fistula
38.5. Disorders of Esophageal Motility
38.6. Gastroesophageal Reflux
38.7. Esophagitis
38.8. Hiatal Hernia
38.9. Ingestions

38.9.1. Foreign Body
38.9.2. Caustic

38.10. Infantile Hypertrophic Pyloric Stenosis, Volvulus, Duplication
38.11. Duodenal Obstruction
38.12. Malrotation
38.13. Intestinal duplication
38.14. Meckel Diverticulum
38.15. Chronic obstructive pseudoobstruction
38.16. Chronic Abdominal Pain—Functional Abdominal Pain
38.17. Acid Peptic Disease
38.18. Pancreas – Function, Tests

38.18.1. Pancreatitis
38.18.2. Treatment of Pancreatic insufficiency

38.19. Constipation
38.20. Hirschsprung Disease
38.21. Malabsorption Disorders

38.21.1. Assessment
38.21.2. Celiac
38.21.3. Enzyme Deficiencies

38.22. Inflammatory Bowel Disease
38.23. Intestinal Obstruction
38.24. Intussusception
38.25. Appendicitis
38.26. Abdominal Tuberculosis
38.27. Ascites
38.28. Umbilical Hernia
38.29. Inguinal Hernia
38.30. Testicular Torsion
38.31. Anorectal Disorders

38.31.1. Anal Fissure
38.31.2. Hemorrhoids
38.31.3. Prolapse

38.31.4. Pilonidal sinus
38.31.5. Anorectal malformations

38.32. Cyclic vomiting

39. Hepatobiliary Diseases

39.1. Liver Function Tests
39.2. Neonatal Cholestasis
39.3. Portal Hypertension
39.4. Gastrointestinal Bleeding
39.5. Metabolic Liver disease

39.5.1. Wilson
39.5.2. Others

39.6. Liver Abscess
39.7. Viral Hepatitis
39.8. Chronic Liver Disease
39.9. Acute Liver Failure
39.10. Autoimmune Hepatitis
39.11. Drug induced Hepatitis
39.12. Cystic disease of Liver
39.13. Liver transplantation
39.14. Liver Tumors
39.15. Peritoneum

39.15.1. Ascites
39.15.2. Peritonitis

39.16. Epigastric hernia

40. Disorders of Hematopoietic System

40.1. The Hematopoietic System
40.2. Anemia: Etiology and Classification
40.3. Inadequate Production

40.3.1. Physiological anemia of infancy
40.3.2. Congenital Bone Marrow Failure
40.3.3. Aplastic Anemia
40.3.4. Iron Deficiency Anemia
40.3.5. Megaloblastic Anemia
40.3.6. Anemia of Chronic disease
40.3.7. Congenital dyserthropoietic anemia

40.4. Hemolytic Anemia

40.4.1. Hemoglobinopathies

40.4.1.1. Sickle Cell Disease
40.4.1.2. Thalassemia

40.4.2. RBC Membrane Defects
40.4.3. Red Blood Cell Enzyme Defects
40.4.4. Immune Hemolytic Anemia

40.5. Polycythemia

40.6. Hemorrhagic and Thrombotic disorders

- 40.6.1. Coagulation Disorders
- 40.6.2. Hemophilia
- 40.6.3. Other Clotting Factor Deficiencies
- 40.6.4. Von Willebrand Disease
- 40.6.5. Thrombotic disorders
- 40.6.6. Disseminated Intravascular Coagulation

40.7. Platelet

- 40.7.1. Immune Thrombocytopenia
- 40.7.2. Hemolytic Uremic Syndrome
- 40.7.3. Thrombotic Thrombocytopenic Purpura
- 40.7.4. Kasabach- Merritt Syndrome
- 40.7.5. Platelet Function Defects

40.8. Blood Component Therapy

40.9. Spleen

- 40.9.1. Splenomegaly
- 40.9.2. Splenectomy

40.10. Lymphatics

- 40.10.1. Lymphadenopathy

41. Respiratory Diseases

41.1. Congenital Malformations of the Upper Respiratory Tract
41.2. Epistaxis
41.3. Nasal Polyps
41.4. Allergic Rhinitis
41.5. Otitis Media
41.6. Common Cold
41.7. Acute Pharyngitis
41.8. Retropharyngeal abscess
41.9. Sinusitis
41.10. Tonsils and Adenoids
41.11. Community Acquired Pneumonia
41.12. Pleural effusion, Empyema
41.13. Bronchiectasis
41.14. Pneumothorax, Pneumomediastinum, Pyopneumothorax
41.15. Skeletal deformities of Chest
41.16. Obstructive Sleep Apnea
41.17. Congenital Malformations of the Respiratory Tract
41.18. Congenital disorders of Lung
41.19. Croup, Epiglottitis, Laryngitis, Tracheitis
41.20. Bronchiolitis
41.21. Alpha-1 Antitrypsin Deficiency

41.22. Aspiration Syndromes
41.23. Preschool Wheeze and Bronchial Asthma
41.24. Aerosol Therapy
41.25. Pneumonia
41.26. Parapneumonic Effusion and Empyema
41.27. Pneumothorax and Air Leaks
41.28. Persistent and Recurrent Pneumonia
41.29. Interstitial Lung Disease
41.30. Hemoptysis and Alveolar Bleeds
41.31. Primary Ciliary Dyskinesia
41.32. Cystic Fibrosis
41.33. Bronchiectasis
41.34. Lung Abscess
41.35. Foreign Body Aspiration
41.36. Central Hypoventilation
41.37. Acute Respiratory Distress Syndrome
41.38. SIDS

42. Cardiovascular Disorders

42.1. Genetic Basis of Heart Diseases
42.2. Chest Skiagram in Heart Disease
42.3. Electrocardiogram
42.4. Echocardiography
42.5. Congestive Heart Failure
42.6. Cardiac Malposition
42.7. Acyanotic Congenital Heart Disease, Left to Right shunt

42.7.1. Ventricular Septal Defects
42.7.2. Patent DuctusArteriosus
42.7.3. Atrial Septal Defects
42.7.4. PAPVC
42.7.5. Atrioventricular Septal Defects

42.8. Acyanotic Congenital Heart Disease, Obstructive

42.8.1. Pulmonary Valve Stenosis
42.8.2. Coarctation of Aorta
42.8.3. Pulmonary Venous Hypertension

42.9. Acyanotic Congenital Heart Disease, Regurgitation

42.9.1. Mitral Valve Prolapse

42.10. Cyanotic Congenital Heart Disease, reduced Pulmonary flow

42.10.1. Tetralogy of Fallot and Variants
42.10.2. Tricuspid Atresia
42.10.3. Double outlet Right Ventricle
42.10.4. Ebstein Anomaly

42.11. Cyanotic Congenital Heart Disease, Increased Pulmonary flow

42.11.1. Transposition of Great Arteries and variants
42.11.2. TruncusArteriosus
42.11.3. TAPVC
42.11.4. Hypoplastic Left Heart Syndrome

42.12. Others

42.12.1. Anomalies of the Aortic Arch
42.12.2. Pulmonary Arterial Hypertension

42.13. Acquired Heart Disease

42.13.1. Acute Rheumatic Fever
42.13.2. Rheumatic Heart Disease
42.13.3. Infective Endocarditis
42.13.4. Myocardial Diseases: Myocarditis and Cardiomyopathies
42.13.5. Diseases of the Pericardium
42.13.6. Kawasaki disease

42.14. Cardiac Arrhythmias
42.15. Cardiac Emergencies
42.16. Heart Failure
42.17. Systemic Hypertension

43. Disorders of the Kidney and Urinary Tract

43.1. Investigations for Kidneys and Urinary Tract
43.2. Congenital Anomalies of Kidneys and Urinary Tract

43.2.1. Cystic Kidney Diseases

43.3. Glomerular Disease

43.3.1. Glomerulonephritis

43.3.1.1. Acute Poststreptococcal Glomerulonephritis
43.3.1.2. Membranous Nephropathy
43.3.1.3. Membranoproliferative Glomerulonephritis
43.3.1.4. RapidlyProgressive Glomerulonephritis

43.3.2. IgA nephropathy
43.3.3. Alport syndrome

43.4. Systemic Vasculitis and Lupus Nephritis
43.5. Goodpasture Disease
43.6. Henoch-SchonleinPurpura Nephritis
43.7. Hemolytic Uremic Syndrome
43.8. Toxic Nephropathy
43.9. Tubulointerstitial Disease

43.9.1. Pyelonephritis
43.9.2. Tubulointerstitial nephritis
43.9.3. Papillary necrosis
43.9.4. Acute Tubular Necrosis

43.10. Vascular Disease

43.10.1. Renal vein Thrombosis
43.10.2. Hypercalciuria
43.10.3. Nephrocalcinosis

43.11. Infections

43.11.1. Urinary Tract Infection
43.11.2. Cystitis
43.11.3. Urethritis
43.11.4. Hemorrhagic cystitis
43.11.5. Pyelonephritis

43.12. Proteinuria

43.12.1. Transient, Orthostatic
43.12.2. Nephrotic Syndrome

43.13. Tubular Disorders

43.13.1. Renal Tubular Disorders
43.13.2. Nephrogenic Diabetes Insipidus
43.13.3. Bartter Syndrome
43.13.4. Gitelman Syndrome

43.14. Renal Failure

43.14.1. Acute Kidney Injury
43.14.2. Chronic Kidney disease
43.14.3. End-stage renal disease
43.14.4. Renal Replacement Therapy
43.14.5. Renal Transplantation

43.15. Renal Calculi
43.16. Refractory Rickets
43.17. Hypertension
43.18. Vesicoureteral Reflux
43.19. Voiding Disorders
43.20. Penile anomalies

44. Gynecological Issues

44.1. Vaginal bleeding in prepubertal children
44.2. Breast concerns
44.3. Female genital mutilation

45. Neurological Disorders

45.1. Approach to Neurological Disorders including localization
45.2. Cerebrospinal Fluid and Neurophysiology
45.3. Neuroimaging
45.4. Congenital Anomalies

45.4.1. Neural Tube Defects and Spinal Cord Malformations

45.4.2. Microcephaly
45.4.3. Brain Malformations
45.4.4. Hydrocephalus
45.4.5. Craniosynostosis

45.5. Seizures

45.5.1. Febrile Seizures
45.5.2. Unprovoked Seizures and Epilepsy

45.5.2.1. Generalized
45.5.2.2. Focal
45.5.2.3. Reflex Seizures

45.5.3. Treatment of Seizures
45.5.4. Status Epilepticus
45.5.5. Nonepileptic Paroxysmal Disorders

45.6. Headaches

45.6.1. Migraine
45.6.2. Tension Headache
45.6.3. Secondary Headaches

45.7. Neurocutaneous Syndromes
45.8. Movement Disorders
45.9. Encephalopathies

45.9.1. Cerebral Palsy
45.9.2. Autoimmune
45.9.3. Mitochondrial

45.10. Neurodegenerative Disorders

45.10.1. Grey versus White Matter
45.10.2. Sphingolipidosis
45.10.3. Neuronal CeroidLipofuscinoses
45.10.4. Adrenoleucodystrophy

45.11. Demyelinating Disorders

45.11.1. Acute Disseminated Encephalomyelitis
45.11.2. Optic Neuritis
45.11.3. Transverse Myelitis
45.11.4. Multiple Sclerosis
45.11.5. Autoimmune and Paraneoplastic

45.12. Stroke

45.12.1. Arterial versus Venous

45.13. CNS Vasculitis
45.14. CNS Infections

45.14.1. Acute Pyogenic Meningitis
45.14.2. Tuberculosis of the Central Nervous System

45.14.3. Viral Meningoencephalitis
45.14.4. Neurocysticercosis
45.14.5. Brain Abscess

45.15. PseudotumorCerebri
45.16. Coma and Raised Intracranial Pressure
45.17. Brain Death
45.18. Infantile Tremor Syndrome
45.19. Neurometabolic Disorders
45.20. Spinal Cord Disorders
45.21. Traumatic Brain Injury
45.22. Neuro-Rehabilitation

45.22.1. Traumatic Brain Injury
45.22.2. Spinal cord Injury
45.22.3. Spasticity
45.22.4. Brachial plexus injury
45.22.5. Meningomyelocele
45.22.6. Disabled Child

46. Neuromuscular Disorders

46.1. Approach to Diagnosis of Neuromuscular Disorders
46.2. Floppy Infant
46.3. Congenital Muscle Disorders

46.3.1. Congenital Myopathies
46.3.2. Arthrogryposis

46.4. Muscular Dystrophies

46.4.1. Duchenne and Becker Muscular Dystrophy
46.4.2. Myotonic Muscular Dystrophy
46.4.3. Limb Girdle Muscular Dystrophy
46.4.4. Fascio-scapulo-humeral Muscular Dystrophy

46.5. Endocrine/Toxic Myopathies
46.6. Metabolic Myopathies

46.6.1. Periodic Paralysis
46.6.2. Glucogenoses
46.6.3. Mitochondrial
46.6.4. Lipid

46.7. Neuromuscular Transmission Disorders

46.7.1. Myasthenia Gravis
46.7.2. Spinal Muscular Atrophy
46.7.3. Motor Neuron Disease

46.8. Hereditary Motor Sensory Neuropathies

46.8.1. Peroneal Muscular Atrophy
46.8.2. Refsum Disease
46.8.3. Fabry Disease
46.8.4. Leukodystrophy

46.8.5. Acute Flaccid Paralysis

46.9. Toxic Neuropathies
46.10. Autonomic Neuropathy
46.11. Guillain-Barré Syndrome
46.12. Bell Palsy

47. Disorders of the Endocrine System

47.1. Physiology of Neuroendocrinology
47.2. Hypopituitarism

47.2.1. Growth Hormone Deficiency and Resistance
47.2.2. Polyuria, Diabetes Insipidus and Syndrome of Inappropriate Secretion of ADH

47.3. Thyroid Disorders

47.3.1. Thyroid Hormone Physiology
47.3.2. Hypothyroidism
47.3.3. Thyroiditis
47.3.4. Hyperthyroidism
47.3.5. Goiter and Thyroid Nodules
47.3.6. Newborn Screening for Congenital Hypothyroidism

47.4. Parathyroid Disorders

47.4.1. Bone Mineral and Hormone Physiology
47.4.2. Calcium Disorders
47.4.3. Metabolic Rickets
47.4.4. Disorders with Bone Fragility
47.4.5. Hypoparathyroidism
47.4.6. Pseudo hypothyroidism
47.4.7. Hyperparathyroidism

47.5. Pubertal Development

47.5.1. Normal Puberty
47.5.2. Delayed Puberty
47.5.3. Precocious Puberty

47.6. Adrenal Gland Disorders

47.6.1. Normal Development and Physiology of the Adrenal Gland
47.6.2. Congenital Adrenal Hyperplasia
47.6.3. Adrenal Insufficiency
47.6.4. Cushing Syndrome
47.6.5. Primary Aldosteronism
47.6.6. Pheochromocytoma

47.7. Gonad Disorders

47.7.1. Testicular Hypofunction
47.7.2. Ovarian Hypofunction
47.7.3. Gynecomastia
47.7.4. Disorders of Sex Development

47.7.5. Cryptorchidism and Micropenis

47.8. Glucocorticoid Use and Withdrawal

47.9. Diabetes Mellitus

47.9.1. Classification of Diabetes Mellitus
47.9.2. Type 1 Diabetes Mellitus
47.9.3. Type 2 Diabetes Mellitus
47.9.4. Acute and Chronic Complications of Diabetes Mellitus

47.10. Monogenic Obesity
47.11. Hyperlipidemia
47.12. Endocrine Consequences of Thalassemia Major
47.13. Endocrine Effects of Radiation and Cancer Chemotherapy
47.14. Adult Consequences of IUGR and Preterm Birth

48. Malignancies in Children

48.1. Epidemiology and Biology of Cancers
48.2. Principles of Diagnosis and Therapy of Cancer
48.3. Leukemias

48.3.1. Acute Lymphoblastic Leukemia
48.3.2. Acute Myelogenous Leukemia
48.3.3. Chronic Myelogenous Leukemia
48.3.4. Infantile Leukemia

48.4. Lymphoma

48.4.1. Hodgkin Lymphoma
48.4.2. Non-Hodgkin Lymphoma

48.5. Brain Tumors
48.6. Neuroblastoma
48.7. Wilms Tumor
48.8. Soft Tissue Tumors
48.9. Bone Tumors
48.10. Retinoblastoma
48.11. Gonadal, Germ cell neoplasms
48.12. Hemangioma
48.13. Lymphangiomas, Cystic Hygromas
48.14. Thyroid Tumours
48.15. Nasopharyngeal Carcinoma
48.16. Adrenal Tumours
48.17. Histiocytosis

48.17.1. LCH
48.17.2. HemophagocyticLymphohistiocytosis

48.18. Oncological Emergencies and Supportive Care
48.19. Hematopoietic Stem Cell Transplant

49. Rheumatological Disorders

49.1. Approach to a Child with Rheumatological Disorder
49.2. Laboratory Investigations for Rheumatological Disorders
49.3. Drugs and Principles of Management for Rheumatic Disorders
49.4. Juvenile Idiopathic Arthritis
49.5. Reactive, Post-Infectious Arthritis
49.6. Systemic Lupus Erythematosus: Clinical Features and Diagnostic Criteria
49.7. Management of Systemic Lupus Erythematosus
49.8. Juvenile Dermatomyositis
49.9. Large Vessel Vasculitis: Takayasu Arteritis
49.10. Medium Vessel Vasculitis: Kawasaki Disease and PolyarteritisNodosa
49.11. Small Vessel Vasculitis:Henoch-SchönleinPurpuraand ANCA Associated Vasculitis
49.12. Juvenile Scleroderma
49.13. Antiphospholipid Syndrome
49.14. Growing Pains

50. Common Eye Abnormalities

50.1. Common Visual Problems
50.2. Congenital Anomalies
50.3. Refractive Errors
50.4. Cornea and Conjunctiva
50.5. Uveitis
50.6. Cataract and Lens
50.7. Glaucoma
50.8. Optic Nerve and Pupil
50.9. Strabismus and Motility Disorders
50.10. Eyelid, Orbit, and Lacrimal Sac
50.11. Ocular Injuries
50.12. Orbital Infections
50.13. Ocular Manifestations of Systemic Disorders

51. Common ENT Problems

51.1. Hearing Loss
51.2. Congenital malformations of Ear
51.3. External Otitis
51.4. Otitis Media
51.5. Mastoiditis
51.6. Inner Ear

52. Common Skin Problems

52.1. S
kin of the Newborn: Physiological and Pathological Changes
52.2. Care of Skin in the Newborn
52.3. Infections and Infestations
52.4. Congenital Cutaneous Malformations
52.5. Vitiligo and Other Hypopigmentary Diseases
52.6. Atopic Dermatitis
52.7. Contact Dermatitis

52.8. Urticaria and Mastocytosis
52.9. Psoriasis, GianottiCrosti Syndrome
52.10. AcanthosisNigrans
52.11. Cutaneous Drug Reactions
52.12. Cutaneous Manifestations of Nutritional Deficiency
52.13. Cutaneous Manifestations of Collagen Vascular Diseases
52.14. Neurocutaneous Syndromes
52.15. Vesiculobullous Disorders
52.16. Papulosquamous Disorders
52.17. Ichthyosis
52.18. Genetic Cutaneous Disorders
52.19. Hair Disorders
52.20. Nail Disorders
52.21. Infections of Skin

52.21.1. Impetigo
52.21.2. Subcutaneous Infections
52.21.3. Staphylococcal Scalded Skin Syndrome
52.21.4. Ecthyma
52.21.5. Fungal Infections
52.21.6. Viral Infections
52.21.7. Arthropod bites
52.21.8. Scabies
52.21.9. Pediculosis
52.21.10. Acne

53. Disorders of Bones and Joints

53.1. Assessment of the Locomotor System
53.2. Deformities of Foot and Toes

53.2.1. Congenital TalipesEquinovarus

53.3. Torsional deformities of Limb
53.4. Leg Length discrepancies
53.5. Transient Monoarticularsynovitis
53.6. Legg-Calvé-Perthes Disease
53.7. Neck Problems

53.7.1. Torticollis
53.7.2. Cervical anomalies

53.8. Scoliosis and Kyphosis
53.9. Developmental Dysplasia of the Hip (DDH)
53.10. Osteomyelitis
53.11. Septic Arthritis
53.12. Osgood-Schlatter Disease
53.13. Arthrogryposis
53.14. Injuries to Bones/Joints
53.15. Skeletal Dysplasia
53.16. Osteogenesisimperfecta
53.17. Marfan Syndrome
53.18. Metabolic Bone Disease

53.18.1. Hypo/Hyperphosphatemia
53.18.2. Osteoporosis

54. Vulnerable Children

54.1. Street Children
54.2. Child Labor
54.3. Child Abuse and Neglect
54.4. Adoption: Medical and Legal Issues
54.5. Rights of the Child

55. Environmental Health

55.1. Climate Change and its impact on Health
55.2. Air Pollution and its impact on Health
55.3. Biomedical Waste Management

56. Community Pediatrics

56.1. Indicators of Child Health
56.2. Environment and Child Health
56.3. Lead Poisoning
56.4. Adoption
56.5. Travel Medicine
56.6. Protection of Children from Sexual Offences ACT 2012
56.7. Rights of People With Disability Act 2016
56.8. National Programs for Child Health as relevantto Natonal Health Mission including RBSK.
56.9. Integrated Management of Neonatal and ChildhoodIllness-Facility (IMNCI-F)
56.10. Investigation of an Outbreak

57. Quality Assessment and Improvement

57.1.1. Point of Care Quality Improvement

B. Psychomotor Domain

- *Should be able to perform independently in the practice of Paediatrics, the following diagnostic and therapeutic interventions as listed below:*

1. Physical Examination

1.1. Measurement of Vitals
1.2. Measurement of Anthropometry
1.3. General physical examination
1.4. Physical Examination of Systems
1.5. Development (Screening) Assessment
1.6. Behavioral (Screening) Assessment
1.7. Sexual Maturity Assessment
1.8. Newborn Assessment including gestational assessments
1.9. Breastfeeding Assessment of Position and Attachment
1.10. Motor Disability Assessment

1.11. Autism Spectrum Disorder Screening
1.12. Fundus examination
1.13. Middle ear examination
1.14. Throat examination
1.15. Triage - Rapid assessment of Airway, Breathing and Circulation
1.16. Hand hygiene
1.17. Biomedical Waste disposal guidelines

2. Non-Invasive Monitoring

2.1. Pulse oximetry
2.2. Electrocardiogram
2.3. Vital Data Monitor

3. Procedures – Diagnostic

3.1. Informed Consent
3.2. Aseptic measures for all invasive procedures
3.3. Sampling

3.3.1. Venous blood
3.3.2. Arterial blood
3.3.3. Capillary blood

3.4. Vascular Access and cannulation

3.4.1. Intravenous – Peripheral
3.4.2. Intravenous - Central
3.4.3. Intraosseous
3.4.4. Intraarterial
3.4.5. Umbilical Vein

3.5. Diagnostic Taps

3.5.1. Pleural
3.5.2. Peritoneal
3.5.3. CSF
3.5.4. Pericardial
3.5.5. Joint fluid

3.5.6. Subdural
3.5.7. Ventricular

3.6. Urinary Catheterization
3.7. Urine collection

3.7.1. Mid-stream sampling
3.7.2. Catheter sampling
3.7.3. Suprapubic puncture

3.8. Tuberculin Skin Test
3.9. Antibiotic Test Dose
3.10. Feeding/Ryles Tube

3.10.1. Insertion

3.10.2. Gastric Aspiration
3.10.3. Feeds
3.10.4. Stomach wash

3.11. Respiratory

3.11.1. Naso, Pharyngeal and Nasopharyngeal swab collection

3.12. Suppository insertion
3.13. Per rectal exam
3.14. Inspection of Vulva/Vagina
3.15. Aspiration/Biopsy

3.15.1. Bone marrow
3.15.2. Liver
3.15.3. Kidney
3.15.4. FNAC Lymph node

3.16. Ultrasound – Lung (B line, Effusion), Circulation (IVC Volume), Vascular access (Central venous), Soft Tissue (Pus)
3.17. Blood Group/Type
3.18. Smears

