Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, India

Department of Neurosurgery

Course curriculum

Program: MCh (Neurosurgery)

Program Duration: Three academic years

Program Objective: Objective of this training program is to train the surgical postgraduate as a "neurosurgeon" who has the skills and in depth understanding about the etiology, pathogenesis, diagnosis and management of common and rare diseases related to the brain, spinal cord and the peripheral nerves. They shall also have intellectual and technical capabilities to contribute in the growth in the field of neurosurgery by imparting training, teaching and their own research.

Program Outcomes: Outcomes of the 'MCh Neurosurgery program', as enumerated below, are to enable the students to acquire the following skills after the successful completion of three years training program:

1. To evaluate, diagnosis, and manage the patients with common/uncommon, simple/complicated surgical conditions of the central nervous system (Brain, spinal cord, meninges, overlying calvaria and spine as well as peripheral nerves)
2. To critically analyse the available scientific evidences and decide their application in patient care.
3. To advance the field of neurosurgery by promoting research in terms of identification of research gap, conducting research, promoting research, and imparting guidance/training to those who wish to pursue research.
4. To identify the research priorities at international, national, and region levels.

Lt Col Varun Bajpai VSM
Executive Registrar
SGPGIMS,Lucknow

Colour Coding
Global GREEN
Regional BLUE
National ORANGE
Local (State) PINK

Needs: Local:Pink, National: Orange, Regional: Blue, Global: Green

Sanjay Gandhi Postgraduate Institute of Medical Science (SGPGIMS), Lucknow, India

Department of Neurosurgery

Course curriculum

5. To impart theoretical, clinical, surgical and research training/education to the next generation.
6. Skills to establish an effective communication with the patients, patients' relatives, health administration, policy makers, common man of the society, medical fraternity, academicians in the field of Neurosurgery or other streams of medicine, and the community leaders.

Courses offered in the program

1. Course I: Basic Science of central nervous system (Brain, spinal cord, meninges, overlying calvaria and spine as well as peripheral nerves)

2. Course II: Applied Clinical Neurosurgery (Brain, spinal cord, meninges, overlying calvaria and spine as well as peripheral nerves)

3. Course III: Advanced clinical and operative neurosurgery (Brain, spinal cord, meninges, overlying calvaria and spine as well as peripheral nerves)

4. Course IV: Recent advances in Neurosurgery (Brain, spinal cord, meninges, overlying calvaria and spine as well as peripheral nerves)

Lt Col Varun Bajpai VSM
Executive Registrar
SGPGIMS,Lucknow

Colour Coding
Global GREEN
Regional BLUE
National ORANGE
Local (State) PINK

Sanjay Gandhi Postgraduate Institute of Medical Science (SGPGIMS), Lucknow, India

Department of Neurosurgery

Course curriculum

Course I: Basic Science of central nervous system (Brain, spinal cord, meninges, overlying calvaria and spine as well as peripheral nerves)

Course objective:

Student shall have an in-depth understanding about the development, anatomy, physiology, molecular genetics, cellular mechanism, receptor level and intracellular mechanism involved in physiology and pathogenesis of various diseases, and the dynamic events in central nervous system system which occurs during life and diseases.

Course outcomes:

Students shall have acquired in depth knowledge about the following:

1. Anatomy of the central nervous system: both gross and microsurgical anatomy.
2. Alterations of the physiological functions involved and implicated in various diseases or disease processes
3. Molecular genetics of CNS tumors.
4. Neuropharmacology.
5. Neuopathology.

Lt Col Varun Bajpai VSM
Executive Registrar
SGPGIMS,Lucknow

Colour Coding
Global GREEN
Regional BLUE
National ORANGE
Local (State) PINK

Sanjay Gandhi Postgraduate Institute of Medical Science (SGPGIMS), Lucknow, India

Department of Neurosurgery

Course curriculum

Course II: Applied Clinical Neurosurgery (Brain, spinal cord, meninges, overlying calvaria and spine as well as peripheral nerves)

Course objective:

Student shall have acquired necessary skill, understanding, and knowledge about the etiopathogenesis, clinical presentations, diagnosis, management, and the prognosis of the common and uncommon surgical conditions of the central nervous system.

