Post Doctoral Super- Speciality Course (PDSC)

Neuroanaesthesia and Neurocritical Care

SGPGIMS, Lucknow

Duration of Course:- 2 Academic years

Basic Qualifications:- MD (Anaesthesiology) from a MCI recognized college or institute/DNB (Anaesthesiology) from National Board.

Number of candidates:- 4 per year

Core teachers identified for the course

Dr Shashi Srivastava	Professor
Dr Devendra Gupta	Professor
Dr Rudrashish Haldar	Assistant Professor
Dr Ruchi Verma	Assistant Professor

The teaching will also include special lectures by faculties of allied sciences

Curriculum for PDSC Neuroanaesthesia

1. Objectives and purposes of the course
   The course aims to impart thorough, exhaustive and comprehensive training to the candidates, enabling them to:-
   a) Function as a specialized Faculty/Consultant in the said specialty
   b) To help and carry out conduction of applied research in Neuroanaesthesia
   c) Train them to a level where they can plan and set up independent neuroanaesthesia and neurocritical care units .

2. Requirements for admission

   For admission to PDSC(Neuroanaesthesiology) course, the candidate should posses a MD degree in Anaesthesiology from an institute/college recognised by the Medical Council of India or DNB (Anaesthesiology) from National Board.

3. Duration of the course
   Two academic years

4. Selection Procedure

The admission to the said course is to be made on the basis of an All India Entrance Examination consisting of theory as well as practical assessment. Both the theory and practical exams will be held as per the Institute's norms.

5. Training Methodology

During the period of training, candidates will be following in service residency programme. He/she will work as a senior resident and will be given gradually increasing responsibility for independently conducting anaesthesia for neurosurgical operations and in decision making in intensive care management, neurophysiology labs, investigative procedures and various intensive monitoring.

The day to day work of the trainees will be supervised by the Core consultants (mentioned above) of the Department of Anaesthesiology. A candidate's posting is designed such that he/she gets rotatory posting in various zones like operation theatres, postoperative neurosurgical and neurological ICU's, neuroradiology suites and neurophysiology labs etc. He/she will be learning invasive diagnostic and therapeutic procedures in ICU's and emergency services. Additionally, program for monitoring demonstrations, seminars, workshops, journal clubs will also be regularly organized.

6 .Teaching Programme

Operation Theatre Teaching:	Five days a week
Seminars/Journal clubs/Audits:	Twice per week
Clinical Audits:	Once per month
Faculty Lectures:	Once per month
Group Discussions	Once per month

Saturday Grand Rounds of the Institute and Audit

7) Surgical / Neurosurgical Intensive Care Unit

During their training the candidates are required to attend the ICU rounds to learn the intricacies of critical care, ventilator care, hemodynamics, pain control, nutrition and outcomes and various procedures associated with them along with their documentations.

8) Neurology Postings

During their postings in Neurology,trainees are required to participate in the ward rounds and manage procedures in adult and paediatric patients including management of ventilator dependant patients with neurological disorders and become familiar with neurologic radiology.

9) Rotatory Posting Periods in Various Specialities:

The candidates will be rotated amongst the following areas for the described duration to familiarize and equip them with the intricacies of patient management related to that particular area. They will be actively involved in the entire periprocedural/clinical management of the patients in whichever specialty they are rotated.

Rotatory postings will be as follows:

Clinical Neuroanaesthesia	1 year 2 months
Neurology	1 months
Neurosurgical ICU	2 months
Post operative ICU	2 months
Neuroradiology	1 months
Trauma centre	3 months
Pain	1 month

10) Assessment

At the end of each year of training there will be an internal assessment comprising of theory papers and clinical examination and viva voce of each candidate as per MCI norms. The internal assessment will also be conducted on the basis of day to day work of the candidate in terms of patient care, teaching, anaesthesia management in the operating room, emergency services, bed side presentations and research. Candidates will be counseled on their performance to optimize their levels.

11) Log Book

The candidate has to maintain a log book according to departmental norms and all the clinical work, research projects and teaching activities have to be logged periodically. The Log book should be signed by the anaesthesiology consultants regularly.

12) Research

The trainee shall be required to undertake research and write papers under the guidance of consultants (Core professors will be the lead guides) with co –guides from allied specialties as per institute's norms(02 publications reuired). The candidates will have to submit proposals/topics for the project work within three months of joining the course. The work period for the project is 1-1.5 years. It is desired that the scientific papers from the projects are publish worthy.

13) Neuroanaesthesiology Curriculum:

The training program can be updated and modulated as and when required

Part I

Basic Sciences

1) Applied Anatomy: Basic and correlative neurovascular anatomy.embryological development of brain, spinal cord, skull and spinal structures, neck anatomy, neurotology ,neuropthalmology,

2) Applied Physiology: Basic and correlative neurophysiology

3) Applied Pharmacology:Basic and correlative pharmacology of drugs acting on the nervous system and principles of neurotherapeutics

4) Applied Bacteriology: Pulmonary infections, infections of the brain and meninges, infection following neurosurgery and nosocomial infection in ICU's

5) Applied Neurosurgical equipments: Concepts of neurosurgical instruments, emphasis on types of investigative facilities for assay of drug levels in the brain and CSF with their clinical correlates

Part II

Clinical Sciences

1) Clinical and anaesthetic management of patients undergoing surgery on brain, spinal cord, skull, spine and peripheral nerves.

2) Postoperative intensive care of neurosurgical patients

3) Anaesthetic management of cases undergoing neuroinvestigations and therapeutics.