3.18.1. Malaria Parasite Smear/Rapid Antigen Test
3.18.2. Peripheral Blood Smear
3.18.3. CSF/Pus Grams Stain
3.18.4. Sputum Ziehl Neilson Smear

3.19. Urine dipstick
3.20. Stool Hanging drop
3.21. Glucometer Blood Sugar
3.22. Shake test (Newborn gastric aspirate)
3.23. Electrocardiogram
3.24. Specific Screening/Assessment Tools

3.24.1. Gestation Assessments
3.24.2. Anthropometric measurements and Growth charting
3.24.3. Peak Flow Meter Measurement
3.24.4. HEADSS screening (Adolescence)
3.24.5. DDST screening (Development Assessment)
3.24.6. Assessment of Sexual Maturity using Tanner's
3.24.7. M-CHAT-R screening (Autism Assessment)
3.24.8. GMSCF Assessment of Motor Disability (Cerebral Palsy)
3.24.9. Pain assessment

4. Procedures – Therapeutic

4.1. Informed Consent
4.2. Prescriptions/Medication Orders
4.3. Neonatal Resuscitation Programincluding intubation
4.4. Basic Life Support
4.5. Advanced Paediatric Life Support including intubation

4.6. Heimlich, Foreign Body Removal
4.7. Exchange Transfusion
4.8. Stomach wash
4.9. Injections

- 4.9.1. Intravenous
- 4.9.2. Intramuscular
- 4.9.3. Subcutaneous
- 4.9.4. Intradermal

4.10. Infusions

- 4.10.1. IV bolus
- 4.10.2. Intravenous
- 4.10.3. Intraosseous
- 4.10.4. Blood Component Transfusion

4.11. Respiratory

- 4.11.1. Meter dose inhalation with or without Spacer/Mask
- 4.11.2. Nebulization
- 4.11.3. Airway Insertion – Nasopharyngeal, Oropharyngeal
- 4.11.4. Needle Cricothyroidotomy
- 4.11.5. Oxygen delivery methods
- 4.11.6. HFNC/CPAP/Non-Invasive Ventilation
- 4.11.7. Ventilation – Conventional
- 4.11.8. Intercostal drainage
- 4.11.9. Surfactant Administration (INSURE)

4.12. Spinal infusion/injection
4.13. Therapeutic Ascitic Tap
4.14. Peritoneal dialysis
4.15. Phototherapy
4.16. Incision and Drainage
4.17. Dressings
4.18. Sling
4.19. Transport onto and off stretcher
4.20. Neonatal Temperature Warm Chain Measures

- 4.20.1. Wrapping up Newborn
- 4.20.2. Kangaroo Mother Care

4.21. Immunization Cold Chain Measures

- 4.21.1. Refrigerator
- 4.21.2. Vaccine carrier

4.22. Restraining a child
4.23. Transporting a child
4.24. Early Interventional Therapy
4.25. Chest Physiotherapy

Milestones to be achieved on Psychomotor Skills through Year 1 to 3.
O-Observe PS-Perform under supervision PI-Perform ndependently

Milestones	1st Year	2nd Year	3rd Year
1. Physical Examination			
1.1. Measurement of Vitals	PI		
1.2. Measurement of Anthropometry	PI		
1.3. General physical examination	PI		
1.4. Physical Examination of Systems	PI		
1.5. Development (Screening) Assessment	O, PS	PI	
1.6. Behavioral (Screening) Assessment	O	PS	PI
1.7. Sexual Maturity Assessment	O, PS	PI	
1.8. Newborn Assessment including gestational assessments	PI		
1.9. Breastfeeding Assessment	PI		
1.10. Motor Disability Assessment	O	PS	PI
1.11. Autism Spectrum Disorder Screening	O	PS	PI
1.12. Fundus examination	PI		
1.13. Middle ear examination	PI		
1.14. Throat examination	PI		
1.15. Triage - Rapid assessment of ABC	PI		
1.16. Hand hygiene	PI		
1.17. Biomedical Waste disposal guidelines	PI		
2. Non-Invasive Monitoring			
2.1. Pulse oximetry	PI		
2.2. Electrocardiogram	PI		
2.3. Vital Data Monitor	PI		
3. Procedures – Diagnostic			
3.1. Informed Consent	PI		
3.2. Aseptic measures for all procedures	PI		
3.3. Sampling			
3.3.1. Venous blood	PI		
3.3.2. Arterial blood	PI		

3.3.3. Capillary blood	PI		
3.4. Vascular Access and cannulation			
3.4.1. Intravenous – Peripheral	PI		
3.4.2. Intravenous - Central	O	PS	PI
3.4.3. Intraosseous	PI		
3.4.4. Intraarterial	O	PS	PI
3.4.5. Umbilical Vein	PI		
3.5. Diagnostic Taps			
3.5.1. Pleural	PS	PI	
3.5.2. Peritoneal	PI		
3.5.3. CSF	PI		
3.5.4. Pericardial	O	PS	PI
3.5.5. Joint fluid	O	PS	PI
3.5.6. Subdural	O, PS	PI	
3.5.7. Ventricular	O	PS	PI
3.6. Urinary Catheterization	PI		
3.7. Urine collection			
3.7.1. Mid-stream sampling	PI		
3.7.2. Catheter sampling	PI		
3.7.3. Suprapubic puncture	PI		
3.8. Tuberculin Skin Test	PI		
3.9. Antibiotic Test Dose	PI		
3.10. Feeding/Ryles Tube			
3.10.1. Insertion	PI		
3.10.2. Gastric Aspiration	PI		
3.10.3. Feeds	PI		
3.10.4. Stomach wash	PI		
3.11. Respiratory			
3.11.1. Naso, Pharyngeal, NP swab collection	PI		
3.12. Suppository insertion	PI		
3.13. Per rectal exam	O	PS	PI

3.14. Inspection of Vulva/Vagina	PI		
3.15. Aspiration/Biopsy			
3.15.1. Bone marrow	O, PS	PI	
3.15.2. Liver	O	PS	PI
3.15.3. Kidney	O	PS	PI
3.15.4. FNAC Lymph node	O	PS	PI
3.16. Ultrasound – Lung (B line, Effusion), Circulation (IVC Volume), Vascular access (Central venous), Soft Tissue (Pus)	O	O, PS	PS
3.17. Blood Group/Type	O, PS	PI	
3.18. Smears			
3.18.1. Malaria Parasite Smear/Rapid Antigen Test	O, PS	PI	
3.18.2. Peripheral Blood Smear	O, PS	PI	
3.18.3. CSF/Pus Grams Stain	O, PS	PI	
3.18.4. Sputum Ziehl Neilson Smear	O, PS	PI	
3.19. Urine dipstick	PI		
3.20. Stool Hanging drop	O, PS	PI	
3.21. Glucometer Blood Sugar	PI		
3.22. Shake test (Neon gastric aspirate)	PI		
3.23. Electrocardiogram	PI		
3.24. Specific Screening/Assessment Tools			
3.24.1. Gestation Assessments	PI		
3.24.2. Anthropometric measurements and Growth charting	PI		
3.24.3. Peak Flow Meter Measurement	PI		
3.24.4. HEADSS screening (Adolescence)	O, PS	PI	
3.24.5. DDST screening (Development Assessment)	O, PS	PI	
3.24.6. Assessment of Sexual Maturity using Tanner's	O, PS	PI	
3.24.7. M-CHAT-R screening (Autism Assessment)	O	PS	PI
3.24.8. GMSCF Assessment of Motor Disability (Cerebral Palsy)	O	PS	PI

3.24.9. Pain assessment	PI		
4. Procedures – Therapeutic			
4.1. Informed Consent	PI		
4.2. Prescriptions/Medication Orders	PI		
4.3. Neonatal Resuscitation Program including ET	PI (BVM)	PI (ET)	
4.4. Basic Life Support	PI		
4.5. Advanced Paediatric Life Support including ET	PI (BVM)	PI (ET)	
4.6. Heimlich, Foreign Body Removal	PI		
4.7. Exchange Transfusion	O	PS	PI
4.8. Stomach wash	PI		
4.9. Injections			
4.9.1. Intravenous	PI		
4.9.2. Intramuscular	PI		
4.9.3. Subcutaneous	PI		
4.9.4. Intradermal	PI		
4.10. Infusions			
4.10.1. IV bolus	PI		
4.10.2. Intravenous	PI		
4.10.3. Intraosseous	PI		
4.10.4. Blood Component Transfusion	PI		
4.11. Respiratory			
4.11.1. Meter dose inhalation with or without Spacer/Mask	PI		
4.11.2. Nebulization	PI		
4.11.3. Airway Insertion – Nasophy, Orophy	PI		
4.11.4. Needle Cricothyroidotomy	O	PS	PI
4.11.5. Oxygen delivery methods	PI		
4.11.6. HFNC/CPAP/Non-Invasive Ventilation	O, PS	PI	
4.11.7. Ventilation – Conventional, High Freq (HFV)	O	PS	PI (Not HFV)
4.11.8. Intercostal drainage	O, PS	PI	
4.11.9. Surfactant Administration	O, PS	PI	

	(INSURE)			
4.12.	Spinal infusion/injection	O	PS	PI
4.13.	Therapeutic Ascitic Tap	O, PS	PI	
4.14.	Peritoneal dialysis	O	PS	PI
4.15.	Phototherapy	PI		
4.16.	Incision and Drainage	O	PS	PI
4.17.	Dressings	PI		
4.18.	Sling	PI		
4.19.	Transport onto and off stretcher	PI		
4.20.	Neonatal Temperature Warm Chain	PI		
4.20.1.	Wrapping up Newborn	PI		
4.20.2.	Kangaroo Mother Care	PI		
4.21.	Immunization Cold Chain Measures			
4.21.1.	Refrigerator	PI		
4.21.2.	Vaccine carrier	PI		
4.22.	Restraining a child	O, PS	PI	
4.23.	Transporting a child	O, PS	PI	
4.24.	Early Interventional Therapy	O	PS	PI
4.25.	Chest Physiotherapy	O, PS	PI	

C. Predominant in Affective Domain

Should be able to effectively and empathetically……...

1. *Communication – Child/Attender/Guardian*

1.1. Elicit a relevant and appropriate historyfrom an attender/child including family and support systems

1.2. Engage and explainsin appropriate language the plan (diagnostic and management including economics of plans)to an attender/child

1.3. Explain the prognosis of the child's condition

1.4. Educatea Parent, an attendant/guardian/child with regards disease/, cultural, and spiritual understanding associated with health care delivery complication prevention, health promotion, and management keeping illustrating ethical ---?

1.5. Counsel towards an Informed Consent/Assent

1.6. Communicate disturbing/bad news including death

1.7. Demonstrates communication skills to appropriately word reports, professional opinions, patient education and counseling with regards

1.7.1. Health and Disease condition with management plan

1.7.2. Nutrition - Breastfeeding, complimentary feeding and nutrition using a Growth chart

1.7.3. Immunization – On schedule, catch up including costs and advantages/disadvantages

1.7.4. Lifestyle

1.7.4.1. Dietary

1.7.4.2. Habits

1.7.5. Genetic risks of relevant inherited conditions

1.7.6. Options for management and future approach in care with advantages and disadvantages

1.7.7. Rights and responsibilities

1.8. Demonstrates knowledge or applies an understanding of psychological, social, and economic factors which are pertinent to the delivery of health care.

1.9. Demonstrates and effectively engages the patient and / or family in all communication.

1.10. Demonstrates ability to provide patient, family and community education through written material especially simple patient information leaflets

Should be able to effectively and respectfully……..

2. *Communication – Health Team members*

2.1. Communicate with all members of the health care team

2.2. Communicate with other members of the profession

2.3. Communicate with allied professionals associated with Health care

Should be able to ……..

3. *Professionalism and Ethical Behaviour*

3.1. Demonstrates Professional Conduct in patient care and research

3.1.1. Demonstrate respect for the Doctor-Patient relationship

3.1.2. Demonstrate respect for the Doctor-Health Care Team Member relationship

3.1.3. Demonstrateadherence to confidentiality and patient privacy in all communications in and outside the place of work.

3.1.4. Demonstrate respect of a patient's rights and decisions including the right to information and second opinion.

3.1.5. Demonstrate behaviour aligned with MCI/NMC code of ethics in all related dealings

3.1.6. Demonstrates personal and social responsibility/accountability in the provision ofhealth care at an individual, community and population level

3.1.7. Demonstrate an awareness of economic costs of health care in all dealings with patients.

3.1.8. Demonstrate adherence to research ethics guidelines in the conduct of patient related research.

3.1.9. Demonstrates work ethics while working in a health care team.

3.1.10. Demonstrates truthfulness, honesty and integrity in all interactions.

3.1.11. Provides care that surpasses personal beliefs and prejudices

3.1.12. Demonstrates appropriate etiquette in dealings with patients, relatives and other health personnel

3.2. Demonstrates behavior that is Ethical and bound by the Law of the land

3.2.1. RecognizesEthical conflicts and dilemmas seeking solutions to reduce conflicts and do the right thing.

3.2.2. Complies with legal requirements while dealing with child health and includes issues dealing with the Industry Conflict, MTP Act,PCPNDT act, Child Abuse, Child labour, Legal adoption, Consent and Assent.

D. Pedagogic and Research Skills

Should be able to effectively ……..

1. *Pedagogic Skills*

1.1. Conduct a small group learning session (Theory and Practical) using appropriate tools

1.2. Create and use an effective Powerpoint Presentation

1.3. Present to a large group

Should be able to effectively ……..

2. *Research Skills*

2.1. Search scientific literature and critically appraise the evidence using standard study design checklists enabling application to clinical care.

2.2. Justify the application of the findings of a research study in clinical practice (Diagnostic and Therapeutic Studies)

2.3. Develop a research hypothesis supported by scientific literature review, design an appropriate study, implement the methodology, generate results by analyzing data, and draw appropriate conclusions.

2.4. Should be able to present or/and publish a paper based on the conducted research.

TEACHING AND LEARNING METHODS

General principles

Acquisition of competencies being the keystone of doctoral medical education, such training should be skills oriented. Learning in the program, essentially autonomous and self-directed, and emanating from academic and clinical work, shall also include assisted learning. The formal sessions are meant to supplement this core effort.

All students joining the postgraduate (PG) courses shall work as full-time (junior) residents during the period of training, attending not less than 80% of the training activity during the calendar year, and participating in all assignments and facets of the educational process. They shall maintain a logbook for recording the training they have undergone, and details of the procedures done during laboratory and clinical postings in real time.

Teaching-Learning methods

This should include a judicious mix of demonstrations, symposia, journal clubs, clinical meetings, seminars, small group discussion, bed-side teaching, case-based learning, simulation-based teaching, self-directed learning, integrated learning, interdepartmental meetings and any other collaborative activity with the allied departments. Methods with exposure to the applied aspects of the subject relevant to basic/clinical sciences should also be used. **The suggested examples of teaching-learning methods are given below but are not limited to these.**

A. Lectures: Didactic lectures should be used sparingly. A maximum of 10 lectures per year in the concerned PG department is suggested. All postgraduate trainees are encouraged to attend such lectures. Lectures can cover topics such as:

1. Subject-related important topics as per Paediatric requirements

2. Recent advances
3. Research methodology and biostatistics
4. Undergraduate/Postgraduate medical curriculum
5. Teaching and assessment methodology.

Topic numbers 3, 4, 5 can be done during research methodology/biostatistics and medical education workshops in the institute.

B. Journal club: Minimum of once in 1- 2 weeks is suggested.

Topics will include presentation and critical appraisal of original research papers published in peer reviewed indexed journals. The presenter(s) shall be assessed by faculty and grades recorded in the logbook.

C. Student Seminar: Minimum of once in 1-2 weeks is suggested.

Important topics should be selected as per subject requirements and allotted for in-depth study by a postgraduate student. A teacher should be allocated for each seminar as faculty moderator to help the student prepare the topic well. It should aim at comprehensive complete evidence-based review of the topic. The student should be graded by the faculty and peers. Symposium, Colloquium and Seminars may overlap to enhance involvement and active participation of postgraduates.

D. Student Symposium: Minimum of once every 3 months.

A broad topic of significance should be selected, and each part shall be dealt by one postgraduate student. A teacher moderator should be allocated for each symposium and moderator should track the growth of students. The symposium should aim at an evidence-based exhaustive review of the topic. All participating postgraduates should be graded by the faculty and peers. Symposium, Colloquium and Seminars may overlap to enhance involvement and active participation of postgraduates.

E. Bedside clinics: Minimum - once a week.

Clinics/bedside teaching should be coordinated and guided by faculty from the department. Various methods like DOAP (Demonstrate, Observe, Assist, Perform), simulations in skill lab, and case-based discussions etc. are to be used. Faculty from the department should participate in moderating the teaching-learning sessions during clinical rounds.

F. Interdepartmental colloquium

Faculty and students must attend monthly meetings between the main Department and other department/s on topics of current/common interest or clinical cases. Symposium, Colloquium and Seminars may overlap to enhance involvement and active participation of postgraduates.

G. a. Rotational clinical / community / institutional postings

Final decision that determines "external" postings outside the primary department will differ according to department needs, feasibility, sub-speciality availability and accessibility. Apart for mandatory postings, 'external' postings listed below are highly recommended (desirable) to expose postgraduates to allied Pediatric sub-specialities given existing trends in practice. Specific Learning Outcomes need to be defined for each of these postings even assessed keeping in mind the Competency based curriculum and their future professional roles as Pediatricians.

Rotations are listed below:

Mandatory Postings

- Paediatric emergency (minimum 1 month a year)
- Neonatology (NICU) (minimum 3 months a year)
- Intensive Care (PICU) (minimum 2 months a year)
- District Residency Programme with participation in Community Outreach Child Health Programs (at least 3 months over the entire course; 3rd or 4th or 5th semester; See Section G-b below).

Desirable postings based on need, availability, accessibility, and feasibility and may be innovatively integrated into schedule of posting to optimize learning experiences.

- Subspecialities Outpatient Clinics / observing- assisting in emergency
    - Clinical
        - Child Psychiatry
        - Pediatric Surgery
        - Developmental Pediatrics
        - Pediatric Nephrology
        - Pediatric Hemato-oncology
        - Pediatric Cardiology
        - Pediatric Gastroenterology
        - Pediatric Rheumatology/Immunology/Allergy
        - Genetic
        - Pediatric Pulmonology
        - Pediatric Dermatology
        - Pediatric Endocrinology
        - Adolescent Health

- DOTS, PPTCT, ART center with pediatric exposure
- Microbiology diagnostic Lab
- Radiology including CT/MRI
- Forensic Medicine especially Child related
- Neuro-rehabilitation (PMR, Physiotherapy, Occupational Therapy)

G b.Posting under "District Residency Programme" (DRP):

All postgraduate students pursuing MD/MS in broad specialities in all Medical Colleges/Institutions shall undergo a compulsory rotation of three months in District Hospitals/District Health System as a part of the course curriculum, as per the Postgraduate Medical Education (Amendment) Regulations (2020). Such rotation shall take place in the 3rd or 4th or 5th semester of the Postgraduate programme and the rotation shall be termed as "District Residency Programme" and the PG medical student undergoing training shall be termed as "District Resident".

Every posting should have its defined learning objectives. It is recommended that the departments draw up objectives and guidelines for every posting offered in conjunction with the collaborating department/s or unit/s. This will ensure that students acquire expected competencies and are not considered as an additional helping hand for the department / unit in which they are posted. The PG student must be tagged along with those of other relevant departments for bedside case discussion/basic science exercises as needed, under the guidance of an assigned faculty.

H. Teaching research skills

Writing a thesis should be used for inculcating research knowledge and skills. All postgraduate students shall conduct a research project of sufficient depth to be presented to the University as a postgraduate thesis under the supervision of an eligible faculty member of the department as guide and one or more co-guides who may be from the same or other departments.

In addition to the thesis project, every postgraduate trainee shall participate in at least one additional research project that may be started or already ongoing in the department. It is preferable that this project will be in an area different from the thesis work. For instance, if a clinical research project is taken up as thesis work, the additional project may deal with community/field/laboratory work. Diversity of knowledge and skills can thereby be

reinforced. There should be periodic department review of the thesis work, as per following schedule:

- End of 6 months — Submission of protocol
- During 2ndyear — Mid-term presentation
- 6 months prior to examination — Final presentation; submission

I. Training in teaching skills

MEU/DOME should train PG students in education methodologies and assessment techniques. The PG students shall conduct UG classes in various courses and a faculty shall observe and provide feedback on the teaching skills of the student.

J. Log book

During the training period, the postgraduate student should maintain a Log Book indicating the duration of the postings/work done in Wards, OPDs, Casualty and other areas of posting. This should indicate the procedures assisted and performed and the teaching sessions attended. The logbook entries must be done in real time. The logbook is thus a record of various activities by the student like: (1) Overall participation & performance, (2) attendance, (3) participation in sessions, (4) record of completion of pre- determined activities, and (5) acquisition of selected competencies.

- The purpose of the Log book is to:
  a) help maintain a record of the work done during training,
  b) enable Faculty/Consultants to have direct information about the work done and intervene, if necessary,
  c) provide feedback and assess the progress of learning with experience gained periodically.

The Logbook should be used in the internal assessment of the student, should be checked and assessed periodically by the faculty members imparting the training. The PG students will be required to produce completed logbook in original at the time of final practical examination. It should be signed by the Head of the Department. A proficiency certificate from the Head of Department regarding the clinical competence and skillful performance of procedures by the student will be submitted by the PG student at the time of the examination.

The PG students shall be trained to reflect and record their reflections in logbook particularly of the critical incidents. Components of good teaching practices must be assessed in all academic activity conducted by the PG student and at least two sessions dedicated for assessment of teaching skills must be conducted every year of the PG program. The teaching faculty are referred to the MCI Logbook Guidelines uploaded on the Website.

K. **Course in Research Methodology**: All postgraduate students shall complete an NMC recognized course in Research Methodology within six months of the commencement of the batch and generate the online certificate on successful completion of the course.

Other aspects

- The Postgraduate trainees must participate in the teaching and training program of undergraduate students and interns attending the department.
- Trainees shall attend accredited scientific meetings (CME, symposia, and conferences) at least once a year.
- Department shall encourage e-learning activities.
- The Postgraduate trainees should undergo training in Basic Cardiac Life Support (BCLS), Neonatal Resuscitation, Advanced Pediatric Life Support and Adult Advanced Cardiac Life Support (ACLS).
- The Postgraduate trainees must undergo training in information technology and use of computers.

During the training program, patient safety is of paramount importance; therefore, relevant clinical skills are to be learnt initially on the models, later to be performed under supervision followed by independent performance. For this purpose, provision of skills laboratories in medical colleges is mandatory.

5. ASSESSMENT

FORMATIVE ASSESSMENT ie., assessment to improve learning

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.

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 practical/clinical examination, should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills.

Quarterly assessment during the MD training should be based on:

- Case presentation, case work up, case handling/management : once a week
- Laboratory performance : twice a week
- Journal club : once a week
- Seminar : once a fortnight
- Case discussions : once a fortnight/month
- Interdepartmental case or seminar : once a month

Note: These sessions may be organized and recorded as an institutional activity for all postgraduates.

- Attendance at Scientific meetings, CME programmes (at least 02 each)

For Knowledge Assessments, *Patient case scenario presentations and discussions including interdepartmental sessions remain the cornerstone of Paediatric learning focused on critical thinking and clinical reasoning. This is also ideally achieved during teaching at the bedsides on rounds and in ambulatory settings such as outpatient clinics if not emergency. Clinical Pathologic Case discussions, Mortality-Morbidity discussions and Prescription-Medication Order Audits are of great value and are encouraged to improve quality of care as well teaching-learning preferably scheduled every month to routine educational program.*

For Psychomotor and Affective/Communication Assessments*, consider the use of OSCEs, DOPs and even mini-CEX that one may strengthen Formative Feedback/Assessments.*

The student to be assessed periodically as per categories listed in appropriate (non-clinical/clinical) postgraduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT ie., assessment at the end of training

Essential pre-requisites for appearing for examination include:

1. **Log book** of work done during the training period including rotation postings, departmental presentations, and internal assessment reports should be submitted.