Course outcomes

Students shall have acquired the following knowledge and skills at the end of the course

1. Shall have good knowledge of the burden and spectrum of neurosurgical conditions at regional, state, national and international levels.
2. Shall have sound knowledge of etiology and pathogenesis of various neurosurgical diseases; their management and expected complications.
3. Shall have good knowledge to interpret and evaluate the results of various radiological investigations (X- ray, CT scan, MRI scan) which are required in the diagnosis and management of various neurosurgical conditions.
4. Shall be able to anticipate, approach, investigate, and manage all types of neurosurgical diseases.

Lt Col Varun Bajpai VSM
Executive Registrar
SGPGIMS,Lucknow

Colour Coding

Global	GREEN
Regional	BLUE
National	ORANGE
Local (State)	PINK

5. Shall have acquired necessary surgical skills with basic procedures like external ventricular drain insertion, ventriculoperitoneal shunt, laminectomy, lumbar drain insertion and craniotomy.

Course III: Advanced clinical and operative neurosurgery (Brain, spinal cord, meninges, overlying calvaria and spine as well as peripheral nerves)

Course outcomes:

This course aims at enabling the students to achieve the advanced competency about the neurosurgical procedures, neurosurgical intensive care, postoperative management of neurosurgical conditions.

Students shall have acquired the following knowledge and skills at the end of the course

1. Ability to manage critically ill neurosurgical patients and ventilatory management.
2. Ability to assist and perform more complex neurosurgical procedures like brain and spine tumor resection, spinal instrumentation, brachial plexus surgery, management of severe head injury and reconstructive brain surgery such as cranioplasty and craniosynostosis.
3. Ability to anticipate, manage and prognosticate postoperative complications in elective as well as emergency cases of brain and spine surgery.

Lt Col Varun Bajpai VSM
Executive Registrar
SGPGIMS,Lucknow

Colour Coding

Global	GREEN
Regional	BLUE
National	ORANGE
Local (State)	PINK

4. Learn about pharmacotherapy for raised intracranial pressure, ionotropic agents, vasospasm after aneurysm and arteriovenous malformation surgery.

Course IV: Recent advances in neurosurgery (Brain, spinal cord, meninges, overlying calvaria and spine as well as peripheral nerves)

Course objectives

Course outcomes:

Student shall be well versed with the new knowledge, cutting edge issues, controversies, new diagnostic and therapeutic modalities, new interventions, and changing trends of epidemiology in the field of neurosurgery.

The students shall have acquired the following knowledge, skills, and attitude at the end of the course

1. In depth knowledge of the recent advances and cutting-edge issues in diagnosis and management of different neurosurgical conditions.
2. Shall be aware and capable to diagnose, and manage the newly defined disease entities in the field.

Lt Col Varun Bajpai VSM
Executive Registrar
SGPGIMS,Lucknow

Colour Coding

Global	GREEN
Regional	BLUE
National	ORANGE
Local (State)	PINK

3. Shall be updated with the changing terminology for diseases, classifications by recognised bodies as well as standard guidelines and recommendation, laid down for the management of neurosurgical conditions , given by various national and international associations such as WHO, cIMPACT, brain trauma foundation, International League against epilepsy, ASIA grade of spine injury etc.
4. Shall be aware about the upcoming new information on diagnosis and management such as liquid biopsy, cell free DNA, role of mitochondrial RNA in Glioma, proteomics, metabolomics and radio genomics. This field is an upcoming stream and will keep on changing in the days to come.

Method for computing program outcome

The summative assessment examination shall include two heads: **A. Theory examination. B. Practical, Clinical examination, and Viva-voce.**

Theory examination and Practical/Clinical, Viva-voce shall be separate heads of passing.

Lt Col Varun Bajpai VSM
Executive Registrar
SGPGIMS,Lucknow

Sanjay Gandhi Postgraduate Institute of Medical Science (SGPGIMS), Lucknow, India

Department of Neurosurgery

Course curriculum

Theory examination shall comprise of

Four papers, each representing four courses included in the program. Passing percentage shall be cumulatively 50% with minimum of 40% marks in each theory paper.