4) Neurointensive care

5) Management of common emergencies

Part III

Recent advancements in Neuroanaesthesiology which includes:

1. Functional Neurosurgery
2. Depth of Anaesthesia monitoring
3. Cerebral Protection
4. Developments in Neurocritical Care
5. Neonatal and Paediatric Neuroanaesthesia

14) Clinical skills to be acquired by the candidates:

- Preanaesthetic evaluation for elective and emergency surgery
- Anaesthetic and perioperative management of various neurosurgical conditions.
- Transcranial Doppler and its application in neuroanaesthesia
- Intraoperative neurophysiological monitoring
- Various modalities of difficult airway management
- Intensive care:
  - Mechanical ventilation in neurological patients
  - Hemodynamic management in neuro ICU patient
  - Fluid and electrolyte management in neuro ICU patient
  - Bronchoscopy
  - ICP monitoring
  - Management of status epilepticus
  - Management of blood gases and acid base status
  - Infection control in neuro ICU
  - Tracheostomy, Percutaneous tracheostomy

- Pain Management (acute/chronic)
- Advanced Cardiac Life Support
- Advanced Trauma Life Support

15) Final Exit Examination

Eligibility

As per Institute's norms the duration of the course is 2 years including the exit exams.

Board of Examiners

External examiners will be Neuroanaesthesiologists from all over India with a minimum of 10 years of teaching experience and active and direct involvement in the specialty of Neuroanaesthesia.

Internal examiners: one amongst Core

Neuroanaesthesia Professors.

Theory Papers

There will be three (03) theory papers with the following titles as per Institute's norms:

- Basic Sciences as related to Neuroanaesthesia
- Clinical aspect of Neuroanaesthesia
- Recent advances in Neuroanaesthesia

Clinical practical and viva voce

One long and two short cases will be given to candidates and the discussion there on would last for 30-40 min per case. The candidates will also be given radiological images (CT,MRI, Angiography, PET,SPECT,X-ray etc),investigations (ECG, Echo, TCD,ABG, electrophysiological monitoring , EEG , capnography etc)reports to interpret. Various equipment used in operation rooms, ICU's drugs, fluids etc. will be exhibited for discussion. A grand viva will also be held.

16) Detailed Syllabus

General

- History of anaesthesia for neurosurgical procedures
- Natural history of neurosurgical disorders and demography
- Diagnosis, Preoperative evaluation and preparation for surgery

1. Basic Sciences

- Anatomy of central and peripheral nervous system
- Physiology of central nervous system
  Cerebral blood flow/metabolism- Measurement of CBF
  Cerebrospinal fluid dynamics
  Intracranial pressure-ICP monitoring
  Electrophysiology of CNS-EEG, Evoked potential
- Pathophysiology of Cerebral ischaemia/Traumatic brain injury
- Genetic aspect and evaluation of markers for identifying/diagnosing ischaemia
- Pharmacology of Anaesthetic/adjuvant drugs
- Pharmacology of:
  Anticonvulsants
  Drugs for treating brain oedema
  Antipsychotics/antidepressants
  Drugs used in Parkinsonism

Drugs used in CNS infections
Radiocontrast media used in CNS investigations
Antimalignant compounds
Corticosteroids
Thrombolytic agents

- Neuromicrobiology as applicable to operating rooms and critical care units, neuroinfections
- Basic and statistical methods/research methodology
- Fundamentals of Biomedical engineering: Basics of instrumentation, Biological signal processing

2. Clinical Sciences

Anaesthetic management of:

- Brain tumors
- Neurovascular surgery
- Hydrocephalus
- Spinal surgery
- Surgery for epilepsy
- Awake craniotomy
- Neuroendoscopy
- Head injury
- Pituitary surgery
- Cerebral protection
- Stroke
- Intraoperative and postoperative monitoring
- Frameless Stereotactic Surgery
- Peripheral nerve repair
- Polytrauma with head injury
- Difficult airway management
- One lung anaesthesia for anterior dorsal laminectomies
- Paediatric neurosurgery and foetal neurosurgery
- Spine surgery

Monitoring:

ECG, NIBP, Temperature, SpO_2, Capnography, neuromuscular blockade
Invasive and noninvasive haemodynamic and intra cranial pressure monitoring techniques for perioperative periods in neuro OTand ICU

- Understanding of basic concepts of monitoring
- Indications, cost effectiveness, complications
- Equipment usage and knowledge of accessories

Pulmonary functions – Pulmonary function tests , Blood Gases, Airway mechanics

Advanced monitoring - EEG, Evoked potential, Transcranial Doppler

Coagulation function- Thromboelastography

Intensive Care

- Principles of ventilator management
- Principles of cardiac and hemodynamic management
- Fluid and electrolyte management
- Head injury
- Spinal injury/other spinal pathology
- Neurological and neuromuscular disorders
- Status epilepticus
- Stroke
- Nutrition in neuro ICU patients
- Subarachnoid hemorrhage
- Airway issues related to neuroanaesthesia
- Tracheostomy,percutaneous tracheostomy

Recent Advances

Neuronavigational Neurosurgery

Functional neurosurgery for Parkinsonism

Awake craniotomy for eloquent tumours and epilepsy surgery

Stereotactic Neurosurgery

Interventional Neuroradiology Procedures

Current advances in drugs, equipment and monitoring.

This section is subject to updating based on the constantly evolving practices of neuroanaesthesia and neurosurgery and addition of the latest developments in this area as and when they are being incorporated in clinical practice.

List of External Expert

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