2. At least one if not two presentation(s) at national/state level conference. If not presented at national level, alternatively, one research paper should be published / accepted in an indexed journal**.** (It is suggested that the local or University Review committee assess the work sent for publication).

The summative examination would be carried out as per the Rules given in the latest POSTGRADUATE MEDICAL EDUCATION REGULATIONS. The theory examination shall be held in advance before the Clinical and Practical examination, so that the answer books can be assessed and evaluated before the commencement of the clinical/Practical and Oral examination**.**

The postgraduate examination shall be in three parts:

1. **Thesis**

   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 in broad specialty shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners**.**

2. *Theory examination*

   The examinations shall be organized based on '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, as given in the latest POSTGRADUATE MEDICAL EDUCATION REGULATIONS. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination. The examination for M.D./ M.S shall be held at the end of 3rd academic year.

   There shall be 4 theory papers (as per PG Regulations).

   Paper I: Basic Sciences as related to the subject

Paper II: General Paediatrics

Paper III: Systemic Paediatrics

Paper IV: Recent Advances

3. Practical/clinical and Oral/viva voce examination

Practical examination

Practical examination should be as per concerned university regulation.

Oral/Viva voce examination shall be comprehensive enough to test the post graduate student's overall knowledge of the subject focusing on psychomotor and affective domain.

The final clinical examination in broad specialty clinical subjects should include:

- Cases pertaining to major systems (eg. one long case and three short cases)
- OSCE Stations to cover clinical, procedural and communication skills
- Logbook Records and reports of day-to-day observation during the training
- It is emphasized that Oral/viva voce examination shall be comprehensive enough to test the post graduate stu overall knowledge of the subject.

RECOMMENDED READING:

Books (latest edition)

1. Nelson Textbook of Pediatrics, Ed: Kliegman RM, St. Geme J. Elsevier.
2. PG Textbook of Pediatrics, Ed: Gupta P, Menon PSN, Ramji S, Lodha R. Jaypee
3. Rudolph's Pediatrics, Ed: Kline MW, McGraw Hill.
4. Textbook of Clinical Neonatology (IAP/NNF), Ed: Pejavar RK, Thakre R. Paras.
5. Cloherty and Stark's Manual of Neonatal Care. Ed: Eichenwald EC, Hansen AR, Martin CR, Stark AR. Wolters Kluwer.
6. Principles of Pediatric& Neonatal Emergencies (IAP). Ed: Gupta P, Bagga A, Ramji S, Chugh K, Lodha R, Dewan P, Kaushik JS, Shah D. Shah. Jaypee.
7. Clinical Methods in Pediatrics. Gupta P. CBS Publisher.
8. The Harriet Lane Handbook. Hughes HK, Kahl LK, Elsevier.
9. Nutrition and Child Development. Elizabeth KE. Paras Medical Publisher.
10. Illingworth's Development of The Infant and The Young Child. Au: Illingworth RS; Elsevier Health.

11. Fenichel's Clinical Pediatric Neurology. Au: Piña-Garza JE, James KC. Elsevier.
12. Park's Pediatric Cardiology for Practitioners. Myung Park M, Salamat M. Elsevier.
13. Lanzkowsky's Manual of Pediatric Hematology and Oncology. Fish J, Lipton J, Lanzkowsky P. Elsevier.
14. Essential Paediatric Pulmonology. Lodha R, Kabra SK. Jaypee.
15. Textbook of Pediatric Rheumatology. Petty RE, Laxer R, Lindsley C, Wedderburn L, Fuhlbrigge RC, Mellins ED. Elsevier.

Journals

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

Online Resources

a. IAP https://www.iapindia.org/https://diapindia.org/
b. GOI MOHFW and IIPS. http://rchiips.org/nfhs/
c. Pubmed. https://pubmed.ncbi.nlm.nih.gov/
d. Google Scholar. https://scholar.google.co.in/
e. Cochrane. https://www.cochranelibrary.com/
f. Uptodate. https://www.uptodate.com/login
g. Clinical Key. https://www.clinicalkey.com/#!/login
h. Medscape. https://www.medscape.com/
i. JM Rey's IACAPAP e-Textbook of Child and Adolescent Mental Health. Rey JM, Martin A. International Association for Child and Adolescent Psychiatry and Allied Professions. ISBN 9780646574400 Free on https://iacapap.org/english/

Annexure I

Student appraisal form for MD in Pediatrics											
	Elements	**Less than Satisfactory**			**Satisfactory**			**More than satisfactory**			**Comments**
		1	2	3	4	5	6	7	8	9	
1	**Scholastic Aptitude and Learning**										
1.1	Has Knowledge appropriate for level of training										
1.2	Participation and contribution to learning activity (e.g., Journal Club, Seminars, CME etc)										
1.3	Conduct of research and other scholarly activity assigned (e.g. Posters, publications etc.)										
1.4	Documentation of acquisition of competence (eg Log book)										
1.5	Performance in work based assessments										
1.6	Self- directed Learning										
2	**Care of the patient**										
2.1	Ability to provide patient care appropriate to level of training										
2.2	Ability to work with other members of the health care team										
2.3	Ability to communicate appropriately and empathetically with patients families and care givers										
2.4	Ability to do procedures appropriate for the level of training and assigned role										

2.5	Ability to record and document work accurately and appropriate for level of training										
2.6	Participation and contribution to health care quality improvement										
3	**Professional attributes**										
3.1	Responsibility and accountability										
3.2	Contribution to growth of learning of the team										
3.3	Conduct that is ethically appropriate and respectful at all times										
4	**Space for additional comments**										
5	**Disposition**										
	Has this assessment been discussed with the trainee?	Yes	No								
	If not explain										
	Name and Signature of the assesse										
	Name and Signature of the assessor										
	Date										

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NATIONAL MEDICAL COMMISSION

Postgraduate Medical Education Board

D 11011/1/22/AC/Guidelines/13 **Date: 05-08-2022**

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN PHYSIOLOGY

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN PHYSIOLOGY

Preamble

The purpose of postgraduate medical education in Physiology is to produce experts with necessary knowledge, skills and attitude to function as competent physiologists who actively contribute towards growth of the subject through research and intellectual contribution, participate in the training of budding health professionals, participate meaningfully in patient care and lifestyle disorders, stay abreast with the advancements in the field and serve the community at large. Physiology being the basis of entire practice of Medicine, a postgraduate in Physiology needs to acquire all necessary competencies that would enable him or her to function efficiently in domains of preclinical, para- clinical and clinical sciences.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes. The Expert group of the National Medical Commission has endeavored to render uniformity without compromise to purpose and content of this document. The revision within the document are mainly aimed to introduce competencies that ensure application of Physiology beyond preclinical boundaries and thereby improve health outcomes, embrace research and pedagogy as a vital part of training and reduce redundancy of contents. This document envisions a competent Physiologist who performs the roles of a Medical Teacher, Researcher, Member of Health Care Team (Clinical Physiologist), Administrator and Life Long learner with equal zeal and efficiency.

SUBJECT SPECIFIC LEARNING OBJECTIVES

Goal:

The goal is to have uniform standards in the teaching of Physiology at the postgraduate level throughout the country. The guidelines will help in achieving such standards which will ensure availability of competent physiologists equipped with required skills for teaching, patient care (diagnostic, therapeutic and rehabilitative) and applied research.

Learning Objectives

A postgraduate student having qualified for the MD (Physiology) examination should be able to:

1. Achieve comprehensive knowledge of general, systemic and applied Physiology.
2. Teach effectively the basic physiological mechanisms of human body in the context of pathophysiological basis of evolution, clinical presentation and management of disease states to undergraduate and postgraduate medical, dental and paramedical courses.
3. Acquire in-depth knowledge of physiology while catering to the learning needs of specific courses such as sports physiology, speech pathology etc.
4. Understand general principles of medical education (use of appropriate teaching techniques and resources) and apply theoretical frameworks in pedagogy.
5. Interpret and evaluate research publications critically.
6. Conduct research in core physiology, applied physiology and Education which may have significant application towards improving health, patient care and student learning.
7. Generate credible evidence towards advancement of Physiology and its application in basic and applied significance.
8. Acquire skills in conducting collaborative research in the field of physiology with allied sciences, clinical sciences and biomedical engineering.
9. Explain how the knowledge of physiology can be effectively applied in diagnostic and therapeutic clinical settings.
10. Integrate physiology with Diagnostic, Therapeutic, Preventive and Rehabilitative Medicine.
11. Interact with the allied departments and render services in advanced laboratory investigations.
12. Interact effectively with other paraclinical, clinical and allied health sciences departments to develop integrated modules in basic sciences and teach competencies related to the same.
13. Acquire administrative skills to set up concerned department / laboratories and initiate purchase procedures and procure necessary items for running such laboratories.

14. Be an efficient Leader and member of academic, research and health care team.
15. Participate actively in various workshops/seminars/journal clubs of allied subjects to acquire various skills for collaborative research.

SUBJECT SPECIFIC COMPETENCIES

At the end of the course, the postgraduate student should be able to:

A. Predominant in Cognitive Domain

1. Demonstrate in-depth understanding of basic physiological concepts, their clinical applications and physiological demands in special circumstances such as sports, environmental changes, yoga, meditation etc.
2. Demonstrate comprehensive knowledge of physiology of specific organ systems to cater to the learning needs of specialized courses such as speech pathology, kinesiology, aerospace physiology etc.
3. Impart knowledge about the basic physiological mechanisms of human body with reference to their implications in the pathophysiology of disease and the physiologic basis of their management to undergraduate medical and paramedical students.
4. Demonstrate knowledge of integrated study of basic sciences as per the needs of current CBME.
5. Demonstrate higher order thinking and problem-solving skills to exhibit interactive teaching techniques and facilitate contextual study of physiology in various teaching learning sessions.
6. Demonstrate knowledge and ability to participate in the present student centric TL strategies of CBME such as ECE, SDL, AETCOM and AITo (Aligned and Integrated Topic).
7. Demonstrate knowledge of the current assessment practices in undergraduate CBME such as DOAP.
8. Demonstrate knowledge of research methodologies and statistics.
9. Conduct such clinical and experimental research, as would have a significant bearing on human health and patient care.
10. Incubate ideas and contribute towards generation of patents and copyrights related to the subject.

11. Interact with other departments by rendering services in advanced laboratory investigations and relevant expert opinion.
12. Participate actively in various workshops/seminars/journal clubs/demonstration in the allied departments, to acquire various skills for collaborative research.
13. Contribute to society by imparting physiological understanding of health problems. Disseminate knowledge of human physiology, the clinical applications and research as per the needs or specific demands of the society at large.
14. Outline the components of a basic physiology curriculum, demonstrate ability to develop or implement the same in future academic career.
15. Serve as interface with society at large.

B Predominant in Affective domain

At the end of the course, the postgraduate student should be able to:

1. Demonstrate responsibility, professionalism and ethical conduct in all professional undertakings.
2. Demonstrate ethical conduct in biomedical or animal research.
3. Follow ethical guidelines with regards to research and publications.
4. Demonstrate appropriate behavior of not letting his/her personal beliefs, prejudices and limitations come in the way of duty.
5. Display principles of integrity and social accountability as a teacher.
6. Appreciate the issues of equity and social accountability while exposing students to early clinical exposure (Equity and social accountability).
7. Mentor/ counsel students to facilitate their holistic development.
8. Communicate effectively with peers, students and teachers in various curricular [teaching-learning, research] activities.
9. Function effectively as a member of the department, professional bodies and maintain professional conduct in interactions with students, peers, patient and staff.
10. Demonstrate the ability to give effective student feedback to undergraduate students.
11. Demonstrate the ability to receive feedback from teachers and peers.

12. Develop the capacity to reflect on own academic progress, develop self-directed learning skills and assess own learning needs.

C. Predominant in Psychomotor Domain

The postgraduate student should acquire practical competencies in the following tasks:

At the end of the course the postgraduate student should be able to:

1. Demonstrate physiological concepts of various organ systems by performing amphibian experiments using simulated models.
2. Demonstrate physiological concepts of specific organ systems by performing mammalian experiments using simulated models.
3. Perform and interpret a complete hematological profile.
4. Perform clinical examination of various organ systems.
5. Perform human experiments pertaining to specific organ systems and interpret results of the same.
6. Perform human experiments related to physiological challenges such as exercise, yoga and meditation.
7. Perform studies in stimulated environment - microgravity; high altitude; hot and cold environment.

Syllabus

Course contents:

A: Cognitive domain

Paper-I: *General and Cellular Physiology including Genetic Basis and Historical perspectives:*

1. Physiology of cell, various cellular mechanisms and genetic control mechanisms.
2. Various principles of Physics and Physical Chemistry involved in physiological phenomenon e.g. haemo-dynamics, bio-electrical potentials, body fluids, methods of measurements.
3. History of Physiology, Noebl laurates and discoveries.
4. Biostatistics, Biophysics, Biochemistry, Micro-anatomy.
5. Growth and Development including aging.

6. Excretion, pH, water and electrolyte balance.
7. Comparative Animal Physiology

Paper-II: *Systemic Physiology (system providing transport, nutrition and energy) including comparative Physiology.*

1. Blood and Immunity.
2. Cardiovascular System.
3. Respiratory System.
4. Gastro- Intestinal Tract (GIT) and dietary requirements.

Paper-III:*Systemic Physiology (system concerned with procreation, regulation and neural control)*

1. Nerve-Muscle Physiology including muscle mechanics
2. Endocrine Physiology
3. Nervous System (Central, peripheral and autonomic)
4. Special Senses
5. Reproduction & family planning/fetal & neonatal Physiology

Paper-IV: *Applied Physiology including recent advances*

1. Recent advances relevant to Physiology
2. Patho-physiology pertaining to systemic Physiology
3. Physiological basis of various clinical investigation tests
4. Interaction of human body in ambient environment- high altitude, space and deep sea
5. Exercise & Sports physiology
6. Transgender Physiology
7. Integrated Physiology
8. Yoga and Meditation
9. Social responsibilities of physiologists
10. Application of Artificial Intelligence in Physiology

B: Psychomotor domain:

A. The postgraduate student during the training period must PERFORM independently the following procedures:

i. Hematological profile

1. Estimation of hemoglobin
2. Determination of Total Erythrocyte (RBC) Count and RBC Indices (Blood Standards)
3. Determination of Total Leucocytes (WBC) Count : TLC
4. Preparation of a peripheral Blood Smear and Determination of Differential Leucocyte Count: DLC
5. Determination of Arneth Count
6. Determination of Bleeding Time (BT) and Clotting Time (CT)
7. Determination of Blood groups (A, B,O and Rh system)
8. Determination of Erythrocyte Sedimentation Rate (ESR) and Packed cell volume (PCV)
9. Determination of Osmotic Fragility of Red Blood Cells
10. Determination of Platelet Count
11. Determination of Reticulocyte Count

ii. Human Physiology

a. Clinical Physiology

1. Detailed clinical examination of various systems.

b. Nerve muscle physiology

1. Ergography and hand grip spring dynamography and study of human fatigue.
2. Recording of electromyography (EMG) and its application.
3. Recording of nerve conduction.

c. Cardiovascular system (CVS)

1. Clinical examination of CVS
2. Examination of arterial & venous pulses
3. Measurements of arterial blood pressure and effect of head-up/head-down tilt
4. Recording of 12 lead Electrocardiography (ECG) and its interpretation
5. Measurement of blood flow

6. Heart rate variability
7. Ambulatory Blood pressure monitoring

d. Respiratory system

1. Clinical examination of respiratory system.
2. Stethography – study of respiratory movements and effect of various factors.
3. Assessment of respiratory functions (spirometry, vitalography, and gas analysis).
5. Measurement of BMR.
6. Cardio pulmonary resuscitation (CPR) and Artificial respiration.

e. Gastrointestinal system:

1. Clinical examination of abdomen.

f. Integrative Physiology / Excretory system

1. Recording of body temperature/effect of exposure to cold and hot environment

g.Reproductive system

1. Determination of ovulation time by basal body temperature chart and pregnancy diagnostic test - Immunological Tests.
2. Semen analysis: sperm count, motility and sperm morphology.

h. Nervous System including Special senses

1. Clinical examination of the nervous system and its physiological basis.
2. Examination of higher mental functions.
3. Examination of cranial nerves.
4. Examination of sensory system.
5. Examination of motor system including reflexes.
6. Clinical examination of special senses:
    (i) Smell and Taste
    (ii) Test for hearing to differentiate deafness
    (iii) Physiology of eye:
        (a) Clinical examination of the eye and pupillary reflex
        (b) Visual acuity
        (c) Perimetery – mapping out of visual field and blind spot
        (d) Accommodation
        (e) Fundoscopy
        (f) Colour vision and colour blindness
7. Reaction (visual and auditory) and reflex time.

8. Electroencephalography (EEG) and Polysomnography
9. Autonomic Nervous System (ANS) Testing.
10. **Neuro-electrodiagnostic techniques:** Nerve conduction study, Visual evoked potential (VEP), Brainstem auditory evoked potential (B.A.E.P), Somato-sensory evoked potential (SEP), Motor evoked potential (MEP).
11. Use of various test batteries for psychological evaluation of subject.

i. Sports Physiology

Tests for physical fitness: Cardio – respiratory responses to steady state exercise using:

(i) Body Composition
(ii) Conducting the Clinical Exercise Test
(iii) Harvard step test
(iv) Bicycle Ergometry
(v) Treadmill test for determination of VO_2 max

j. Yoga and Meditation Physiology

i. Physical, Mental and Emotional well being
ii. Effect of yoga and pranayama on physiological parameters
iii. Mindfulness
iv. Concentration, anxiety and stress
v. Counseling in health and diseases

k. Others

1. Construction of dietary chart for growing children, pregnant woman, elderly individuals, hypertensive patients, & diabetes mellitus patients.
2. Basic Life Support and Cardiac Life Support
3. Effective Digital presentation, medical photography, Good Clinical Practice, Humanities and Bioethics.

iii. Amphibian (Frog) Experiments

All animal experiments must be compliant with Govenment of India Regulations, notified from time to time). Experiments in Amphibian/Dog/Cat should be conducted by computer assisted simulation models/ facilities. Other experiments should be performed as permissible by CPCSEA guidelines.

1. Effect of temperature on simple muscle twitch.
2. Effect of two successive stimuli (of same strength) on skeletal muscle.
3. Effect of increasing strength of stimuli on skeletal muscle.
4. Effect of increasing frequency of stimuli on skeletal muscle (genesis of tetanus).
5. Effect of free load and after load on skeletal muscle.
6. Effect of repeated stimuli on skeletal muscle (study of phenomenon of Fatigue).
7. Study of isometric contraction in skeletal muscle.
8. Determination of conduction velocity of sciatic nerve and effect of variables on it.
9. Properties of cardiac muscle – Refractory period, All-or-None Law, extra-systole and compensatory pause, beneficial effect.
10. Regulation of Heart, Vagus dissection and effect of Vagal and WCL stimulation.
11. Effect of physiological and pharmacological variables on intact frog's heart.
12. Perfusion of isolated frog's heart-role of sodium, potassium, calcium ions and drugs.

B. **The postgraduate student during the training period must ASSIST in the following procedures:**

Human Physiology

i. **Cardiovascular system (CVS)**

- Cardiac TMT Holter Monitoring
- Collection and Assessment of Arterial blood gas

ii. Nervous System including Special senses

- Intra operative neuro monitoring (IONM)

C. The postgraduate student during the training period must OBSERVE the following procedures:

i. Hematological profile

- Determination of Absolute Eosinophil Count
- Study of Haemopoietic Cells present in the Bone Marrow

- Other high end hematological investigations (specify): Flow cytometry, Platelet functions, D Dimers, coagulation profile etc.

ii. Human Physiology

➢ Cardiovascular system (CVS)

- Echocardiography
- Central venous line insertion, CVP monitoring

➢ Respiratory system

- Introduction to working of continuous positive airway pressure and Bilevel positive airway pressure (CPAP & BiPAP) Therapy
  - Ventilator setting

➢ Gastrointestinal system:

- GI Manometry

➢ Reproductive system

- Ovulation study by using ultrasonography

➢ Integrative Physiology / Excretory system

- Pressure and PH studies in esophagus, stomach, intestine and rectum

➢ Others

- Genetic testing and introduction to procedural skills for clinical genetics/ prenatal diagnosis/ adult genetics - birth defects, genetic hematology, dysmorphology, skeletal dysplasia, neurological and muscular disorders, primary immunodeficiency diseases, autoimmune and multi-factorial disorders, biology and genetics of cancer.
- Interaction of human body in ambient environment - high altitude, space and deep sea
- Exercise & Sports physiology
- Integrated Physiology
- Yoga and Meditation
- Social responsibilities of physiologists
- Application of Artificial Intelligence in Physiology

iii. Mammalian Experiments (Dog/Rabbit/Guinea pig/Rat/Mice)

- General management of mammalian experiments.

- Recording of heart rate, blood pressure and respiration and study the effects of various factors; drugs; asphyxia; occlusion of common carotid artery.
- Effect of stimulation of central and peripheral end of vagus on arterial blood pressure and respiration after vagotomy.
- Effect of stimulation and distension of carotid sinus on blood pressure and respiration.
- Effect of stimulation of splanchnic nerve.
- Effect of stimulation of peripheral somatic nerve (sciatic nerve).
- Study of hypovolemic shock and its reversal.
- Perfusion of isolated mammalian heart and study the effects of drugs and ions.
- Recording of Isolated Intestinal movement and tone and studying the effect of drugs and ions.
- Study of various stages of menstrual cycle, cervical smear and vaginal smear.

Departmental resources

It is to be mandatory for the department to establish and develop the following laboratories.

In addition to teaching, these laboratories should be involved in active research and in patient care services in one or more well defined fields.

1. Clinical Neurophysiology Laboratory

The department should generate liaison with clinical department and provide routine services for health monitoring and diagnostics (disease).

(i) Electroencephalography

(ii) Evoked potential recording

(iii) Electromyography

(iv) Nerve conduction studies

(v) Autonomic nervous system (ANS) testing

(vi) Any other newer technology like Functional Near infrared spectroscopy (fNIRS), Intra operative neuro monitoring (IONM), polysomnography

(vii) Diabetic neuropathy assessment kit

(viii) Reaction time apparatus

(ix) Electroretinography

2. Cardio-Respiratory Laboratory

The department should generate liaison with clinical department and provide routine services for health monitoring and diagnostics (disease).

(i) Electrocardiography

(ii) Blood-gas Analysis

(iii) Computerized multifunctional spirometry

(iv) Laboratory for measuring pulmonary diffusion capacity and functional residual capacity (FRC)

(v) Whole-body plethysmography

(vi) Laboratory for Blood flow measurements (Impedance plethysmograph/Laser flow meter/ Doppler flow meter)

(vii) Ankle brachial pressure index/ Vascular Doppler

3. Exercise Physiology Laboratory

The department should generate liaison with sports authorities and clinical departments to provide services for testing and grading exercise and physical efficiency for health monitoring and diagnostics (disease). This should be done by using the following techniques:

(i) Two step test exerciser

(ii) Bicycle Ergometry

(iii) Tread mill

(iv) Respiratory gas analysis and measurement of basal metabolic rate (BMR)

4. Metabolic/Endocrinology/Reproductive Bio-medicine laboratory

This laboratory should perform various tests pertaining to gastrointestinal, renal, metabolic, endocrinal and reproductive bio-medicine. The department should generate liaison with clinical departments and provide routine services for health monitoring and diagnostics (disease).

1. Body Fat Analysis
2. Spectrophotometer
3. pH meter
4. Elisa Reader/Washer

5. Luminometer
6. Semi-autoanalyzer
7. Artificial reproductive techniques/ semen laboratory/ infertility laboratory

Post graduate students should be posted in the above laboratories and extend the required services on routine basis.

The Department should be equipped with general facilities like PG resource room with internet access and a departmental library with books especially those related to pertinent higher studies in Physiology and field of research. The college/department should make important journals available (at least four Indian journals and two international journals – Online/Offline).

TEACHING AND LEARNING METHODS

General principles

Acquisition of competencies being the keystone of doctoral medical education, such training should be skills oriented. Learning in the program, essentially autonomous and self-directed, and emanating from academic and clinical work, shall also include assisted learning. The formal sessions are meant to supplement this core effort.

All students joining the postgraduate (PG) courses shall work as full-time (junior) residents during the period of training, attending not less than 80% of the training activity during the calendar year, and participating in all assignments and facets of the educational process. They shall maintain a log book for recording the training they have undergone, and details of the procedures done during laboratory and clinical postings in real time.

Teaching-Learning methods

This should include a judicious mix of demonstrations, symposia, journal clubs, clinical meetings, seminars, small group discussion, bed-side teaching, case-based learning, simulation-based teaching, self-directed learning, integrated learning, interdepartmental meetings and any other collaborative activity with the allied departments. Methods with exposure to the applied aspects of the subject relevant to

basic/clinical sciences should also be used. The suggested examples of teaching-learning methods are given below but are not limited to these. The frequency of various below mentioned teaching-learning methods can vary based on the subject's requirements, competencies, work load and overall working schedule in the concerned subject.

A. Lectures: Didactic lectures should be used sparingly. A minimum of 10 lectures per year in the concerned PG department is suggested. Topics to be selected as per subject requirements All postgraduate trainees will be required to attend these lectures. Lectures can cover topics such as:

1. Subject related important topics as per specialty requirement
2. Recent advances
3. Research methodology and biostatistics
4. **Salient features of** Undergraduate/Postgraduate medical curriculum
5. Teaching and assessment methodology.

Topic numbers 3, 4, 5 can be done during research methodology/biostatistics and medical education workshops in the institute.

B. Journal club: Minimum of once in 1-2 weeks is suggested.

Topics will include presentation and critical appraisal of original research papers published in peer reviewed indexed journals. The presenter(s) shall be assessed by faculty and grades recorded in the logbook.

C. Student Seminar: Minimum of once every 1-2 weeks is suggested.

Important topics should be selected as per subject requirements and allotted for in- depth study by a postgraduate student. A teacher should be allocated for each seminar as faculty moderator to help the student prepare the topic well. It should aim at comprehensive evidence-based review of the topic. The student should be graded by the faculty and peers.

D. Student Symposium: Minimum of once every 3 months.

A broad topic of significance should be selected, and each part shall be dealt by one postgraduate student. A teacher moderator should be allocated for each symposium and moderator should track the growth of students. The symposium should aim at an evidence-based exhaustive review of the topic. All participating postgraduates should be graded by the faculty and peers.

E. Laboratory work / Bedside clinics: Minimum - once every 1-2 weeks.

Laboratory work/Clinics/bedside teaching should be coordinated and guided by faculty from the department. Various methods like DOAP (Demonstrate, Observe, Assist, Perform), simulations in skill lab, and case-based discussions etc. are to be used. Faculty from the department should participate in moderating the teaching- learning sessions during clinical rounds.

F. Interdepartmental colloquium

Faculty and students must attend monthly meetings between the main Department and other department/s on topics of current/common interest or clinical cases.

G. a. Rotational clinical / community / institutional postings

- Depending on local institutional policy and the subject specialty needs, postgraduate trainees may be posted in relevant departments/ units/ institutions including Medical Education Unit (MEU) or Department of Medical Education (DOME). The aim would be to acquire more in-depth knowledge as applicable to the concerned specialty. Postings would be rotated between various units/departments and details to be included in the specialty-based Guidelines.
- **Clinical Postings:** Compulsory clinical postings in following departments must be undertaken as per specified number of days in table 1 depicted below:

Table 1: Plan of Clinical postings for MD Physiology

Prof Year	Department	Period of posting	Focus areas
1st year	Biochemistry	15 days	1. Auto & Semi auto Analyzer, Electrophoresis, Chromatography, RIA, Study of serum chemistry (proteins, Lipid, glucose, electrolytes, enzymes etc.) – 8 days 2. Constituents of normal and abnormal urine, liver function tests, Renal function tests, Gastric function tests – 7 days
I st year	Pharmacology	20 days	1. Animal House (to learn technique of Animal Handling, Blood sampling, anesthesia, Euthanasia, effective Analgesia and infection control after

			surgery. Study of Animal behavior like eating, drinking, locomotion, sexual activity etc.) 2. Experimental Pharmacology lab to study ongoing animal experimental procedures including dissection for rat phrenic nerve hemidiaphragm and others – 10 days 2. Study various guidelines related to ethical use of animals in experiments. To study preparation of different animal models and various tests to study physiological parameters. – 15 days
I st year	Pathology	30 days	1. Blood bank - Cross matching, blood Storage, Immunohistochemistry, Immunological tests – 15 days 2. Central Lab. - Tests for bleeding & clotting disorders, study of Haemopoietic Cells present in the Bone Marrow – 10 days 3. Semen analysis, determination of ovulation time by basal body temperature chart and pregnancy diagnostic tests – 5 days
I st year	Microbiology	10 days	1. Fluorescent microscopy, use of Elisa reader & Washer – 5 days 2. Immuno-physiology and other facilities available in the dept. – 5 days
IInd year	Ophthalmology	15 days	1. Direct and indirect Ophthalmoscopy, Retinoscopy – 8 days 2. Slit lamp microscopy, Tonometry, Pachymetry, Study of corneal topology, Optometry, Auto-refractometer – 7 days
IInd year	Tuberculosis & Chest Disease (Pulmonary Medicine)	15 days	1. Whole body plethysmography – 8 days 2. Bronchoscopy & other facilities available in the dept. – 7 days
IInd year	ENT	15 days	1. Audiometry – 7 days

			2. Oto-rhino-laryngoscopy, direct and Indirect Laryngoscopy, BERA, BSAEP – 8 days
IIIrd year	General Medicine	20 days	1. TMT, Holter analysis, ABG, ECG – 10 days 2. EMG, NCV – 10 days
IIIrd year	Psychiatry	10 days	1. EEG 2. Biofeedback
IIIrd year	Casualty	15 Days	1. To know basics of how to handle emergency 2. Minor procedures

Every posting should have its defined learning objectives. It is recommended that the departments draw up objectives and guidelines for every posting offered in conjunction with the collaborating department/s or unit/s. This will ensure that students acquire expected competencies and are not considered as an additional helping hand for the department / unit in which they are posted. The PG student must be tagged along with those of other relevant departments for bedside case discussion/basic science exercises as needed, under the guidance of an assigned faculty.

G b. Posting under "District Residency Programme" (DRP):

All postgraduate students pursuing MD/MS in broad specialities in all Medical Colleges/Institutions shall undergo a compulsory rotation of three months in District Hospitals/District Health System as a part of the course curriculum, as per the Postgraduate Medical Education (Amendment) Regulations (2020). Such rotation shall take place in the 3rd or 4th or 5th semester of the postgraduate programme and the rotation shall be termed as "District Residency Programme" and the PG medical student undergoing training shall be termed as "District Resident".

Opportunities to present and discuss infectious disease cases through bedside discussion and ward/grand rounds with specialists / clinicians in different hospital settings must be scheduled to address antimicrobial resistance issues and strategies to deal with it.

I. Teaching research skills

Writing a thesis should be used for inculcating research knowledge and skills. All postgraduate students shall conduct a research project of sufficient depth to be presented to the University as a postgraduate thesis under the supervision of an eligible faculty member of the department as guide and one or more co-guides who may be from the same or other departments.

In addition to the thesis project, every postgraduate trainee shall participate in at least one additional research project that may be started or already ongoing in the department. It is preferable that this project will be in an area different from the thesis work. For instance, if a clinical research project is taken up as thesis work, the additional project may deal with community/field/laboratory work. Diversity of knowledge and skills can thereby be reinforced.

J. Training in teaching skills

MEU/DOME should train PG students in education methodologies and assessment techniques. The PG students shall conduct UG classes in various courses and a faculty shall observe and provide feedback on the teaching skills of the student.

K. Log book

During the training period, the postgraduate student should maintain a Log Book indicating the duration of the postings/work done in Wards, OPDs, Casualty and other areas of posting (as specified in table 1) . This should indicate the procedures assisted and performed and the teaching sessions attended. The log book entries must be done in real time. The log book is thus a record of various activities by the student like: (1) Overall participation & performance, (2) attendance, (3) participation in sessions, (4) record of completion of pre-determined activities, and

(5) acquisition of selected competencies.

The purpose of the Log Book is to:

a) help maintain a record of the work done during training,
b) enable Faculty/Consultants to have direct information about the work done and intervene, if necessary,
c) provide feedback and assess the progress of learning with experience gained periodically.

The Log Book should be used in the internal assessment of the student, should be checked and assessed periodically by the faculty members imparting the training. The PG students will be required to produce completed log book in original at the time of final practical examination. It should be signed by the Head of the Department. A proficiency certificate from the Head of Department regarding the clinical competence and skillful performance of procedures by the student will be submitted by the PG student at the time of the examination.

The PG students shall be trained to reflect and record their reflections in log book particularly of the critical incidents. Components of good teaching practices must be assessed in all academic activity conducted by the PG student and at least two sessions dedicated for assessment of teaching skills must be conducted every year of the PG program. The teaching faculty are referred to the MCI Logbook Guidelines uploaded on the Website.

L. **Course in Research Methodology**: All postgraduate students shall complete an online course in Research Methodology within six months of the commencement of the batch and generate the online certificate on successful completion of the course.

Other aspects

- The postgraduate trainees must participate in the teaching and training program of undergraduate students and interns attending the department.
- Trainees shall attend accredited scientific meetings (CME, symposia, and conferences) at least once a year.
- Department shall encourage e-learning activities.
- The postgraduate trainees should undergo training in Basic Cardiac Life Support (BCLS) and Advanced Cardiac Life Support (ACLS).
- The postgraduate trainees must undergo training in information technology and use of computers.

During the training program, patient safety is of paramount importance; therefore, relevant clinical skills are to be learnt initially on the models, later to be performed under supervision followed by independent performance. For this purpose, provision of skills laboratories in medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, i.e. assessment to improve learning

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.

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 practical/clinical examination, should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills.

Quarterly assessment during the MD training should be based on:

- Case presentation, case work up, case handling/management : once a week
- Laboratory performance : twice a week
- Journal club : once a week
- Seminar : once a fortnight
- Case discussions : once a fortnight/month
- Interdepartmental case or seminar : once a month

Note: These sessions may be organized and recorded as an institutional activity for all postgraduates.

- Attendance at Scientific meetings, CME programs (at least 02 each)

The student to be assessed periodically as per categories listed in appropriate (non-clinical/clinical) postgraduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT, ie., assessment at the end of training

Essential pre-requisites for appearing for examination include:

1. **Log book** of work done during the training period including rotation postings, departmental presentations, and internal assessment reports should be submitted.

2. At least **two presentations** at national level conference. One research paper should be published / accepted in an indexed journal**. (It is suggested that the local or University Review committee assess the work sent for publication).**

The summative examination would be carried out as per the Rules given in the latest POSTGRADUATE MEDICAL EDUCATION REGULATIONS. The theory examination shall be held in advance before the Clinical and Practical examination, so that the answer books can be assessed and evaluated before the commencement of the clinical/Practical and Oral examination**.**

The postgraduate examination shall be in three parts**:**

1. Thesis

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 postgraduate student in broad specialty shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners**.**

2. Theory examination

The examinations shall be organized on the basis of 'Grading' or 'Marking system' to evaluate and to certify postgraduate student's level of knowledge, skill and competence at the end of the training, as given in the latest POSTGRADUATE MEDICAL EDUCATION REGULATIONS. 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./ M.S shall be held at the end of 3rd academic year.

There shall be four theory papers (as per PG Regulations).

Paper I: Basic sciences as applied to the subject (General and Cellular Physiology including Genetic basis and historical perspectives)

Paper II: Systemic Physiology (system providing transport, nutrition and energy) including comparative Physiology

Paper III: Systemic Physiology (system concerned with regulation, neural control and procreation)

Paper IV: Recent advances in the subject (including applied Physiology)

3. Practical/clinical and Oral/viva voce examination Practical examination

Practical examination should be spread over **two** days and include various major components of the syllabus focusing mainly on the psychomotor domain.

Oral/Viva voce examination on defined areas should be conducted by each examiner separately. Oral examination shall be comprehensive enough to test the postgraduate student's overall knowledge of the subject focusing on psychomotor and affective domain.

The practical examination should include:

- Case presentation pertaining to major systems
- Stations for clinical, procedural and communication skills
- Log Book Records and reports of day-to-day observation during the training
- It is emphasized that Oral/viva voce examination shall be comprehensive enough to test the postgraduate student's overall knowledge of the subject

Recommended Reading:

Books (latest edition)

1. A.C. Guyton – Text book of Medical Physiology
2. W.F. Ganong – Review of Medical Physiology
3. William's Textbook of Endocrinology
4. J.E. Cotes- Respiratory Physiology
5. D.T. Harris – Experimental Physiology
6. Wintrobe's – Clinical Hematology
7. **P**rinciples of medical physiology by Sircar
8. Brown B.L. – Cell signaling, Biology and medicine of signal transudation
9. Berne and Levy- Medical Physiology

10. Textbook of Medicine by Harrison
11. Principles of Neural sciences edited by E. R. Kandel, J. H. schwartz and T. M. Jessell
12. Williams Hematology edi. by M.A. Lichtman, E. Beutter, K. Kaushansxy, T.J. Kipps, U. Seligsohn, J. Prachal
13. Medical Physiology: by W. F. Boron and E. L. Boulpep
14. Medicat Physiology: by A. Rhodes and G. A. Tanner
15. Neuroscience : by Dale Purves

Practical Books:

1. Hutchison's Clinical Methods: An Integrated Approach to Ctinical Practice.
2. Macleod's clinical Examination
3. Textbook of Practical Physiology: by Dr. G. K. Pal and Dr. Pravati Pal
4. Textbook of Practical Physiology: by Dr. C. L. Ghai
5. Textbook of Practical Physiology: by Dr. Ranade
6. Textbook of Practical Physiology: by Dr. A. K. Jain

Journals:

03-05 International Journals and 02 National (all indexed) journals

Annexure 1

Student appraisal form for MD in Physiology

	Elements	Less than Satisfactory			Satisfactory			More than satisfactory			Comments
		1	2	3	4	5	6	7	8	9	
1	**Scholastic aptitude and learning**										
1.1	Has knowledge appropriate for level of training										
1.2	Participation and contribution to learning activity (e.g., Journal Club, Seminars, CME etc)										
1.3	Conduct of research and other scholarly activity assigned (e.g Posters, publications etc.)										
1.4	Documentation of acquisition of competence (eg Log book)										
1.5	Performance in work based assessments										
1.6	Self-directed Learning										
2	**Work related to training**										
2.1	Practical skills that are appropriate for the level of training										
2.2	Respect for processes and procedures in the work space										
2.3	Ability to work with other members of the team										
2.4	Participation and compliance with the quality improvement process at the work environment										
2.5	Ability to record and document work accurately and appropriate for level of training										

3	**Professional attributes**										
3.1	Responsibility and accountability										
3.2	Contribution to growth of learning of the team										
3.3	Conduct that is ethically appropriate and respectful at all times										
4	**Space for additional comments**										
5	**Disposition**										
	Has this assessment pattern been discussed with the trainee?	Yes	No								
	If not explain.										
	Name and Signature of the assesse										
	Name and Signature of the assessor										
	Date										

Subject Expert Group members for preparation of REVISED Guidelines for competency based postgraduate training programme for MD in Physiology

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NATIONAL MEDICAL COMMISSION
Postgraduate Medical Education Board

D 11011/1/22/AC/Guidelines/15 **Date: 05-08-2022**

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR M.D. IN PSYCHIATRY

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN PSYCHIATRTY

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 postgraduate specialist having undergone the required training should be able to recognize the health needs of the community, should be competent to handle medical problems effectively and should be aware of the recent advances pertaining to his specialty. The post graduate student should 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.

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 Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. 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 primary **goal** of the MD course in Psychiatry is to produce a post graduate clinician able to provide health care in the field of Psychiatry. A physician qualified in Psychiatry, at the end of the course, should be able to diagnose and treat psychiatric disorders, take preventive and curative steps for the disease in the community at all levels of health care and qualify as a consultant and teacher in the subject.

At the end of the MD course in Psychiatry, the student should be able to:

- Understand the relevance of mental health in relation to the health needs of the country,
- Ethical considerations in the teaching and practice of Psychiatry,
- Identify the social, economic, biological and emotional determinants of mental health,
- Identify the environmental causes as determinants of mental health,
- institute appropriate diagnostic, therapeutic and rehabilitative procedures to the mentally ill patient,

- Take detailed history, conduct appropriate ethically valid physical examination and institute appropriate evaluation procedures to make a correct clinical diagnosis,
- Perform relevant investigative and therapeutic procedures for the psychiatric patient,
- Recommend appropriate laboratory and imaging examinations and interpret the results correctly,
- Plan and deliver comprehensive treatment of a psychiatric patient using principles of rational drug therapy,
- Plan rehabilitation of psychiatric patient suffering from chronic illness,
- Clinically manage psychiatric emergencies efficiently,
- Demonstrate empathy and humane approach towards patients and their families and respect their sensibilities,
- Demonstrate communication skills of a high order in explaining management and prognosis, providing counselling and giving health education messages to patients, families and communities,
- Develop appropriate skills to practice evidence-based psychiatry,
- Demonstrate competence in basic concepts of research methodology and epidemiology,
- Be aware of and take appropriate steps in the implementation of national mental health programs, effectively and responsibly,
- Be aware of the concept of essential drugs and rational use of drugs,
- Be aware of the legal issues in the practise of Psychiatry,
- Be aware of the special requirements in the practice of Child and adolescent Psychiatry and Geriatric Psychiatry.
- Be aware of the role of sex and gender in the practice of psychiatry
- Be able to determine the capacity and capability of the individual (especially children and adolescents) to identify and articulate a gender identity

- **Research:** The student should know the basic concepts of research methodology and plan a research project in accordance with ethical principles. S/he should also be able to interpret research findings and apply these in clinical practice. S/he should know how to access and utilize information resources and should have basic knowledge of statistics.
- **Teaching:** S/He should learn the basic methodology of teaching and develop competence in teaching medical/paramedical students, health professionals, members of allied disciplines (e.g. behavioural sciences), law enforcement agencies, families and consumers and members of the public.

SUBJECT SPECIFIC COMPETENCIES

By the end of the course, the student should have acquired knowledge (cognitive domain), professionalism (affective domain) and skills (psychomotor domain) as given below:

A. Cognitive domain

By the end of the course, the student should demonstrate knowledge in the following:

1. General topics:

1. The student should be able to demonstrate knowledge of basic sciences (Anatomy, Physiology, Biochemistry, Microbiology, Pathology and Pharmacology) as applied to Psychiatry.
2. The student should be able to explain aetiology, assessment, classification and management and prognosis of various psychiatric disorders (including psychiatric sub-specialities including Neuroanatomy, Neurophysiology, Neurochemistry, Neuroimaging, Electrophysiology, Psychoneuroendocrinology, Psychoneuroimmunology, Chronobiology and Neurogenetics.
3. Acquire knowledge of delirium, dementia, and amnestic and other cognitive disorders and mental disorders due to a general medical condition.
4. The student should be able to discuss long term care of persons with chronic mental health problems
5. The student should acquire knowledge of emergency measures in acute crisis arising out of various psychiatric illnesses including drug detoxification and withdrawal.
6. The student should acquire knowledge of pharmacokinetics & pharmacodynamics of drugs involved in psychiatric management of patients.
7. The student should acquire knowledge of (a) normal child development and adolescence (b) neurodevelopmental disorders, intellectual disability and specific learning disability and their management
8. The student should acquire knowledge and be able to explain mechanisms for rehabilitation of psychiatric patients.
9. The student should acquire knowledge of substance related disorders and their management.
10. The student should acquire knowledge of psychotic disorders, mood disorders, and anxiety disorders and their management
11. The student should understand difference between sex and gender/ biological and social construction of personhood; sexual/gender identity; transgender, gender non-conformity, and other gender diverse identities, sexual/sexuality identity, sexual orientation, sexual desire; the wide variety, and cultural presence of various sexual orientations and desires; gender dysphoria and its management.

12. The student should acquire knowledge of eating disorders and sleep disorders and their management
13. The student should be conversant with recent advances in Psychiatry.
14. The student should be conversant with routine bedside diagnostic and therapeutic procedures and acquire knowledge of latest diagnostics and therapeutics procedures available.
15. The student should be conversant with various policy related aspects of Psychiatric practice in India (e.g. Mental Health Act, National Health Mental Health Programmes etc.).
16. The student should be conversant with research methodologies.
17. Student should be conversant with the role of Yoga and Meditation in the management of psychiatric disorders.

B. Affective Domain:

1. The student should be able to function as a part of a multidisciplinary team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
2. The student should 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, confidentiality and second opinion.
3. The student should develop communication skills to prepare reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

C. Psychomotor domain

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

1. Obtain a proper relevant history and perform thorough clinical examination including detailed mental state examinations using proper communication skills.
2. Able to do risk assessment and mental capacity assessment.
2. Provide a clinical formulation, arrive at a logical working diagnosis and differential diagnosis after clinical examination.
3. Order appropriate investigations keeping in mind their relevance and cost effectiveness and obtain additional relevant information from family members to help in diagnosis and management.

4. Identify psychiatric situations calling for urgent or early intervention and refer at the optimum time to appropriate centres.
5. Write a complete case record with all necessary details.
6. Write a proper discharge summary with all relevant information.
7. Obtain informed consent for any examination/procedure.
8. Perform clinical audit.
9. Must be able to perform modified Electroconvulsive therapy (ECT).
10. Should have the following skills in relation to gender related issues:
    - Demonstrate the ability to assess the gender identity of an individual and distress caused (if any) due to the individual's own gender identity in simulated environment.
    - Describe and understand how to discuss sexual orientation, sexuality identity, gender identity, as well as intersex identity (differences in sex development) as part of routine history taking.
    - Demonstrate the ability to educate and counsel individuals or family members about intersex variations, sexual orientations, sexuality identities, gender incongruence, gender dysphoria, and gender identities. Demonstrate ability to identify when a mental health referral is needed for the above.
    - Demonstrate knowledge that conversion therapy practices for sexual orientation or gender identity or on people with intersex variations is unethical.
    - Describe differences between Gender Incongruence and Gender Dysphoria.
    - Describe and understand gender identity, the biological and gender binaries, rejection of gender binary, gender non-conforming, gender non-binary, androgynous, and other identities.
    - Demonstrate the ability to educate an individual and family members that Gender Incongruence by itself is not a disorder and does not require clinical intervention. Any form of conversion therapy is unethical.
    - Discuss situations where there is a role for mental health support in Gender Dysphoria i.e., discussing with family, deciding on hormonal treatments or Sex Reassignment Surgery (Gender Affirming Care or Gender Affirmative Therapies or Gender Confirmation Surgery).

The student, at the end of the course should be able to perform independently, the following:

1. Conduct detailed Mental Status Examination (MSE)
2. Cognitive behaviour therapy
3. Supportive psychotherapy
4. Modified ECT and non-invasive neuromodulation
5. Clinical IQ assessment
6. Management of alcohol withdrawal
7. Alcohol intoxication management
8. Opioid withdrawal management
9. Delirious patients
10. Crisis intervention

The student must be able to assess a patient with following symptoms:

1. Psychotic symptoms
2. Seizures true and pseudo seizure
3. Anxiety symptoms
4. Affective symptoms
5. Cognitive symptoms
6. Catatonia
7. Delirium
8. Malingering
9. Behavioral symptoms of developmental disorders

The student, at the end of the course should be able to perform under supervision, the following:

1. Behaviour therapy
2. Family therapy
3. Interpersonal therapy
4. Cognitive behaviour therapy and other newer therapies
5. First level psychological intervention for sexual abuse, sexual assault and domestic violence
6. Genetic counselling

Syllabus

Course Contents:

No limit can be fixed and no fixed number of topics can be prescribed as course contents. The student is expected to know the subject in depth; however 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. Competence in managing behavioural problems commensurate with the specialty must be ensured.

The student must acquire knowledge in the following: Theoretical concepts:

1. Neurophysiology and Neuro-chemistry
2. Functional and behavioural neuroanatomy
3. Genetics
4. Psychoneuroendocrinology
5. Psychoneuroimmunology
6. Electrophysiology and cognitive neuroscience
7. Neuro-imaging
8. Memory

9. Sleep and circadian rhythm

10. Learning – Theories

11. Theory of personality

12. Clinical Psychology including Psychometry and Psychodiagnostics

13. Transcultural Psychiatry

14. Research Methodology and Statistics

15. Psychodynamics

16. Psychiatric assessment (including History Taking, Neurological Examination, Mental Status Examination, Investigations, Use of rating scales, etc.).

17. Classification In Psychiatry

18. Organic Psychiatry (including Psychological Features and Clinical Assessment of Cerebrovascular Disorders, Delirium, Epilepsy, Head Injury, Headache, HIV – AIDS, Infections, etc.)

19. Movement Disorders (including Medication-Induced Movement Disorders, etc)

20. Substance Related Disorders (including Alcohol-Related Disorders, Amphetamine-Related Disorders, Caffeine-Related Disorders, Cannabis-Related Disorders, Cocaine-Related Disorders, Hallucinogen-Related Disorders, Inhalant-Related Disorders, Nicotine-Related Disorders, Opioid-Related Disorders, Phencyclidine-Related Disorders, Sedative-, Hypnotic-, or Anxiolytic-Related Disorders, etc.)

21. Psychosis (including Schizophrenia, Schizophreniform Disorder, Schizoaffective Disorder, Delusional Disorder, Brief Psychotic Disorder, Shared Psychotic Disorder, etc).

22. Mood Disorders (including Depressive Disorders, Bipolar Disorders, Cyclothymic Disorder, etc.)

23. Anxiety Disorders (including Panic Disorder, Agoraphobia, Phobias, Obsessive-Compulsive Disorder, Generalized Anxiety Disorder, etc).

24. Stress and related disorders (Posttraumatic Stress Disorder, Acute Stress Disorder Adjustment Disorder etc.)

25. Somatoform Disorders (including Somatization Disorder, Undifferentiated Somatoform Disorder, Conversion Disorder, Pain Disorder, Hypochondriasis, Body Dysmorphic Disorder, etc.)

26. Factitious Disorders

27. Dissociative Disorders (including Dissociative Amnesia, Dissociative Fugue, Dissociative Identity Disorder, Depersonalization Disorder, etc.)

28. Personality disorders

29. Sexual disorders, gender dysphoria and psychological issues among LGBTQIA+ groups (including Sexual Desire Disorders, Sexual arousal

Disorders, Orgasmic Disorders, Sexual Pain Disorders, Vaginismus, Paraphilias, etc)

30. Eating Disorders (including Anorexia Nervosa, Bulimia Nervosa, etc.)

31. Sleep Disorders (including Insomnia, Narcolepsy, Breathing-Related Sleep Disorders, Circadian Rhythm Sleep Disorders, Parasomnias, Nightmare Disorder, Sleep Terror Disorder, Sleepwalking Disorder, etc.)

32. Impulse-Control Disorders (including Intermittent Explosive Disorder, Kleptomania, Pyromania, Pathological Gambling, Trichotillomania, etc

33. Psychosomatic Disorders including Consultation Liaison psychiatry

34. Miscellaneous: Non-compliance, Malingering, Antisocial Behaviour, Borderline Intellectual Functioning, Age-Related Cognitive Decline, Bereavement [including Death], Academic Problems, Occupational Problems, Identity Problems, Religious or Spiritual Problems, Acculturation Problems, Phase of Life Problems, Chronic Fatigue Syndrome, etc.)

35. Abuse (Physical / Sexual) or Neglect Of Child /Adult

36. Culture Bound Syndromes

37. Pre-Menstrual Dysphoric Disorder

38. Perinatal Psychiatry

39. Emergencies In Psychiatry including suicide, its management and medico-legal aspect

40. Psychotherapy

41. Psychopharmacology

42. Electro-Convulsive Therapy,Other brain stimulation methods (rTMS, DBS, tDCS and others) and Neurosurgery

43. Child and Adolescent Psychiatry (including Learning Disorders, Motor Skills Disorder, Communication Disorders, Pervasive Developmental Disorders (Autistic Disorder, Rett's Disorder, Childhood Disintegrative Disorder, Asperger's Disorder), Attention-Deficit/Hyperactivity Disorder, Conduct Disorder, Oppositional Defiant Disorder, Pica, Tic Disorders, Elimination Disorders, Separation Anxiety Disorder, Selective Mutism, Reactive Attachment Disorder of Infancy or Early Childhood, Stereotypic Movement Disorder, etc.)

44. Intellectual disability

45. Geriatric Psychiatry (including dementia, legal and ethical issues, positive psychiatry in aging, psychiatric aspects of long term care)

46. Community psychiatry

47. Rehabilitation of psychiatric patients

48. Ethics In Psychiatry

49. Forensic and Legal Psychiatry (including Mental Health Care Act, Persons with Disability Act, Narcotic Drugs and Psychotropic Substance Act etc.)

The student may know the following:

1. History of Psychiatry
2. Epidemiology
3. Mind – the evolving concepts
4. Psychiatry rating scales
5. Placebo Effect
6. Sex and Gender Issues in Psychiatry
7. Psychosurgery

TEACHING AND LEARNING METHODS

Teaching methodology

1. **Lectures:** Lectures are to be kept to a minimum. They may, however, be employed for teaching certain topics. Lectures may be didactic or integrated. Didactic lectures are of least importance; small group discussion such as seminars, journal clubs, symposia, reviews and guest lecturers should get priority for theoretical knowledge. Bedside teaching, grand rounds, structured interactive group discussions and clinical demonstrations should be the hallmark of clinical/practical learning. The student should have hands-on training in performing various procedures and ability to interpret various tests/investigations. Exposure to newer specialized diagnostic/therapeutic procedures concerning the subject should be given. Self learning tools like assignments and case base learning may be promoted.

The post graduate student should have knowledge of:

- Psycho-pharmacology and broadening the treatment options using medicines.
- Neuro-imaging techniques to understand behaviour and psychiatric illness.
- Community-Psychiatry.
- Functioning of psychiatric hospital.

Community Psychiatry should go beyond familiarization with the National Mental Health Programme. The post graduate student should have hands on experience with:

- Training programmes for primary care physicians
- Organizing Mental Health Camps

- Carrying out Health Education Activities
- Forensic /Legal Psychiatry
- Integration of Mental Health Care with General Health Care

2. **Thesis writing:** Thesis writing is compulsory.
3. **Research Methodology:** The student should know the basic concepts of research methodology and biostatistics, plan a research project, understand ethical issues of research especially in vulnerable groups such as those with mental illness and intellectual disability as well as minors, be able to retrieve information from the library, use reference managers .
4. **Teaching skills:**The post graduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
5. **Continuing Medical Education Programmes (CME):** Each student should attend at least two CME programmes, in 3 years.
6. **Conferences:** The student should attend courses, conferences and seminars relevant to the specialty, and encouraged to make presentation in conferences
7. A post graduate student of a postgraduate degree course in broad specialties/super specialties 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.
8. **Seminars:** There should be a weekly seminar in which the PG students present material on assigned topics in rotation. It should be followed by discussion in which all trainees are supposed to participate. Generally, the topics covered should be those that supplement the formal teaching programme.
9. **Case Conference**: A case conference should be held every week where a PG student prepares and presents a case of academic interest by rotation and it is attended by all the members of the Department.
10. **Psychosomatic Rounds**: This is a presentation of a case of psychosomatic illness, or a medical illness with pronounced psychiatric problems. It should be held weekly in collaboration with various departments and attended by the faculty and the PG students of psychiatry and the concerned Department.
11. **Research Forum**: There should be a monthly meeting of one hour each in which the PG students present their plan of research as well as the report of the completed work of their projects. The other research scholars/staff in the department also may participate in it. The faculty, PG students and the non-medical professionals should make critical comments and suggestions.

12. **Journal Club**: A monthly meeting of Journal club should be held in which a senior PG student presents a critical evaluation of a research paper from a journal. All PG students are expected to attend.
13. **Case presentations**: All new in-patients and outpatients cases should be routinely reviewed with one of the Consultants. In addition, the PG student is required to present case material at routine rounds and other case conferences. Senior PG students will conduct evening classes on clinical topics.
14. **Extra-mural activities**: The post graduate students are encouraged to attend certain academic activities in allied subjects held outside parent department e.g. seminars/lectures held at Departments of Sociology, Psychology, Neurology etc.
15. **Psychotherapy tutorials**: These should be held in small groups supervised by a consultant, in which a case is presented by a PG student and psychotherapeutic management discussed.

16. Rotation:

Clinical Postings

- A major tenure of posting should be in General Psychiatry. It should include care of in-patients, out-patients, special clinics and maintenance of case records for both in and out patients.
- Exposure to the following areas should be given :-

Schedule of clinical postings for M.D Psychiatry *(36 months)

Area/ Specialty	
Ward and OPD (Concurrent)	18 months
Neurology	2 months
Emergency Medicine/ Internal Medicine	1 month
Consultation Liaison Psychiatry	3 months
Psychiatric hospital and Forensic Psychiatry	1 month
Clinical Psychology	1 month
Addiction Psychiatry	3 months
Child and Adolescent Psychiatry	3 months
Community psychiatry	2 months#
Elective posting	2 months (as per choice in the same Institute)

* The stated duration can be subjected to minor modifications depending on available resources

 # Exposure to community based services should be integral to various postings.

Applicable only for trainees in General Hospital Psychiatric units: Facilities for these need to be arranged.

The post graduate student in Psychiatric hospitals would have extended period of exposure to consultation - liaison psychiatry and other medical specialties. Exposure to community based services should be integral part of various postings. The post graduate student shall be given full responsibility for patient care and record keeping under the supervision of the senior PG students and consultants. The post graduate

student shall also take patients for psychological interventions in an individual as well as group setting. S/he must complete a minimum of 100 hours of supervised psychological interventions.

- Inter-Unit Rotation of posting

Inter-unit rotation in the department should be done for a period of up to one year (divided during the first year and third year while the post graduate student stays in the parent unit throughout the duration of his thesis work).

17. Clinical meetings:

There should be intra - and inter - departmental meetings for discussing the uncommon / interesting medical problems.

18. Log book:

Each student must be asked to present a specified number of cases for clinical discussion, perform procedures/present seminars/review articles from various journals in inter-unit/interdepartmental teaching sessions. They should be entered in a Log Book and signed by the authorized teacher and Head of Department.

19. The Department should encourage e-learning activities.

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 clinical skills laboratories in medical colleges is mandatory. Objective structured clinical examination (OSCE) modules may be developed and used in teaching.

ASSESSMENT

FORMATIVE ASSESSMENT, ie., assessment during the training

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.

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
6. Professionalism and teamwork

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

SUMMATIVE ASSESSMENT, ie., at the end of training

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The examination shall be in three parts:

1. Thesis

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 Examination:

There shall be four papers each of three hours duration.

Paper I: Basic Sciences as related to Psychiatry

Paper II: Clinical Psychiatry

Paper III: Psychiatric Specialties

Paper IV: Recent Advances

3. Clinical/Practical and Oral/viva voce examination should consist of:

- Presentation of long case of Psychiatry
- Neurology short case
- A short case Psychiatry
- Viva –voce

Due importance should be given to Log Book Records and day-to-day observation during the training.

Recommended Reading Books (latest edition)

1. Textbook of Psychiatry Publisher: Lippincott Williams and Wilkins, Editors: Benjamin James Sadock, Virginia Alcott Sadock, Pedro Ruiz
2. Kaplan and Sadock's Synopsis of Psychiatry, Editor: RJ Boland, ML Verduin, P Ruiz; Publisher: Wolters Kluver India
3. Introduction to Psychology by Clifford T. Morgan Editors: Clifford T Morgan, Richard A King, John R Weiss, John Schopler, Publisher: MC Graw Hill

4. New Oxford Textbook of Psychiatry Edited by: John R. Geddes, Nancy C. Andreas and Guy M. Goodwin, Publisher: Oxford
5. Stahl's Essential Psychopharmacology: Neuroscientific Basis and Practical Applications, Editor: Stephen M Stahl, Publisher: Cambridge
6. Forensic Psychiatry: RC Jiloha, D Kataria, P Kukreti (Jaypee)
7. ECT administration manual, NIMHANS Editors: Bangalore N Gangadhar, A Shyam Sundar, Jagadisha Thirthalli, Shivarama Varambally, Kesavan Muralidharan, C Naveen Kumar, Preeti Sinha, Biju Viswanath, Publisher: NIMHANS
8. Community Psychiatry in India (Eds Chavan, Gupta, Arun, Sidana, Jadav) Jaypee.
9. Fish's Clinical Psychopathology – Signs and Symptoms In Psychiatry By Patricia Casey, Editor: Patricia Casey, Brendan Kelly, Publisher: Tree Life Media
10. Sims Symptoms in the Mind: Textbook of Descriptive psychopathology, Editor: Femi Oyebode, Publisher: Elsevier
11. Bickerstaff's Neurological Examination in Clinical practice, Editor: Kameshwar Prasad, Ravi Yadav, John Spillane, Publisher: Wiley
12. A Primer of Research, Publication and Presentation: Sandeep Grover, Shahul Amin, Jaypee
13. Maudsley's Prescribing Guidelines in Psychiatry, Editors: Author: David M. Taylor, Thomas R. E. Barnes, Allen Young, Publisher: Wiley
14. Lishman's Organic Psychiatry Editor: Anthony S. David, Simon Fleminger, Michael D. Kopelman, Publisher: Wiley Blackwell
15. Kaufman's Clinical Neurology for Psychiatrists, Elsevier.

Journals

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

Appendix 1

Student appraisal form for MD in Psychiatry

	Element	Less than Satisfactory			Satisfactory			More than satisfactory			Comments
		1	2	3	4	5	6	7	8	9	
1	**Scholastic Aptitude and Learning**										
1.1	Has Knowledge appropriate for level of training										
1.2	Participation and contribution to learning activity (e.g., Journal Club, Seminars, CME etc)										
1.3	Conduct of research and other scholarly activity assigned (e.g. Posters, publications etc.)										
1.4	Documentation of acquisition of competence (eg Log book)										
1.5	Performance in work based assessments										
1.6	Self- directed Learning										
2	**Care of the patient**										
2.1	Ability to provide patient care appropriate to level of training										
2.2	Ability to work with other members of the health care team										
2.3	Ability to communicate appropriately and empathetically with patients families and care givers										
2.4	Ability to do procedures appropriate for the level of training and assigned role										
2.5	Ability to record and document work accurately and appropriate for level of training										
2.6	Participation and contribution to health care quality improvement										
3	**Professional attributes**										
3.1	Responsibility and accountability										
3.2	Contribution to growth of learning of the team										
3.3	Conduct that is ethically appropriate and respectful at all times										
4	**Space for additional comments**										
5	**Disposition**										
	Has this assessment been discussed with the trainee?	Yes	No								
	If not explain										

	Name and Signature of the assesse										
	Name and Signature of the assessor										
	Date										

Module on Gender related Issues and Gender Dysphoria for the MD Curriculum of Psychiatry

At the end of the course the student will be able to:

- Demonstrate the ability to assess the gender identity of an individual and distress caused (if any) due to the individual's own gender identity in simulated environment.
- Describe and understand how to discuss sexual orientation, sexuality identity, gender identity, as well as intersex identity (differences in sex development) as part of routine history taking.
- Demonstrate the ability to educate and counsel individuals or family members about intersex variations, sexual orientations, sexuality identities, gender incongruence, gender dysphoria, and gender identities. Demonstrate ability to identify when a mental health referral is needed for the above.
- Demonstrate knowledge that conversion therapy practices for sexual orientation or gender identity or on people with intersex variations is unethical.
- Describe differences between Gender Incongruence and Gender Dysphoria.
- Describe and understand gender identity, the biological and gender binaries, rejection of gender binary, gender non-conforming, gender non-binary, androgynous, and other identities.
- Demonstrate the ability to educate an individual and family members that Gender Incongruence by itself is not a disorder and does not require clinical intervention. Any form of conversion therapy is unethical.
- Discuss situations where there is a role for mental health support in Gender Dysphoria i.e., discussing with family, deciding on hormonal treatments or Sex Reassignment Surgery (Gender Affirming Care or Gender Affirmative Therapies or Gender Confirmation Surgery).

Subject Expert Group members for preparation of REVISED Guidelines for competency based postgraduate training programme for MD in Psychiatry

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GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN PULMONARY MEDICINE

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.

Evolution of critical care medicine makes it imperative that the post graduates are trained in the basic principles of Pulmonary Medicine as applied to critical care. The person shall be abreast with the recent advances and developments in the specialty of Pulmonary Medicine. It is expected that the person will develop a spirit of enquiry and get oriented to apply recent advances and medical evidence to the practice of pulmonary medicine. He would also grasp the fundamentals of research methodology. Medical Science is dynamic with a continuous enhancement of knowledge. The process of acquiring knowledge and skills continues even after formal education. The syllabus to be covered during post graduate training in Pulmonary Medicine given below is designed to develop a sound and scientific foundation. It is intended to serve as a guide to impart basic knowledge and develop skills and does not impose any limits to expansion beyond the areas listed.

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 Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. 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 OBJECTIVES

The primary **goal** of the MD course in Pulmonary Medicine is to produce post graduate clinicians able to provide health care in the field of pulmonary medicine. It is expected that a physician qualified in Pulmonary Medicine at the end of the course should be able to diagnose and treat pulmonary diseases, take preventive and curative steps for these diseases in the community at all levels of health care and qualify as a consultant and teacher in the subject.

Each student should obtain proficiency in the following domains during the period of training:

1. Theoretical knowledge of different aspects of Pulmonary Medicine including the status in health and disease.
2. Acquire clinical skills.
3. Acquire practical skills.
4. Management of emergencies including intensive care.
5. Preparation of thesis as per MCI guidelines.

These involve patient management in the outpatient, inpatient and emergency situations, case presentations, didactic lectures, seminars, journal reviews, clinico-patholgical conferences and mortality review meetings and working in the laboratories.

SUBJECT SPECIFIC COMPETENCIES

By the end of the course, the student should have acquired knowledge (cognitive domain), professionalism (affective domain) and skills (psychomotor domain) as given below:

A. Cognitive domain

At the end of the MD course in Pulmonary Medicine, the students should be able to:

1. demonstrate sound knowledge of common pulmonary diseases, their clinical manifestations, including emergent situations and of investigative procedures to confirm their diagnosis. A comprehensive knowledge of epidemiological aspects of pulmonary diseases should be acquired.
2. demonstrate comprehensive knowledge of various modes of therapy used in treatment of pulmonary diseases.
3. describe the mode of action of commonly used drugs, their doses, side-effects / toxicity, indications and contra-indications and interactions.
4. describe commonly used modes of management including medical and surgical procedures available for treatment of various diseases and to offer a comprehensive plan of management inclusive of National tuberculosis Control Programme.
5. manage common pulmonary emergencies and understand the basic of intensive care in patients with pulmonary diseases.
6. practice the field of pulmonary medicine ethically and assiduously, show empathy and adopt a humane approach towards patients and their families.
7. recognize the national priorities in pulmonary medicine and play an important role in the implementation of National Health Programmes including tuberculosis.
8. demonstrate competence in medical management.
9. should inculcate good reading habits and develop ability to search medical literature and develop basic concept of medical research.

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 other 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.

C. Psychomotor domain

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

1. interview the patient, elicit relevant and correct information and describe the history in chronological order.
2. conduct clinical examination, elicit and interpret clinical findings and diagnose common pulmonary disorders and emergencies.
3. perform simple, routine investigative and office procedures required for making the bedside diagnosis, especially sputum collection and examination for etiologic organisms especially Acid Fast Bacilli (AFB), interpretation of the chest x-rays and lung function tests.
4. interpret and manage various blood gases abnormalities in various pulmonary diseases.
5. develop management plans for various pulmonary diseases.
6. assist in the performance of common procedures, like bronchoscopic examination, pleural aspiration and biopsy, pulmonary physiotherapy, endotracheal intubation and pneumo-thoracic drainage / aspiration etc.
7. recognize emergency situations in intensive care, respond to these appropriately and perform basic critical care monitoring and therapeutic procedures.
8. collect, compile, analyse, interpret, discuss and present research data.
9. teach pulmonary medicine to undergraduate and postgraduate students.

To acquire the above skills, the student should be exposed and trained in the following tests and procedures:

1. Diagnostic tests: Performance and interpretation

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- Sputum and other body fluids examination with ZN stain for AFB, culture methods for pathogenic bacteria, fungi and viruses
- Newer diagnostic techniques for tuberculosis including molecular techniques
- FNAC of lung masses (blind and image-guided)
- Arterial blood gas analysis and pulse oximetry
- Imaging: Interpretation of plain radiography, ultrasound examination, Computed tomogram, PET scan, MRI
- Sputum cytology
- Simple haematological tests
- Immunological and Serological tests
- Polysomnography (full-night and split-night studies) including CPAP titration; evaluation of daytime sleepiness
- Cardiopulmonary exercise testing
- Pulmonary function tests and interpretation (Spirometry, lung volume, diffusions, body plethysmography, other lung function tests)
- Bronchoprovocation tests
- BCG vaccination
- Mantoux testing; interferon gamma release assays
- Bronchoscopy: fibreoptic/rigid, diagnostic and therapeutic
- ECG, 2D and Doppler echocardiography
- Venous Doppler ultrasound
- Skin tests for hypersensitivity
- Sputum induction and non-invasive monitoring of airway inflammation
- Medical thoracoscopy

2. Therapeutic procedures

- Fine needle aspiration and other guided procedures
- Tube thoracostomy
- Cardiopulmonary rehabilitation exercises
- Postural drainage
- Pleural biopsy, lymph node biopsy
- Administration of inhalation therapy
- Administration of oxygen therapy
- Administration of continuous positive airway pressure (CPAP)/ Bilevel Positive Airway Pressure (BiPAP)
- Monitoring and emergency procedures in intensive care

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Syllabus

Course contents:

The student should acquire knowledge in the following:

I. Basic Sciences

A. Anatomy and Histology of Respiratory System

1. Development and Anatomy of Respiratory System
2. Applied embryology of lungs, mediastinum and diaphragm
3. Developmental anomalies

B. Physiology and Biochemistry

1. Assessment of pulmonary functions
2. Control of ventilation; pulmonary mechanics
3. Ventilation, pulmonary blood flow, gas exchange and transport
4. Non-respiratory metabolic functions of lung
5. Principles of electrocardiography
6. Inhalation kinetics and its implication in aerosol therapy, and sputum induction etc.
7. Acid-base and electrolyte balance
8. Physiology of sleep and its disorders
9. Pulmonary innervation and reflexes
10. Pulmonary defence mechanisms
11. Principles of exercise physiology and testing
12. Physiological changes in pregnancy, high altitude, aging
13. Physiological basis of pulmonary symptoms

C. Microbiology

1. Mycobacterium tuberculosis and other mycobacteria
2. Bacteria causing pulmonary diseases
3. Atypical organisms and respiratory tract infections
4. Anaerobes in pleuropulmonary infections
5. Laboratory diagnosis of non-tubercular infections of respiratory tract
6. Laboratory diagnosis of TB including staining, culture and drug sensitivity testing
7. Virulence and pathogenecity of mycobacteria
8. Respiratory viruses: Viral diseases of the respiratory system and diagnostic methods
9. Respiratory fungi: (i) Classification of fungal diseases of lung: candidiasis, Actinomycosis, Nacardiosis, Aspergillosis, Blastomycosis etc. (ii) Laboratory diagnostic procedures in pulmonary mycosis
10. Opportunistic infections in the immuno-ompromised individuals
11. HIV and AIDS. Virological aspects, immuno-pathogenesis, diagnosis

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12. Parasitic lung diseases

D. Pathology

1. Acute and chronic inflammation: Pathogenetic mechanisms in pulmonary diseases
2. Pathology aspects of Tuberculosis
3. Pathology aspects of Pneumonias and bronchopulmonary suppuration
4. Chronic bronchitis and emphysema, asthma, other airway diseases
5. Occupational lung diseases including Pneumoconiosis
6. Interstitial lung diseases including sarcoidosis, connective tissue diseases, pulmonary vasculitis syndromes, pulmonary eosinphilias
7. Tumours of the lung, mediastinum and pleura

E. Epidemiology

1. Epidemiological terms and their definitions
2. Epidemiological methods
3. Epidemiology of tuberculosis, pneumoconiosis, asthma, lung cancer, COPD and other pulmonary diseases
4. National Tuberculosis Control Programme and RNTCP; Epidemiological aspects of BCG
5. Epidemiological aspects of pollution-related pulmonary diseases
6. Research methodology, statistics and study designs

F. Allergy and Immunology

1. Various mechanisms of hypersensitivity reactions seen in pulmonary diseases
2. Diagnostic tests in allergic diseases of lung - *in vitro* and *in vivo* tests, bronchial provocation test
3. Immunology of tuberculosis, Sarcoidosis and other diseases with an immunological basis of pathogenesis

G. Pharmacology

1. Pharmacology of antimicrobial drugs
2. Pharmacology of antitubercular drugs
3. Pharmacology of antineoplastic and immunosuppressant drugs
4. Bronchodilator and anti-inflammatory drugs used in pulmonary diseases
5. Drugs used in viral, fungal and parasitic infections
6. Other drugs pharmacokinetics and drugs interaction of commonly used drugs in pulmonary diseases
7. Pharmacovigilance

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II. Clinical Pulmonary Medicine

Clinical pulmonary medicine covers the entire range of pulmonary diseases. All aspects of pulmonary diseases including epidemiology, aetiopathogenesis, pathology, clinical features, investigations, differential diagnosis and management are to be covered.

A. Infections

1. **Tuberculosis**

1. Aetiopathogenesis
2. Diagnostic methods
3. Differential diagnosis
4. Management of pulmonary tuberculosis; RNTCP, DOTS, and DOTS-Plus; International Standards of TB Care
5. Complications in tuberculosis
6. Tuberculosis in children
7. Geriatric tuberculosis
8. Pleural and pericardial effusion and empyema
9. Mycobacteria other than tuberculosis
10. Extrapulmonary tuberculosis
11. HIV and TB; interactions of antitubercular drugs with antiretrovirals
12. Diabetes mellitus and tuberculosis
13. Management of MDR and XDR tuberculosis

2. Non-tuberculous infections of the lungs

- Approach to a patient with pulmonary infection
- Community-acquired pneumonia
- Hospital-associated pneumonia, ventilator-associated pneumonia
- Unusual and atypical pneumonias including bacterial, viral, fungal and parasitic and ricketsial, anerobic
- Bronchiectasis, lung abscess and other pulmonary suppurations
- Acquired immunodeficiency syndrome and opportunistic infections in immuno-compromised host
- Principles governing use of antibiotics in pulmonary infections
- Other pneumonias and parasitic infections, Zoonosis

B. Non-infectious Lung Diseases

3. Immunological disorders

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- Immune defence mechanisms of the lung
- Sarcoidosis
- Hypersensitivity pneumonitis and lung involvement
- Eosinophilic pneumonias and tropical eosinophilia
- Pulmonary vasculitides
- Connective tissue diseases involving the respiratory system
- Interstitial lung disease of other etiologies
- Reactions of the interstitial space to injury, drugs
- Occupational and environmental pulmonary diseases

4. Other non-infectious disorders of the lungs and airways

- Aspiration and inhalational (non-occupational) diseases of the lung
- Drug induced pulmonary diseases
- Bullous lung disease
- Uncommon pulmonary diseases (metabolic, immunological, unknown etiology), pulmonary haemorrhagic syndromes
- Other pulmonary diseases of unknown etiology including PLCH, LAM, PAP, alveolar microlithiasis
- Cystic fibrosis and disorders of ciliary motility
- Obesity-related pulmonary disorders
- Upper airways obstruction syndromes
- Occupational lung diseases and pneumoconiosis
- Air-pollution induced diseases, toxic lung and other inhalational injuries
- Health hazards of smoking
- Drug-induced lung diseases

5. Pulmonary Circulatory disorders

- Pulmonary hypertension and cor pulmonale
- Pulmonary edema
- Pulmonary thromboembolic diseases and infarction
- Cardiac problems in a pulmonary patient and pulmonary complications produced by cardiac diseases

6. Obstructive diseases of the lungs

- Asthma including allergic bronchopulmonary aspergillosis, specific allergen immunotherapy and immunomodulation
- Chronic obstructive lung disease and diseases of small airways

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- Special aspects of management including Long term oxygen therapy, Inhalation therapy and Pulmonary rehabilitation

7. Tumors of the lungs

- Comprehensive knowledge of neoplastic and non-neoplastic diseases of lung including epidemiology, natural history, staging, and principles of treatment (medical, surgical, and radiation)
- Solitary pulmonary nodule

8. Diseases of the mediastinum

- Non-neoplastic disorders
- Benign and malignant (primary and secondary) neoplasms and cysts

9. Disorders of the pleura

- Pleural dynamics and effusions
- Non-neoplastic and neoplastic pleural diseases
- Pneumothorax
- Pyothorax and broncho-pleural fistula
- Fibrothorax

10. Critical Care Pulmonary Medicine

- Management of emergency problems of different pulmonary diseases
- Adult respiratory distress syndrome
- Respiratory failure in the patient with obstructive airway disease
- Respiratory failure in other pulmonary diseases
- Management of sepsis
- Respiratory and haemodynamic monitoring in acute respiratory failure
- Non-invasive and Mechanical ventilation
- Principles of critical care, diagnosis and management of complications; severity of illness scoring systems
- Ethical and end-of-life issues in critical care

11. Extrapulmonary manifestations of pulmonary diseases

12. Sleep-related pulmonary diseases

- Polysomnography
- Sleep apneas

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- Other sleep-disordered breathing syndromes

13. Miscellaneous aspects

- Diseases of the diaphragm
- Disorders of chest wall
- Obesity-related pulmonary disorders
- Oxygen therapy
- End-of-life care
- Aerospace Medicine
- Pulmonary problems related to special environments (high altitude, diving, miners)
- Assessment of quality of life using questionnaires
- Health impacts of global warming

14. Preventive Pulmonology

- Principles of smoking cessation and smoking cessation strategies
- Cardiopulmonary rehabilitation
- Preventive aspects of pulmonary diseases
- Vaccination in pulmonary diseases

III. Surgical aspects of Pulmonary Medicine

- Pre- and post-operative evaluation and management of thoracic surgical patients
- Chest trauma/trauma related lung dysfunction
- Lung transplantation

TEACHING AND LEARNING METHODS

Postgraduate teaching programme

General principles

Acquisition of practical competencies being the keystone of PG medical education, PG training should be skills oriented. Learning in PG program should be essentially self- directed and primarily emanating from clinical and academic work. The formal sessions are merely meant to supplement this core effort.

Teaching methodology

This should include regular bedside case presentations and demonstrations, didactic lectures, seminars, journal clubs, clinical meetings, and combined conferences with allied

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departments. The post graduate student should be given the responsibility of managing and caring for patients in a gradual manner under supervision.

Formal teaching sessions

In addition to bedside teaching rounds, at least 5-hr of formal teaching per week are necessary. The departments may select a mix of the sessions, as given under formative assessment. Further, the student should:

- Attend accredited scientific meetings (CME, symposia, and conferences).
- Attend additional sessions on resuscitation, basic sciences, biostatistics, research methodology, teaching methodology, hospital waste management, health economics, medical ethics and legal issues related to medical practice are suggested.
- There should be a training program on Research methodology for existing faculty to build capacity to guide research.
- The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
- 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 book:** During the training period, the post graduate student should maintain a Log Book indicating the duration of the postings/work done in Wards, OPDs and Casualty. This should indicate the procedures assisted and performed, and the teaching sessions attended. The Log book shall be checked and assessed periodically by the faculty members imparting the training.
- Department should encourage e-learning activities.

Thesis

All MD (Pulmonary Medicine) post graduate students should carry out work on an assigned topic under the direct guidance of a recognised post graduate teacher. A written protocol of the proposed work should be submitted before the end of the first 6 months. Subsequently, the post graduate student should carry out the proposed work for at least 1 year (not inclusive of the period for submitting the protocol and writing-up the final thesis).

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 medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, ie., assessment during training

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.

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 practical/clinical examination.

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, ie., assessment at the end of training

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The Post Graduate Examination shall be in three parts:

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.

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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 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**.**

There shall be four theory papers:

Paper I: General pulmonary medicine and basic sciences;
Paper II: Clinical pulmonary medicine including medical emergencies;
Paper III: Clinical pulmonary medicine including critical care medicine;
Paper IV: Recent advances in pulmonary medicine, and research methodology.

The final qualifying examination should include an assessment of clinical skills in the form of case presentations and discussions. Other rules laid down by the MCI regarding M.D. examinations shall apply here as well.

3. Practical/Clinical and Oral/viva voce Examination:

The post graduate students shall examine a minimum of one long and two short cases.

Oral/viva voce Examination

The oral examination shall be thorough and shall aim at assessing the knowledge and competence of the post graduate student on the subject, investigative procedures, therapeutic technique and other aspects of the specialty which form a part of the examination.

Recommended reading:

Books (latest edition)

1. Harrison's Principles of Internal Medicine ed. Petersdorf (McGraw Hill)
2. Cecil Text book of Medicine ed. Wyngaarden
3. Crofton & Douglas Respiratory diseases ed. Seaton et al (Oxford)
4. Pulmonary diseases & disorders by Fishman (McGraw Hill)
5. Textbook on Pulmonary disease by Fraser & Pare

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6.	Asthma	by Clarke et al
7.	Bronchoscopy	by Straddling
8.	Tuberculosis	by SK Sharma
9.	Lung diseases in the Tropics	ed. OP Sharma (Marcel Dekker)
10.	The Normal Lung	by Murray (Saunders)
11.	Pulmonary Function Testing	by Clausen (Academic Press)
12.	Respiratory Physiology	by J.B. West (Williams & Wilkins)
13.	Physiology of Respiration	by J.H. Comroe (Yearbook Med Pub.)
14.	Respiratory Function in disease	by Bates et al (Saunders)

Journals

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

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Annexure I

Postgraduate Students Appraisal Form
Pre / Para /Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM……TO……

Sr. No.	PARTICULARS	Not Satisfactory	Satisfactory	More Than Satisfactory	Remarks
		1 2 3	4 5 6	7 8 9	
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 CONSULTANT** **SIGNATURE OF HOD**

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GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN RADIODIAGNOSIS

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.

The Goal of this program is to impart training in conventional and modern radiology and imaging techniques so that the post graduate student becomes well versed and competent to practice, teach and conduct research in the discipline of radiology. The student should also acquire basic knowledge in the various sub-specialities of radiology. These Guidelines also would also help to standardize Radiodiagnosis teaching at post graduate diploma (DMRD) level throughout the country so that it will benefit in achieving competent radiologist with appropriate expertise.

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 Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. 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".

SPECIFIC LEARNING OBJECTIVES

The objective of the program is to train a student to become a skilled and competent radiologist to conduct and interpret various diagnostic/interventional imaging studies (both conventional and advanced imaging), to organize and conduct research and teaching activities and be well versed with medical ethics and legal aspects of imaging/ intervention.

SUBJECT SPECIFIC COMPETENCIES

A. Cognitive Domain

A post graduate student on completing MD (Radiodiagnosis) should acquire knowledge in the following areas, and be able to:

1. Acquire good basic knowledge in the various sub-specialties of radiology such as chest radiology, neuro-radiology, GI-radiology, uro-radiology, cardio-vascular-radiology, musculoskeletal, interventional radiology, emergency radiology, pediatric radiology and women's imaging.

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2. Independently conduct and interpret all routine and special radiologic and imaging investigations.
3. provide radiological services in acute emergency and trauma including its medico-legal aspects.
4. Elicit indications, diagnostic features and limitation of applications of ultrasonography, CT and MRI and should be able to describe proper cost- effective algorithm of various imaging techniques in a given problem setting.
5. Decide on the various image-guided interventional procedures to be done for diagnosis and therapeutic management.
6. Able to decide on further specialization to be undertaken in any of the branches in Radiodiagnosis such as gastrointestinal radiology, uro-radiology, neuro-radiology, vascular radiology, musculoskeletal radiology, interventional radiology etc.
7. Able to formulate basic research protocols and carry out research in the field of radiology- related clinical problems.
8. Acquire knowledge and teaching capabilities to work as a post graduate student /consultant in Radiodiagnosis and conduct teaching programmes for undergraduates, post graduates as well as paramedical and technical personnel.
9. interact with other specialists and super-specialists so that maximum benefit accrues to the patient.
10. Should be able to organize CME activities in the specialty utilizing modern methods of teaching and evaluation.
11. Acquire knowledge to impart training in both conventional radiology and modern imaging techniques so that the post graduate student is fully competent to practice, teach and do research in the broad discipline of radiology including ultrasound, Computed Tomography and Magnetic Resonance Imaging.
12. Acquire knowledge of interventional radiology.

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 other 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.

C. Psychomotor domain

Practical Training will include two major aspects:

A) Interpretation of images, and

B) Skill in performing a procedure.

A) Interpretation of images:

The student should be able to interpret images on all imaging modalities of diseases of following organs :

1. **Musculo-skeletal System -** Interpretation of diseases of muscles, soft tissue, bones and joints including congenital, inflammatory, traumatic, endocrine and metabolic, neoplastic and miscellaneous conditions.
2. **Respiratory System -** Interpretation of diseases of the chest wall, diaphragm, pleura and airway; pulmonary infections, pulmonary vasculature; pulmonary neoplasm; diffuse lung disease; mediastinal disease, chest trauma; post-operative lung and X-ray in intensive care.
3. **Cardiovascular System -** Interpretation of diseases and disorders of cardiovascular system (congenital and acquired conditions) and the role of imaging by conventional radiology, ultrasound, colour Doppler, CT, MRI, Angiography and Isotopes Studies.
4. **Gastro-intestinal tract and hepato-biliary pancreatic system** - Interpretation of diseases and disorders of mouth, pharynx, salivary glands, esophagus, stomach, small intestine, large intestine, diseases of omentum, peritoneum and mesentery: acute abdomen, abdominal trauma. Diseases and disorders of liver, biliary system and pancreas**.**
5. **Urogenital System** - Interpretation of various diseases and disorders of genitor-urinary system. These include: congenital, inflammatory, traumatic, neoplastic, calculus disease and miscellaneous conditions.
6. **Central Nervous System (C.N.S.) -** Interpretation of diseases and disorders of the head, neck and spine covering, congenital, infective, vascular, traumatic neoplastic degeneration metabolic and miscellaneous condition.
7. Imaging in Emergency Medicine.
8. Imaging in Obstetrics and Gynecology.
9. Imaging of Breast and interventional procedures.
11. ENT, EYE and Dental Imaging**.**
11. Imaging of endocrine glands and those involved with metabolic diseases.
12. Clinical applied radionuclide imaging.
13. Interventional Radiology

B) Skills in performing a procedure

The student should be able to perform the following procedures:

1) **GIT contrast studies:** Barium studies (swallow, upper GI, Follow through, enema);

fistulogram; sialogram; cologram/ileostogram,

2) **GU:** Excretory urography, MCU, RGU, nephrostogram, genitogram,
3) **Ultrasound:** Studies of whole body including neonatal transfontanell studies, Doppler studies,
4) **CT scan:** should be able to position a patient, plan study as per the clinical indication, do reconstruction of images, perform triple phase study, perform & interpret advanced applications like CT enterography, CT angiography etc.
5) **MRI:** plan and perform MRI studies of whole body
6) **DSA:** should be able to describe the techniques, do (if available to student) transfemoral puncture and insert catheter, help in angiographic procedures both diagnostic and interventional.
7) **Radiography:** should be able to independently do radiography of common and some important uncommon views of different body parts. This includes positioning, centering of X ray beam, setting of exposure parameters, exposing and developing the films. The student should be familiar with not only conventional radiography but with CR and DR systems.
8) **Interventional radiology:** The student should be able to perform simple, common non- vascular procedures under ultrasound and fluoroscopy guidance e.g. abscess drainage, drainage catheter placement, nephrostomy, biliary drainage etc. The student should have knowledge of common vascular interventions e.g stricture dilatation using balloon catheters, embolization with gel foam and other agents, names of common catheters, handling of intravenous contrast reactions; techniques, indications and contraindications for various procedures;

Syllabus

Course contents:

Anatomy

Gross and cross sectional anatomy of all the body systems.

Pathology

Gross morphology of pathological conditions of systemic diseases affecting all organ systems.

Radiology Course

This would cover imaging and interventions of diseases affecting all the body systems:

- Chest
- Cardiovascular system
- Musculoskeletal including soft tissue
- Gastrointestinal system
- Hepato-biliary-pancreatic system
- Urogenital (genito-urinary) system

- CNS including head and neck
- Obstetrics and gynaecology
- ENT, eye, dental, breast
- Endocrine and metabolic system
- Clinically applied radionuclide imaging

Radiological Physics

1. Introduction of general properties of radiation and matter: Fundamentals of nuclear physics and radioactivity
2. Interaction of x-rays and gamma rays with matter and their effects on irradiated materials
3. X-ray Generating Apparatus
4. Screen-film radiography
5. Film processing: Dark room, dry processing, laser /dry chemistry cameras, artifacts.
6. Fluoroscopy: Digital including flat panel units, fluoroscopy cum radiography units
7. Digital radiography: Computed Radiography, Flat panel radiography
8. Other equipments: Ultrasound including Doppler, CT, MRI and DSA
9. Contrast Media (Iodinated, MR & Ultrasound) - types, chemical composition, mechanism of action, dose schedule, route of administration, adverse reaction and their management
10. Nuclear Medicine: Equipments and isotopes in various organ systems and recent advances
11. Picture Archiving and Communication System (PACS) and Radiology Information System (RIS) to make a film-less department and for Teleradiology
12. Radiation protection, dosimetry and radiation biology
13. Image quality and Quality Assurance (QA)
14. Recent advances in radiology and imaging

The student should have knowledge of the following physics experiments:

- Check accuracy of kVp and timer of an X ray unit
- Check accuracy of congruence of optical radiation field
- Check perpendicularity of x ray beam
- Determine focal spot size
- Check linearity of timer of x ray unit
- Check linearity of mA
- Verification of inverse square law for radiation
- Check film screen contact
- Check film screen resolution
- Determine total filtration of an x ray unit
- Processor quality assurance test

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- Radiological protection survey of an x ray unit
- Check compatibility of safe light
- Check performance of view box
- Effect of kVp on x ray output

Radiography and processing techniques

1. Processing techniques: includes dark room and dry processing.
2. Radiography of the musculo-skeletal system including extremities.
3. Radiography of the chest, spine, abdomen and pelvic girdle.
4. Radiography of the skull, orbit, sinuses.
5. Contrast techniques and interpretation of GI tract, hepato-biliary tract, pancreas etc.
6. Contrast techniques and interpretation of the Central Nervous system.
7. Contrast techniques and interpretation of the cardiovascular system including chest.
8. Contrast techniques and interpretation of the genito - urinary system including Obstetrics and Gynaecology.
9. Paediatric radiology including MCU, genitogram, bone age.
10. Dental, portable and emergency (casualty) radiography.

TEACHING AND LEARNING METHODS

The training is spread over 3 years and includes following components:

1. Physics related to imaging
2. Rotational posting in various sub-specialties.
3. Seminars, case discussion, journal club**.**
4. Research methodology and statistics.
5. A log book should be maintained by the student and will be checked and signed regularly by the faculty-in-charge during the training program.
6. The postgraduate students shall be required to participate in the teaching and training program of undergraduate students and interns.
7. The postgraduate student would be required to present one poster presentation, to read one paper at a national/state conference and to submit one research paper which should be published or accepted for publication or sent for publication to a peer reviewed journal, during the period of his/her postgraduate studies so as to make him/her eligible to appear at the postgraduate degree examination.

7. Department should encourage e-learning activities.

Rotations:

During the three-year course, suggested rotations are as follows:-

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1.	Conventional chest, abdomen, musculoskeletal including skull, spine, PNS and mammography etc	8 months
2.	Contrast studies: G.U., GIT, Hepato-biliary, angiography etc including fluoroscopic guided interventions	8 months
3.	US, Doppler and US guided interventions	8 Months
4.	CT and CT guided interventions	6 Months
5.	Emergency radiology	2 Months
6.	M.R.I.	2 Month
7.	Elective posting	2 Months

During each posting, post graduate student should be able to perform the procedures and interpret the findings.

PROPOSED SCHEDULE FOR ROTATION

1ST Year (1/6)	Conventional Chest & abdomen	Conventional skull, spine, musculo-skeletal etc.	US	Contrast studies - GIT & other fluoroscopic investigations	Contrast studies - G.U. tract	US
(2/6)	US & interventions	Conventional skull, spine, musculo-skeletal etc.	CT	Contrast studies -- GIT & other fluoroscopic investigations	Contrast studies - G.U. tract	US & interve - ntions
2nd Year (3/6)	Conventional Chest & abdomen	Contrast studies - GIT & other fluoroscopic investigations including angiography	Contrast studies - G.U. tract	US & interventions	Emergency	CT
(4/6)	Conventional skull, spine, musculo-skeletal etc.	Contrast studies - G.U. tract including pediatric MCU/genito-gram	US & intervent - ions	US & Doppler	Emergency	MRI
3rd year (5/6)	Conventional Chest & mammo - graphy	Contrast studies - GIT & other fluoroscopic investigations including angiography	US & Doppler	Emergency	CT & inter-ventions	Elective
(6/6)	Conventional musculo-skeletal & mammo-graphy	Contrast studies - G.U. tract including pediatric MCU/genito-gram	CT& inter-ventions	CT & inter-ventions	MRI	Elective

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 medical colleges is mandatory.

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.

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 practical/clinical examination.

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.**

Postgraduate Examination

The Post Graduate Examination was conducted in three parts.

1. **Thesis:**

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognized Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis (Dissertation). 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 /

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Practical examination. The thesis shall be examined by a minimum of 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 Examination

The examinations shall be organized 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. shall be held at the end of 3rd academic year. An academic term shall mean six month's training period**.**

There shall be four theory papers:

Paper I: Basic sciences related to Radiology (consists of Anatomy, Pathology, Basic and Radiation Physics, Imaging Techniques, and Film processing).

Paper II: Chest, CVS, CNS including Head & Neck, Eye, ENT, musculo-skeletal, pediatric radiology and Mammography.

Paper III: Abdominal Imaging including GI, GU, Hepatobiliary, endocrine and metabolic, Obstetrics and Gynaecology and Interventional radiology

Paper IV: Recent advances, nuclear medicine; Radiology related to clinical specialties

All papers would consist of short answer questions (minimum 10) covering all aspects of the course.

3. Practical/clinical and oral Examination (will include cases, spots, ultrasound procedure, physics, implements etc)

Practical Examination will have:

1. 3-4 Cases
2. Film Quiz (50 – 60 Spots)
3. To perform Ultrasound on a patient

Oral/Viva voce will include:

- Radiation Physics and quality assurance
- Implements, Catheters and contrast
- Cassettes, films, dark room, equipment
- Radiographic techniques, Radiological procedures,
- Gross pathology

Suggested Reading:

Books (latest edition)

1. Grainger & Allison's Text book of Diganostic Radiology (Churchill Livingstone)
2. Textbook of Gastrontestinal Radiology- Gore and Levine (Saunders)
3. MRI of Brain and Spine - Scott Atlas (LWW)
4. Diagnosis of Diseases of the Chest -Fraser
5. Diagnostic Imaging Series: (Amirsys, Elsevier)
   Abdominal Imaging, Orthopedics, Head and Neck, Neuroradiology, Pediatric Radiology Chest, Obstetrics, Breast
6. MRI in Orthopedics and Sport Injuries - Stoller
7. Skeletal Radiology - Greenspan
8. Abdominal-Pelvic MRI - Semelka (lWW)
9. Caffey's Pediatric Radiology
10. CTI and MRI of the whole body- John R. Haaga
11. Text Book of Radiology and imaging - Davod sulton
12. Diagnostic ultrasound - Carol C. Rumack
13. AIIMS-MAMC-PGI's Comprehensive Textbook of Diagnostic Radiology, Volumes 1, 2, 3

Journals

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

1. ~~American Journal of Roentgenology~~
2. ~~Radiology~~
3. ~~Seminars in Ultrasound, CT, MRI~~
4. ~~Radiographics~~
5. ~~Clinical Radiology~~
6. ~~British Journal of Radiology~~
7. ~~Radiological Clinics of North America~~
8. ~~Pediatric Radiology~~
9. ~~Australasian Radiology~~
10. ~~Journal of Computerized Axial Tomography~~
11. ~~Clinical Imaging~~
12. ~~MR Clinics of North America~~
13. ~~Seminars in Roentgenology~~

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Annexure

Postgraduate Students Appraisal Form Pre / Para /Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM……TO……

Sr. No.	PARTICULARS	Not Satisfactory	Satisfactory	More Than Satisfactory	Remarks
		1 2 3	4 5 6	7 8 9	
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 CONSULTANT SIGNATURE OF HOD

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GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN RADIOTHERAPY

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.

Oncology is a highly specialized and technical discipline in clinical medicine comprising treatment with ionizing radiations and cytotoxic agents as major arms in non-surgical management and treatment of cancer. With a view to update, by inclusion of newer topics, and to provide a uniform syllabus and course contents in Indian universities and teaching medical institutions, the proposed guidelines provide course outlines based on recent developments in clinical medicine and other disciplines related to oncology.

The **goal** of providing training under this specialty is to enable the post graduate students to acquire complete knowledge in diagnosis and comprehensive management of cancer patients with radiotherapy. This clinical specialty is exclusively focused only on oncology at the post-graduate level. Hence, the doctors trained under this field, after completing their course, should be fully capable of handling cancer patients with non-surgical modalities of diagnosis and treatment. Besides, as per WHO, they should also be capable of guiding and coordinating cancer prevention (?), control, screening, early detection, rehabilitation, palliative and terminal care programs for these patients in the country as per the evolving needs and to meet the objectives of the National Cancer Control Programme of India. The post graduate students would also be expected to have acquired knowledge of various research methodologies, a broad based training in all aspects of cancer science and treatment and be able to plan/coordinate research studies in the departmental, and be a part of inter-departmental or multi-centric, national/international research programmes.

The PG students would have clinical management of these patients during radiation therapy and will also advise and supervise their palliative, supportive and terminal care, whenever needed, in coordination with other supportive staff. By the end of the three year course, the post graduate student is expected to have acquired a wide knowledge of malignant disease processes and efficient management of patients with cancer. The main emphasis during training shall be on radiotherapy (and combined practice with anti-cancer chemotherapy), but a good knowledge of general medicine, surgery, head & neck region, gynaecology and pathology as pertaining to Radiation Oncology.

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 Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. 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 COMPETENCIES

1. Demonstrate the ability to diagnose and treat all cases of malignancies using updated guidelines in medical and radiation oncology with special ability to maintain inter disciplinary coordination.
2. Demonstrate the ability to address all emotional issues in patients and family members in relation to diagnosis, therapy, terminal care and mortality related to malignancies
3. Organise proper promotive and preventive care strategies in the community aimed at reducing the burden of care in malignancies
4. Lead and participate in planning and execution of team work related to establishment and maintenance of infrastructure related to radiation therapy, conforming to the updated guidelines
5. Plan and conduct research related to the topic
6. Demonstrate the ability to organise teaching / training sessions for students and health workers in topics related to cancer prevention and care.

SUBJECT SPECIFIC LEARNING OBJECTIVES

The objectives of the MD programme in Radiotherapy (Is it possible to use one term, either Radiation Oncology or Radiotherapy/) is to impart knowledge, practical skills and clinical experience in the non-surgical treatment of cancer.

A. Cognitive domain

The students after successful completion of their training, should have acquired knowledge in the following:

1. Theoretical and practical knowledge for competent, safe, compassionate & ethical multidisciplinary practice of oncology and should contribute to the future *developments in oncology.*
2. The epidemiology, etiology, pathology & natural history of human neoplastic diseases.
3. Knowledge, experience & skill in the clinical diagnosis of human neoplastic diseases.
4. Attain knowledge and a high level of technical expertise in all forms of radiation as a therapeutic tool used in radiotherapy
5. Knowledge of the adverse effects of radiation including radiation related accompaniments.
6. Knowledge and comprehension regarding the use of cytotoxic drugs and biological response modifiers etc in all clinical and research settings with detailed knowledge of adverse effects of these drugs.
7. Knowledge and comprehension with the role of surgery in the management of neoplastic diseases.

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8. Knowledge and ability to judiciously combine various modalities in comprehensive, multi-disciplinary management of cancer patients; coordinate with other specialty experts in the team and plan for use of radiation and cytotoxic drugs integrated into the overall treatment plan
9. A sound knowledge and capability to manage cancer patients as a whole, including
    a) Management of oncological emergencies,
    b) complications associated with malignant diseases and its management,
    c) psychosocial problems,
    d) prevention, rehabilitation and palliative care.
10. Knowledge and capacity to interpret current advances in cancer management and research (basic, clinical and applied aspects of research including radiobiology & molecular oncology).
11. Knowledge and capability to plan and coordinate community based screening, early detection, and awareness programmes including community-based research projects.
12. Basic knowledge of the different statistical methods used in collection, analysis and interpretation of data related to cancer (with special emphasis on planning & interpretation of clinical trials)
13. Knowledge and capability to set up the specialty department and facilities for Oncology in different parts of India.
14. Able to interact with the Government and other agencies as a nodal person for planning development of specialty of radiation oncology.
15. A broad knowledge of different types of investigations in the management of patients with cancer.

B. Affective Domain:

The student:

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 other 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.

C. Psychomotor domain

The student, at the end of the course, should have acquired the following skills:

I. Skills and Clinical Experience:

Considerable familiarity and skills in the application of imaging techniques, nuclear medicine procedures, pathology and other aids in the diagnosis and

management of cancers. Post graduate students **need to have gained a wide range of experience in the areas of patient care which would include** investigation, diagnosis, treatment with radiation, and in palliative and supportive care and to have gained the practical experience detailed below:

1. Radiotherapy – Basic Techniques

a. *Positioning the Patient*

- Setting up of a patient in each of the three basic treatment positions (supine, prone and lateral) to allow the patient to be planned and treated effectively and without discomfort,
- Setting up the source skin distance for fixed FSD, and extended FSD treatment,
- Setting up patients using laser beam alignment,
- Making temporary and permanent marks on the patient for field positions (Gentian violet, tattoo).

b. *Immobilisation Techniques*

- Application of some of the following immobilisation techniques: head clamp, Velcro strap, polystyrene beads, vacuum bag, breast arm rest,
- The construction of thermoplastic beam direction shell.

c. *Methods of Target Volume Determination*

- Performance of planning
  - using direct vision of the tumour (eg skin tumours),
  - from surface landmarks (eg the parotid bed, breast tumours),
  - with direct screening using simulator (eg lung tumours, bone metastases), including opacification techniques (eg barium swallow, cystogram),
  - by volume transfer to orthogonal radiographs (eg head and neck tumours, brain tumours),
- Volume determination from planning CT scans for creating a central axis plan and for 3-dimensional CT planning.

d. *Outline Techniques*

- Use of manual techniques (flexi-curves, plaster of Paris bandage) and CT derived outlines.

e. *Basic Field Arrangements*

- Planning of treatments (under supervision where necessary) using the following field arrangements:
  - Single direct field,
  - Opposed pair of fields using equal and unequal weightings,
  - Opposed pair using wedges,

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- Wedged right-angled pair,
- Wedged oblique pair,
- Plans using 3 and 4 fields,
- Total body irradiation.

f. *Tissue Compensation*

- Planning of patients requiring tissue compensation using bolus, wedges and remote tissue compensators

g. *Shielding*

- Planning of patients using lead cut outs and lead masks for simple superficial tumours,
- Knowledge of the thickness of lead required for superficial, orthovoltage and electron treatments at various energies,
- Prescription and insertion of eye shields.

h. *Megavoltage Techniques*

- Planning of patients incorporating simple lead blocking techniques using standard blocks and cast blocks from templates

i. *Electrons*

- The indications for, and planning of, electron treatments, including the selection of electron energy,
- A technique for total skin electron therapy and experience of its use.

j. *Dose Calculation*

- Proficiency in the use of equivalent square tables,
- Performance of depth dose calculations for single fields and opposed fields using various energies,
- The principles applied to convert dose to machine units for a range of machines,
- The principles of computer based treatment planning.

k. *Radiotherapy Prescriptions*

- Writing radiotherapy prescriptions (countersigned where necessary) for all the field arrangements mentioned above,
- Understanding of dose specification as in ICRU 50 and 62.

l. *Radiotherapy Machines*

- Planning of patients for treatment on a full spectrum of equipment, including superficial x-ray therapy, megavoltage x-ray therapy and megavoltage electron therapy (also orthovoltage x-ray therapy and cobalt-60 therapy, if available)

m. *Quality Assurance in External Beam Therapy*

- Requesting portal imaging and interpreted their appearance satisfactorily in all sites
- Principles of *in vivo* dosimetry and interpretation of results

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n. *Brachytherapy*

- The insertion and removal of radioactive sources manually or using an appropriate after-loading device,
- Interpretation of subsequent check films,
- Interpretation of the corresponding dose calculation and writing of an appropriate prescription,
- Removal of live sources and the after-loading device,
- The placement of implants,
- Principles of oral and intravenous radionuclide therapy.

o. *Radiation Safety*

- The role of the radiation safety and radiation protection supervisor,
- The meaning of and requirements for controlled and supervised areas and their location,
- The procedure to be adopted in the case of a spill of radioactive material,
- Quality assurance practices in radiotherapy and the procedures for dealing with errors in treatment delivery.

2. Radiotherapy Assessment and the Care of Patients on Treatment:

a. *Treatment Review Clinics*

- Regular weekly treatment review clinics

b. *Treatment Checks*

- Assessment of patient position and treatment field placement(s) in relation to the target volume at the start of treatment,
- Performance of checks during the course of treatment on the implementation of the treatment plan, position of shielding for critical normal structures and the use of portal imaging,
- Assessment of changes occurring in patient parameters during treatment and resultant modification of treatment when appropriate,
- Assessment of normal tissue reactions to radiotherapy,
- Use of dose volume histograms and in vivo radiation dosimetry techniques.

c. *Symptom Control*

- Giving advice on skin care during radiation treatment and on the management of skin reactions, including desquamation,
- Managing mucosal reactions in oral cavity, oropharynx, nasopharynx, trachea, oesophagus, anus and vagina,
- Giving dietary advice during abdominal radiotherapy,,

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- Managing radiation induced nausea and vomiting, diarrhoea, dysphagia, xerostomia and cystitis,
- Giving prophylaxis for radiation induced cerebral oedema,
- Giving advice on timing and extent of hair loss with respect to radiation dose,
- Giving advice for hospitalization, if necessary.

d. *Follow-up*

- Managing acute and chronic radiation sequelae, such as pneumonitis, cystitis, chronic bowel complications, gynaecological sequelae (vaginal stenosis, vaginal dryness, infertility and dyspareunia)

3. Supportive and Palliative Care

a. *Pain Relief*

- Drug treatment
  - A wide range analgesic techniques, including simple analgesics, mild and strong opioids, given by a variety of routes,
  - Management of the complications of analgesics, including constipation, nausea, gastro-intestinal discomfort and analgesic intolerance.
- Mechanical methods
  - Prescription, siting and evaluation of TENS analgesia,
  - Referral of patients with refractory pain for procedures such as a nerve block, intrathecal analgesia, rhizotomy or orthopaedic stabilization.
- Radiotherapy
  - Use of radiation to treat painful metastatic disease with single fractions, multiple fractions and hemi-body radiotherapy

b. *Nausea and Vomiting*

- Treatment of nausea and vomiting arising in advanced illness using anti-emetics,
- Palliative management of sub-acute intestinal obstruction.

c. *Anorexia and Dysphagia*

- Management, where appropriate, with corticosteroids, progestogens and nasal gastric feeding

d. *Pleural Effusions and Ascites*

- Drainage of pleural effusions and ascites,
- Other treatments such as pleurodesis.

e. *Depression and Anxiety*

- Knowledge regarding treatment of depression at all stages of cancer management, using counselling and drug techniques with anti-depressants,

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- Knowledge regarding treatment of anxiety with counselling, anxiolytics and major tranquilisers.

f. *Hospice Care*

- Awareness of local hospice facilities,
- A one week (at least) attachment to a hospice or palliative care team.

g. *Counseling*

- Counseling of patients and relatives at all stages of the disease

4. Investigational Techniques

a. *Laboratory Investigations*

- Interpretation of the results of haematological, biochemical and radioimmunoassay investigations

b. *Radiology*

- Attendance at regular radiological review sessions involving a consultant clinical radiologist for the examination of plain x-rays, CT scans, magnetic resonance imaging and ultrasound covering the whole spectrum of cancer radiology,
- Current indications and techniques in interventional procedures.

c. *Radiation Medicine Procedures*

- Diagnostic Imaging – Gamma Camera, SPECT, PET Scanner, PET-CT and PET-MRI image fusion studies in treatment planning, response evaluation and follow up.

d. *Pathology*

- Attendance at regular pathological review sessions involving a consultant pathologist

e. *Genetics in diagnosis, prognosis and treatment of cancer*

f. ***Other Procedures***

- Indirect laryngoscopy
- Lumbar puncture
- Skin biopsy
- Fibre optic naso-endoscopy
- Pelvic EUA and cystoscopy

5. Site or Disease Specific Procedures

- Assessment, treatment and follow-up, in detail, for each of the anatomical sites and types of tumour,
- Presentation and assessment of patients discussed at multidisciplinary team meeting,
- Staging,
- Radiotherapy – adjuvant, radical and palliative,
- Hormone and biological therapy,
- Palliative care,

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- Appropriate follow up,
- Acute and late side effects of treatment.

6. Clinical Trials, Literature and Research

- The aims and format of Phase I to IV clinical trials,
- Obtaining informed consent, following study protocols and using data forms,
- Research programmes (although research experience is not a prerequisite),
- Major areas of current research and of recent important publications,
- Submission of a research project to an Ethics Committee,
- Structure and functioning of local and national clinical and research cancer networks.
- Ethics guidelines of research

7. Communication and Publication

- Effective communication with colleagues, patients and their carers,
- Giving clear and comprehensive descriptions of disease processes, investigations and treatment,
- Clear expression in English/local script and production of legible script,
- Preparing work for publication.
- Ethics of research publication

8. Outpatient and Joint Clinics

- Participation in joint consultative clinics and regular general oncology outpatient sessions,
- Seeing review and new patients and planning their overall management.

9. Resource Management and Quality Assurance

- Introduction to the resource management and quality assurance of an oncology service, so as to be able to develop these skills at a later stage

10. Prevention

- A broad knowledge of the environmental causes of cancer and possible strategies for prevention

11. Screening

- Details of screening programs for cervical, breast, Head & Neck, Lungs, Prostate, GIT and other cancers which might form a major proportion of cancer cases in the country in the years to come.

12. Genetics

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- The familial aspect of some cancers as in colorectal, breast, ovary, retinoblastoma, multiple cancer syndromes etc and the management of high risk families and genetic counseling.

Syllabus

Course contents:

Subjects for Part - I (First Year)

Paper - I

Basic Sciences

1. Applied Anatomy and Physiology

A. Applied anatomy of oral cavity, larynx, pharynx, paranasal sinuses, CSF pathways salivary glands, middle ear, external orbit, breast, broncho-pulmonary segments, mediastinum, oesophagus, liver, spleen, stomach, small and large bowels, pelvic and genitor-urinary organs (bladder, uterus, ovary, testis rectum, anal canal etc.), spinal segments

B. Lympahtic system and lymphatic drainage pathway of various organs

C. Relationship of vital structures

D. Surface Anatomy pertaining to various organs

E. Cross Sectional Anatomy pertaining to US/CT/MR/PET images

F. General principles of physiology of respiratory, cardio-vascular, nervous, biliary, reproductive and endocrine systems and fluid-electrolyte-metabolic balance

2. Various Investigative and Imaging Procedures including radio-isotope based procedures in Diagnosis, Staging, Treatment Planning and follow up of cancer patients

3. Pathology of Benign and Malignant Diseases

A. Carcinogenesis - epidemiological studies, molecular studies, genetic basis, oncogenes, tumour growth kinetics

B. Pre-cancerous conditions

C. Methods of dissemination of cancer and its biological behaviour

D. Degree of differentiation of cancer

E. Principles and methods of definite diagnosis

i). Surgical biopsy - various procedures of biopsy

ii). Exfoliative cytology

iii). Fine Needle Aspiration Cytology (FNAC) and biopsy

iv). Tumour markers

F. General histologic and cytologic features of malignancy including features of special staining, surface markers, intracellular markers

G. Classification of benign and malignant tumours and their interpretation

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H. Molecular pathology, molecular basis of diagnosis and prognosis of cancers

I. Radiation pathology

4. Staging of various cancers:

i. Evolution of different staging systems for various cancers over the years.

ii. Clinical Staging, WHO Staging, TNM Staging, AJCC Staging and FIGO staging etc of various cancers, as applicable, with their inter-comparisons.

5. International Coding and classification of various neoplastic disorders

i. ICD-9, ICD-O and ICD-10 system of classification and coding of various tumours.

Paper II (Part I)

I. Radiation Physics

The following courses of study and the subjects are recommended for training in MD Radiotherapy and Oncology. It is essential that these topics be covered in detail for better understanding of the basics of radiation treatment, as per subject heads given below:

1. Atomic and Nuclear Structure
   - A. Atomic structure
     1. Energy levels, binding energy
     2. Transitions, characteristic radiations
   - B. Nuclear structure
     1. Mass, atomic and neutron numbers
     2. Nuclear binding energy
     3. Fission, fusion
     4. Nuclear reactors
2. Radioactive Decay
   - A. Modes of decay
     1. N/P ratio, even-odd relationship
     2. Beta decay
     3. Positron decay and electron capture
     4. Alpha decay
     5. Isomeric transitions, gamma emission, internal conversion
   - B. Mathematics of Radioactive Decay
     1. Units, half life, graphing
     2. Transient and secular equilibrium
     3. Radionuclide generators
   - C. Natural Radioactivity
     1. Naturally occurring isotopes
     2. Decay series
   - D. Artificial Radioactivity
     1. Production by neutron bombardment
     2. Fission products
     3. Production by charged particle bombardment
     4. Radioactivity equilibrium

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3. Production of X-rays
    A. X-ray tubes
        1. Requirements for X-ray production
        2. Historical development
        3. Focal spot size
        4. Reflection and transmission targets
        5. X-ray production efficiency
    B. X ray circuits
        1. Primary circuits
        2. Secondary circuit
        3. Filament circuit
        4. Modes of rectification
4. High Energy Treatment Machines
    A. Cobalt units
    B. Van de graaff generators
    C. Linear accelerators
    D. Betatrons
    E. Resonance transformers
    F. Cyclotrons for neutron therapy
    G. Microtron, Synchrocyclotron and Particle Accelerators
5. Interactions of X - and Gamma-rays
    A. Attenuation of a beam of x- or gamma-rays
        1. Attenuation and absorption coefficients
        2. Attenuation in the body
    B. Modes of interaction
        1. Photoelectric absorption
        2. Compton scattering
        3. Pair production
        4. Photo-disintegration
6. Interactions of Particulate Radiations
    A. Types of interactions
        1. Elastic, inelastic
        2. Excitation, ionization
    B. Properties of particulate radiations
        1. Specific ionization
        2. LET
    C. Interactions of heavy charged particles and pions
        1. Bragg's peak
        2. Applications in radiation therapy
    D. Interactions of electrons
        1. Interactions with electrons
        2. Interactions with nuclei
        3. Applications to radiation therapy
    E. Neutron interactions

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1. Slow neutron interactions
2. Fast neutron interactions
3. Applications with radiation therapy

F. Radioactive sources used in diagnosis and therapy - Production and properties

7. Measurement of Radiation Exposure

A. Photon and energy flux density and fluence

B. The roentgen

C. Electronic equilibrium

D. Ionization chambers

1. Free-air chambers
2. Thimble chambers
3. Condenser chambers
4. Electrometers
5. Extrapolation chambers

E. Exposure calibration of an X - or gamma - ray beam

1. Selection of calibration variables
2. Selection of chamber
3. Positioning of chamber
4. Corrections to readings

F. Quality assurance checks on radiation therapy units

8. Radiation Quality

A. Measures of quality

1. HVL and effective energy

B. Factors influencing quality

1. Variations in quality across a beam
2. Filtration an acceleration potential

9. Measurement of Absorbed Dose

A. Units of radiation dose, dose equivalent, RBE-dose

B. Calculation of dose from exposure

C. Measurement of absorbed dose with an ionization chamber

1. Bragg-Gray cavity theory

D. Direct measurement of absorbed dose

1. Film
2. TLD
3. Calorimetry
4. Chemical dosimetry

10. Calibration of High Energy Photon and Electron Beams

A. Photons

1. Stopping power ratios and energy absorption coefcients
2. Acq
3. C

B. Electrons

1. C_E

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11. Dose Distribution, External Beam Therapy

A. Dosimetric variables
   1. Backscatter factor
   2. Percent depth dose
   3. Tissue - air ratio
   4. Scatter - air ratio
   5. Tissue - maximum and tissue-phantom ratios
   6. Isodose distributions
   7. Treatment time calculations
   8. Fixed SSD and isocentric treatment techniques
   9. Beam Modulation

B. Single and multiple field dose distributions
   1. Corrections for wedges
   2. Design for compensating filters
   3. Corrections for surface obliquities
   4. Corrections for heterogeneities
   5. Dose perturbations at interfaces
   6. Adjoining fields
   7. Integral dose

C. Dose distribution for rotational therapy

D. Calculation of dose in large, irregular fields

12. Dose Distribution, Sealed Source Therapy

A. Handling of sealed radioactive sources

B. Dose distributions for sealed implant sources

C. Design of sealed source implants

D. Radium and its substitutes

E. Special techniques for ^{192}Ir and ^{125}Ir

F. Other sealed sources in therapy

13. Computerized Treatment Planning

A. External X-and gamma-ray beams
   1. Rectangular fields
   2. Irregular fields
   3. Inverse Planning

B. Electron beams

C. Implanted sources
   1. Intracavitary sources
   2. Interstitial implants
   3. Surface mould

14. Radiation Protection from External Sources

A. Concepts and units
   1. Quality factors
   2. Dose equivalent
   3. Protection regulations

B. Treatment room design

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1. Primary radiation
2. Scatter
3. Leakage
4. Special problems with high energy photon and electron beam
5. Special problems with neutron, proton and π-meson

C. Sealed source storage

D. Protection surveys

E. Personnel monitoring

15. Radiation Protection from Internal Sources

A. Body burdens and critical organs

1. Effective half lives for uptake and elimination.

B. Internal dose computations

1. Locally absorbed radiation
2. Penetrating radiation

C. Handling radionuclide therapy patients

D. Licensing procedure for using radionuclides

16. Planning of a Radiotherapy Department

A. Building designs

B. Choice of various equipments and sources

C. Acceptance and Calibration Tests

D. Various maintenance steps and procedures

17. New Radiation Modalities:

A. Protons

1. Production
2. Processes of absorption
3. Depth dose patterns
4. Advantage compared with x-rays
5. Facilities available

B. Neutrons

1. Production
2. Processes of absorption
3. Depth dose patterns
4. Advantages compared with x-rays
5. Facilities available

C. Pions

1. Production
2. Processes of absorption
3. Depth dose patterns
4. Advantages compared with x-rays
5. Facilities available

D. High energy heavy ions

1. Production
2. Processes of absorption
3. Depth Dose Patterns

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4. Advantages compared with x-rays
5. Facilities available

II. Radiobiology (Radiobiology and Laboratory Radiotherapy)

1. Mammalian Cell Radiosensitivity

A. Apoptosis, Interphase and reproductive death
B. Cell survival curves in vitro
C. Characterization of cell survival curves
D. Critical sites and target theory
    1. DNA
    2. Membranes
E. Dose response curves in vivo
    1. Skin clone
    2. Surviving crypts
    3. Bone marrow colonies growing in spleen, monolayer culture
F. Quantitative normal tissue reaction based on systems
    1. Pig skin
    2. Rodent skin
    3. Lung
    4. Esophagus
    5. Kidney
    6. CNS and spinal cord

2. Factors that Modify Radiation Response

A. The Oxygen effect
    1. Effect of oxygen concentration
    2. Time of action of oxygen
    3. Mechanism of the oxygen effect
    4. Implications for radiotherapy
    5. Methods to overcome problems of hypoxic cells
B. The age response function
    1. The cell cycle
    2. Age response for cells cultured in vitro
    3. Age response for tissues in vivo
    4. Age response for neutrons
    5. The oxygen effect through the cell cycle
    6. Implications for radiotherapy
C. Potentially Lethal damage
    1. Repair *in vitro*
    2. Repair *in vivo*
    3. PLD and high LET radiations
    4. Implications in radiotherapy
D. Sublethal damage
    1. Split-dose experiments with cell in vitro

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2. Sublethal damage repair in normal tissues
3. Sublethal damage repair in tumours
4. Sublethal damage and hypoxia
5. Sublethal damage and high LET radiations
6. Dq as a measure of repair

E. Dose-rate
1. Dose-rate effects in cells *in vitro*
2. Dose-rate effect in normal tissues
3. Dose-rate effect in tumours
4. Interstitial therapy
5. Beam therapy at low dose rate

F. Radiosensitizers
1. The halogenated pyrimidines
2. Hypoxic cell radiosensitizers
    a. Structure and mode of action
    b. Enhancement ratio
    c. Metronidazole/misonidazole
    d. Pharmacokinetics in the human
    e. Clinical limitations
3. Antibiotics

G. Radioprotectors
1. Free radical scavengers

3. Linear Energy Transfer

A. Definition

B. Track and energy average

C. LET for different types of radiation

D. OER as a function of LET

4. Relative Biological Effectiveness (RBE)

A. Definition

B. RBE for different cells and tissues

C. RBE as a function of dose

D. RBE and fractionation

E. RBE as a function of LET

F. Q factor

5. Cell and Tissue Kinetics

A. The cell cycle

B. Autoradiography

C. Constituent parts of the cell cycle

D. Percent labeled mitoses technique

E. Growth fraction

F. Cell loss factor

G. Growth kinetics of human tumours

6. Tissue Radiosensitivity

A. Classification based on radiation pathology

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B. Types of cell populations

1. Self renewal
2. Conditional renewal
3. Stem cell
4. Differentiated

7. Time-Dose and Fractionations

A. The 4 R's of radiobiology

B. The basis of fractionation

C. The Strandquist's plot

D. Nominal standard dose

E. Linear Quadrate equation

8. Hyperthermia

A. Methods of heating

1. RF microwaves
2. Ultrasound
3. Water baths

B. Systematic hyperthermia

C. Localized heating

D. Cellular response to heat

E. Repair of thermal damage

F. Thermotolerance

G. Hyperthermia combined with ionizing radiations

H. Time sequence of heat and irradiation

I. Hypoxic cells and heat

J. Effect of pH on the response to hyperthermia

K. Response of transplanted tumours to heat

L. Response of spontaneous tumours to heat

M. Response of normal tissues to heat

N. Heat and the therapeutic gain factor

O. Hyperthermia and chemotherapy

9. Total Body Irradiation – Acute Effects

A. Prodromal radiation syndrome

B. Central nervous system / cerebrovascular syndrome

C. Gastrointestinal syndrome

D. Haematopoietic syndrome

E. Mean lethal dose: (LD_{50})

F. Treatment of radiation accident

10. Late Effects

A. Probabilistic/Deterministic (Stochastic/Non-Stochastic) effects

B. Non-specific life shortening

1. Definition
2. In animals
3. In man

C. Carciongenesis

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1. The latent period
2. Dose response curve in animals
3. Leukemia
4. Breast cancer
5. Thyroid cancer
6. Bone cancer
7. Skin cancer
8. Lung cancer
9. Other tumours
10. Malignancies in prenatally exposed children

11. Mechanisms of Radiation Carcinogenesis

A. Genetics of irradiation

1. Point mutations
2. Relationship to dose
3. Chromosome aberrations
4. Relationship to dose
5. Doubling dose
6. Genetically significant dose (GSD)
7. Genetic effect in humans
8. Background radiation in relation to the GSD

12. Radiation Effects in the Developing Embryo and Fetus

A. Intrauterine death

B. Congenital abnormalities including neonatal death

C. Growth retardation

D. Dependence of the above effects on dose, dose-rate and stage in gestation

E. Carcinogenesis following *in utero* exposure

F. Human experience of pregnant women exposed to therapeutic doses

G. Occupational exposure of potentially pregnant women

H. Elective booking or "10 day rule"

I. The "Practical threshold" for therapeutic abortion

III. Radiation Pathology:

1. Radiophysiology of Human Tissues

A. Effects or irradiation of the skin

1. Clinical manifestations
2. Histological substratum of effects
3. Repair
4. Degree of sequelae
5. Injurious effects

B. Effects of irradiation of bone and cartilage

1. Effects on growing bones and cartilage
2. Effects on adult bones and cartilage
3. Clinical manifestations
4. Histological substratum of effects
5. Functional consequences and sequelae

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C. Effects of irradiation of the kidney

1. Clinical manifestations
2. Histological substratum of effects
3. Acute and chronic functional repercussions
4. Permanent Sequelae

D. Effects of irradiation of the lung

1. Acute clinical effects
2. Ultimate effects
3. Histologic substratum of effects
4. Measures to reduce final effects
5. Sequelae

E. Effects of irradiation of nervous tissues

1. Effects on the brain
2. Effects on the spinal cord
3. Effects on the peripheral nerves
4. Clinical manifestations
5. Histological substratum
6. Sequelae

F. Effects of irradiation of the ovary

1. Clinical manifestations
2. Histological substratum
3. Reversibility of effects
4. Therapeutic implications

G. Effects of irradiation of the testis

1. Clinical consequences
2. Histological substratum
3. Reversibility
4. Protective measures

H. Effects of irradiation of the eye

1. Clinical consequences
2. Histological substratum
3. Protective measures
4. Time-dose connotations
5. Sequelae-therapy

I. Effects of irradiation of lymphoid tissues

1. Clinical manifestations
2. Histological manifestations
3. Reversibility

J. Effects of irradiation of the bone marrow

1. Clinical and laboratory manifestations
2. Chronology of effects
3. Histologic substrarum
4. Recovery
5. Therapeutic applications

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K. Effects or irradiation of the oral, pharyngolaryngeal and esophageal mucous membrane

1. Clinical manifestations
2. Histological manifestations
3. Repair
4. Sequelae

L. Effects of irradiation of the salivary glands

1. Acute manifestations
2. Histological substratum
3. Dental consequences
4. Prophylaxis

M. Radiation effects observable in clinical radiotherapy

1. Technological protection
2. Role of total dose
3. Role of fractionation
4. Measures of prevention
5. Therapeutic measures

N. Effects of irradiation of human embryo

1. Role of age
2. Role of dose
3. Teratogenic effects
4. Measures of prevention

O. SOMA Scales

IV. Basics of Chemotherapy:

A. Classification, mechanisms of action and pharmacokinetics of anti-cancer (cytotoxic) drugs including Biological Response Modifiers

B. Rationality of using cytotoxic drugs as single agents and as multi-drug protocol in various clinical settings

C. Dosages/Modes/routes of administration of cytotoxic drugs

D. Complications/adverse effects of various cytotoxic drugs

PART – II

Paper I

Principles of Radiotherapy allied specialties

I. Clinical Practice of Radiotherapy and Oncology

A. Principles of Radiotherapy

1. General – Radiosensitivity and Radiocurability
   - Tumor lethal dose, Tissue Tolerance and Therapeutic Ratio (TR)
   - Factor influencing TR
   - Target Volume
   - Choice of Time, dose fractionation and technique
2. Teletherapy

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Radiation factors

Megavoltage therapy

Orthovoltage therapy

Electron therapy

Heavy particle therapy (Neutron, photon, pi-meson)

3. Brachytherapy

Radium and its substitutes

Practice of - surface, intracavitary and interstitial

Clinical application

Rules and techniques

1. Newer developments
2. Afterloading
3. Low and high dose rates

B. Techniques of Radiotherapy

Small field beam directed therapy

Extended and irregular field therapy

Single, double and multiple field therapy

Beam modification therapy (wedge filter / compensator etc.)

Rotation and Arc therapy

IMRT, IGRT, Tomotherapy

Newer Techniques

Techniques in Brachytherapy

Intracavitary

Interstitial

Mould application

Modern development and afterloading devices

C. Clinical Practice

Radical (curative)

Palliative

Pre-operative

Post-operative

Supplementary

Combination (both Pre- & Post operative – Sandwitch technique)

Nutritional care and local hygiene during and after therapy

D. Treatment Planning and Presentation

Mouldroom practices

Simulation

Computerised treatment planning system

Clinical dosimetry

Prescription and execution

E. General histologic and cytologic features of malignancy

F. Classification of benign and malignant tumours and their interpretation

II. Related Specialties: surgical oncology and medical oncology

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A. Principles and practice of general surgery, gynecology an pediatric surgery as related to cancer

Surgical treatment decisions

Surgical diagnosis and staging of cancer

B. Cancer Chemotherapy and Hormones

Chemotherapy

Principles and clinical practice

Classification of drugs

Clinical application of

a. Single drug therapy

b. Polychemotherapy and various combinations

c. Adjuvant therapy

d. Prophylactic therapy

Complication of the chemotherapy and its management

Recent developments

Drug schedules

Hormone Treatment in Cancer

General principles

Role in cancers of the Breast, thyroid, prostate, kidney etc.

Complications and their management

C. Clinical staging and TNM system

Staging procedures

Methods of clinical staging an TNM classification

D. Terminal care of cancer patients – principles and practice of control of pain

E. Cancer registry and epidemiology

F. Prevention and early detection in cancer

G. Cancer education and oncology organization

H. Statistical methods

Papers II & III

A. Clinical Management in tumors of:

a. Head and Neck

- Lip
- Oral cavity
- Oropharynx
- Hypopharynx
- Nasopharynx
- Supraglottis
- Vocal cord
- Sub-glottis
- Middle ear
- Nose and nasal sinuses
- Orbit and optic nerve
- Lachrymal gland
- Salivary gland

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- Glomus jugulare tumours
- Carotid body tumours
- Other sites in the region

b. Gastro-Intestinal Tract

- Oesophagus
- Stomach
- Liver
- Pancreas and biliary tract
- Small bowel
- Colon and rectum
- Anal canal and peri-anal region

c. Chest

- Pleura
- Trachea
- Lung
- Mediastinum and thymus

d. Genito-Urinary Tract

- Kidney
- Ureter
- Bladder
- Urethra
- Prostate
- Penis
- Testis

e. Female Genital Tract

- Uterine cervix
- Uterine body
- Vagina
- Vulva
- Ovary
- Fallopian tube

f. Central Nervous System

- Brain
- Spinal cord
- Craniopharyngioma
- Chordoma
- Acoustic neuroma
- Meninges

g. Soft Tissue Sarcomata and Bone Tumours

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- Adult soft tissue sarcoma
- Childhood/adolescent sarcoma
- Chondrosarcoma
- Osteosarcoma
- Ewing's tumour

h. Paediatric Tumours

- Medulloblastoma
- Neuroblastoma
- Nephroblastoma
- Retinoblastoma
- Embryonal sarcomas

i. Lymphoproliferative and Myeloproliferative Disorders

- Hodgkin's lymphoma
- Non-Hodgkin's lymphomas
- Plasma cell malignancies
- Acute and chronic leukaemias

j. Skin

- Basal cell carcinoma
- Squamous cell carcinoma
- Malignant melanoma
- Cutaneous lymphoma
- Kaposi's sarcoma

k. Endocrine

- Breast
- Thyroid
- Parathyroid
- Pituitary
- Adrenal

l. Other tumours and tumour- like conditions

m. Metastatic cancer in unknown primary

B. For each of the tumour types and sites listed above, the post graduate students shall learn the:

a. Management

- Initial staging investigations including imaging and tumour markers
- Role of PET-CT in modern day management of cancers
- Relevant prognostic factors
- Assessment for treatment
- Role of surgery

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- A management plan, or, where applicable, a range of such plans
- Ionising Radiation Regulations
- Roles of surgery, radiotherapy and cytotoxic chemotherapy in multimodality approaches to cancer treatment

b. Pathology

- The range of tumours that can occur
- Their aetiology, incidence and epidemiology
- A brief morphology of the common tumours
- The natural history of the disease including likely presentation, characteristic growth and metastatic pattern
- Staging classifications eg TNM, WHO, FIGO, AJCC, AFIP
- Use of tumour markers in diagnosis and treatment of tumours
- Use of specialized pathology techniques, eg immunocytochemistry
- Interpretation of clinicopathological data in the tumour site specialised multidisciplinary approach to patient management

c. Radiotherapy

i. The role of irradiation in radical and palliative management

ii. Where radical radiotherapy is a treatment option:

1. Staging investigations
2. A definition of tumour volume and target volume boundaries
3. ICRU, AAPM, ICRP reports relevant to clinical oncology
4. An acceptable radiotherapeutic technique, or, where applicable, a range of such techniques
5. The correct treatment position
6. Details of the target volume localization process
7. Use of CT axial images, 3D planning, Inverse Planning, IMRT, IGRT, Irregular shaped fields
8. Verification techniques such as laser alignment, skin tattoos, orthogonal and portal films
9. The approximate dose distributions for the chosen technique
10. An appropriate dose/fractionation regime
11. Relevant dose modifying factors (changes in fractionation, age, associated conditions, target volume, intercurrent infections, previous therapies)
12. Details of the set-up instructions for technologists
13. Appropriate responses to changes of patient parameters or interruptions during treatment
14. The possible acute and late side effects of the irradiation
15. Radiation dose modifying factors, chemotherapy timing in all forms of chemoradiation schedules

d. Drug Therapy: Basic knowledge and understanding of integrating with Radiotherapy

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i. The role of cytotoxic, hormonal and biological drugs therapies in radical and palliative management

e. Outcomes

i. The expected outcomes of treatment

ii). Biological Therapies

i. A basic knowledge of the clinical uses of currently used biological therapies including interferons, colony stimulating factors, interleukins, erythropoietin, other growth factors and preparations such as imatinib, geftinib, nimotuzumab, trastuzumab, rituximab, erlotonib etc.

f. Oncological Emergencies

- The management of the following complications when they are related to cancer:
  - Ureteric obstruction
  - Spinal cord compression
  - Haemorrhage
  - Mediastinal superior vena caval obstruction

C. Radiotherapy for Benign Disease

- The indications for radiotherapy in the treatment of benign conditions, including suitable techniques and dosage schedules, and likely benefits and risks

D. Complications of Treatment

- The acute and late complications of oncological treatment and their management including:
  - Skin reactions
  - Nausea and vomiting
  - Diarrhoea
  - Oedema
  - Bone marrow toxicity
  - Neutropenic sepsis
  - Drug reactions
  - Cytotoxic extravasation
  - Alopecia
  - Cataract
  - Skin atrophy and ulceration
  - Colitis, proctitis, gut strictures and perforation
  - Renal effects
  - Cardiac effects
  - Pulmonary effects
  - Fibrosis and lymphoedema

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- Endocrine effects (thyroid, pituitary and salivary gland)
- Effects on fertility
- Incidence of second and radiation induced cancers

E. Symptom Control and Continuing Care

- The available medical and surgical techniques for the control of pain, nausea, vomiting and malignant effusions
- Treatment of various cancer related conditions and paraneoplastic syndromes including
  - Hypercalcaemia
  - Ectopic hormone production
  - Raised intra cranial pressure
  - Anaemia

F. Current Research and Literature

- Current major research in progress in the form of multicentric trials
- Recent major publications in oncology journals
- Understanding evidence based medicine and how to read literature

Part IV: Recent Advances and Special Topics

Special Topics

A. Recent advances coming up in various fields as applicable to oncology
B. Causes of treatment failure and retreatment
C. TLI and TBI – Role, Philosophy and Techniques
D. Supportive care in Radiation treatment in combination with chemotherapy/surgery
E. Infections, nutritional and other problems in cancer patients
F. Preventive Oncology
G. Psychosocial aspects of cancer and Rehabilitation
H. Hospice Program
I. Immunotherapy and Role of Monoclonal antibodies in diagnosis, staging and management of cancer
J. Oncological Emergencies
K. Care and Nursing of patients on Radiotherapy and Chemotherapy
L. Cancer Control Programmes
M. International Classification and Coding of Cancer (ICD-9, ICD-O, ICD-10)
N. Research Methodologies in Cancer

This being a highly dedicated PG specialty introducing several new concepts/subjects in the course, it is recommended to divide the entire course into two components

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consisting of First Year of BASIC CONCEPTS OF THE SPECIALTY and the next two years of INTENSIVE CLINICAL TRAINING IN THE SPECIALTY.

The subjects recommended to be covered during the first year are:

- Basic Sciences including concepts of carcinogenesis & epidemiology of cancer
- Applied anatomy and physiology
- General pathology and pathology of tumours
- Medical physics related to Radiotherapy
- Radiobiology
- Radiation Pathology
- Classification, mechanisms of action and Pharmacokinetics of anti-cancer (cytotoxic) drugs
- Rationality of using cytotoxic drugs as single agents and as multi-drug protocol in various clinical settings
- Imaging techniques
- Staging of cancers of various sites.

The post graduate students should devote **next two years** in learning the science and art of practice of Oncology focusing upon radiotherapy along with knowledge of integration of other modalities in total management of cancer, as elaborated in the subsequent sections.

TEACHING AND LEARNING METHODS

Teaching Methodology

1. **Lectures:** Lectures are to be kept to a minimum. They may, however, be employed for teaching certain topics. Lectures may be didactic or integrated.
    a) **Didactic Lectures:** Recommended for selected common topics for post graduate students of all specialties. Few topics are suggested as examples:
        1) Bio-statistics
        2) Use of library
        3) Research Methods
        4) Medical code of Conduct and Medical Ethics
        5) National Health and Disease Control Programmes
        6) Communication Skills

    These topics may preferably be taken up in the first few weeks of the first year.

    b) **Integrated Lectures:** These are recommended to be taken by multidisciplinary teams for selected topics.
2. Theory lectures: seminars in radiation physics, radiobiology, radiation pathology, basic and clinical oncology, clinical radiation therapy, chemotherapy, radiation techniques, computer applications, research methodologies etc.
3. Lectures in other allied disciplines like Psychiatry, Experimental Medicine (with special stress on organization of various research activities & trials in oncology), Community Medicine including preventive oncology, primary and secondary

prevention of cancer, early detection and screening programmes in cancer, Planning of cancer control activities, rehabilitation and pain relief, etc.

4. **Journal Club & Subject seminars:** Both are recommended to be held once a week. All PG students are expected to attend and actively participate in discussion and enter in the Log Book relevant details. Further, every post graduate student must make a presentation from the allotted journal(s), selected articles at least four times a year and a total of 12 seminar presentations in three years. The presentations would be evaluated and would carry weightage for internal assessment. A time table with names of the student and the moderator should be announced at the beginning of every year.
5. **Student Symposium**: Recommended as an optional multi disciplinary programme. The evaluation may be similar to that described for subject seminar.
6. Case discussions, journal club
7. **Inter-departmental meetings:** strongly recommended particularly with the Department of Radiodiagnosis at least once a week. These meetings should be attended by post graduate students and relevant entries must be made in the Log Book.
8. **Teaching Skills:** The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
9. Undertake audit, use information technology tools and carry out research, both basic and clinical, with the aim of publishing his work and presenting his work at various scientific fora.
10. **Continuing Medical Education Programmes (CME):** At least two CME programmes should be attended by each student in 3 years.
11. **Conferences:** The student should attend courses, conferences and seminars relevant to the speciality.
12. 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.
13. Department should encourage e-learning activities.

Note: During the training programme,
each post graduate student shall be required to engage in a project under the supervision of a faculty member for a thesis or a dissertation.

Rotation:

Postings:

- Posting in various divisions of the department – mould room, treatment planning, simulation room, teletherapy and brachytherapy facilities etc.
- Posting in Radiotherapy OPD and ward by rotation.

- Short postings in departments/divisions of Surgical Oncology, Medical Oncology, Palliative Care, Surgery, Medicine, Gynaecology, ENT, Pathology, Cytology, Haematology, Imaging, cancer registry, as per the direction from Head of the Department.

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 medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, ie, during the training

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.

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, ie., at the end of training

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The examination shall be in three parts:

1. Thesis

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 Examination:

There shall be four papers each of three hours duration. These are:

Paper I: Basic Principles in practice of Radiotherapy (Physics, Biology, Pathology, Equipments & Techniques of Radiotherapy)

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Paper II: Clinical Radiation Oncology
Paper III: Allied Oncology Practices (Surgical oncology, medical oncology & Palliative Care)
Paper IV: Recent Developments in Oncology, Cancer Control Programmes, Research methodologies in oncology

3. Clinical/ Practical and oral/viva voce examination

Practical Examination should consist of the following:

- Long and short cases - a minimum of one long case and two-three short cases should form the basis of clinical examinations
- Pathology specimens
- Imaging techniques as relevant to clinical oncology, combined radiotherapy, surgery, chemotherapy, radiotherapy techniques, brachytherapy applications, radiation protection, equipments, instruments and other armamentarium/accessories relevant to various Chemotherapy/Radiotherapy procedures, chemo-ports, paracentesis catheters
- Computer application in Radiotherapy
- Simulation
- Mould room technology
- Radiotherapy Planning etc.

Oral/viva voce examination shall be comprehensive enough to test the post graduate student's overall knowledge of the subject.

Note 1: During the training programme, each post graduate student should be required to engage himself/herself in an investigative project under the supervision of a faculty member and submit his/her thesis or dissertation according to the rules of the University concerned. The subject for the research should be related to clinical practice of oncology (radiotherapy/combined treatments/Lab Research related with clinical practice).

Recommended Reading

A. Books (latest edition)

1. Basic books of anatomy, applied anatomy, physiology and basic pathology
2. Text books of:

Radiotherapy by Ralston Paterson

Radiotherapy by GH Fletcher

Radiotherapy by Moss

Radiotherapy by Halnan

Oxford Text Book of Oncology
Comprehensive Text Book of Oncology by Moosa
Cancer Principles & Practice of Oncology by DeVita *et al*
Textbook of Oncology by Ackerman & del Regato

Medical Council of India

Principles & Practice of Radiation Oncology by Perez & Brady

Cancer Medicine by Holland and Frie

Transplantation in Hematology & Oncology by Buchner, Jurgens *et al*

Clinical Oncology by Philip Rubin

Cancer Treatment by Haskell

Medical Physics by Meredith

Medical Physics by Selman

Medical Physics by FM Khan

Radiation Pathology by Rubin & Cassaret

Radiobiology by Eric J Hall

Radiobiology by Steel

Radiation Planning by Lewis & Tapley

Pediatric Oncology by Suttow

Gynecology Oncology by Disaia

Urologic Oncology/GI Cancers/Breast Cancer/Brain Tumors

Radiation Oncology by GK Rath & BK Mohanti

B. Journals and periodicals

Three international and two national journals (all indexed)

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Annexure I

Postgraduate Students Appraisal Form

Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM……TO……

Sr. No.	PARTICULARS	Not Satisfactory	Satisfactory	More Than Satisfactory	Remarks
		1 2 3	4 5 6	7 8 9	
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* _____

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_____

***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 CONSULTANT SIGNATURE OF HOD

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