Practical /Clinical examination consisting of

(i) Case presentation at least one long case, two short cases and one spotter (ii) Preoperative case discussion followed by demonstration of surgical skills during actual surgery in OT followed by postoperative discussion (iii) Viva voce with radiology, surgical procedures, neurosurgical specimen, instruments and a grant viva voce with evaluation of log book and research work. Passing percentage shall be 50%.

Passing shall be separate for each head and failing shall be common, meaning thereby that clearance at theory and failure at practical / clinical shall amount to failure at Summative examination and vice versa

In addition to the above mentioned formal examination, each student will also be evaluated on day to day basis based on the following activities:

Lt Col Varun Bajpai VSM
Executive Registrar
SGPGIMS,Lucknow

Sanjay Gandhi Postgraduate Institute of Medical Science (SGPGIMS), Lucknow, India

Department of Neurosurgery

Course curriculum

1. Voluntary discussion with other departments (radiology, neurology, pathology, anaesthesiology etc) as and when required for the management of the patients
2. Measures taken by the student to expedite the management of a patient
3. Empathy shown by the student towards their patients
4. Willingness to accept the responsibility by a student
5. Level of confidence while managing a patient or performing a procedure
6. Depth of knowledge about the surgery while performing it
7. Ownership for the procedure related complications
8. Willingness to learn new skill and acquire new knowledge
9. Self-motivated reading and learning
10. Depth of knowledge about the illness of the patient managed by him/her
11. Involvement in extracurricular activities
12. Punctuality to work and patient care
13. Involvement in research and departmental data management
14. Willingness to teach and train

Lt Col Varun Bajpai VSM
Executive Registrar
SGPGIMS,Lucknow

15. Skill to teach and train others
16. Interpersonal relationship

Method for computing course outcomes

Course I: Basic Science

Assessment of the student will be done on his/her performance in the following academic activities

1. Seminars presentation
2. Short topic presentation
3. Journal clubs
4. Group discussion during the rounds and during teaching hours
5. Didactic lectures
6. Bed-side clinic demonstration
7. Invited faculty lectures to elaborate upon specific topics

Lt Col Varun Bajpai VSM
Executive Registrar
SGPGIMS,Lucknow

Sanjay Gandhi Postgraduate Institute of Medical Science (SGPGIMS), Lucknow, India

Department of Neurosurgery

Course curriculum

Course II: Applied Clinical Neurosurgery

Assessment of the student will be done on his/her performance in the following academic activities

1. Clinical assessment of the patients in the outpatient clinic as well as ward
2. Quality of documentation of clinical history taking, physical examination, interpretation of preoperative radiology and formulation of a detailed management plan.
3. Preoperative case presentation in morning academic session
4. Short seminars on clinical topics
5. Case discussion during academic hours
6. Case presentation and discussion during ward rounds
7. Discussion on consultations sought by other departments

Course III: Advanced Clinical Neurosurgery

Assessment of the student will be done on his/her performance in the following academic activities

Lt Col Varun Bajpai VSM
Executive Registrar
SGPGIMS,Lucknow

Sanjay Gandhi Postgraduate Institute of Medical Science (SGPGIMS), Lucknow, India

Department of Neurosurgery

Course curriculum

1. Journal clubs.
2. Care of the patients in Neurosurgical ICU.
3. Skill demonstrated in assistance and performance during surgery.
4. Timed decision making and management of postoperative complications.
5. Updated knowledge in different sub specialities of Neurosurgery

Course IV: Recent advances in Neurosurgery

Assessment of the student will be done on his/her performance in the following academic activities

1. Journal club presentation
2. Number of journals followed by the student on regular basis
3. Knowledge on most recent guidelines or recommendations, laid for the diagnosis and management of neurosurgical conditions
4. Level of knowledge about the new drugs, diagnostic tests, and procedures
5. Critical analysis of the new information's before its application in patient Care

Lt Col Varun Bajpai VSM
Executive Registrar
SGPGIMS,Lucknow

Sanjay Gandhi Postgraduate Institute of Medical Science (SGPGIMS), Lucknow, India

Department of Neurosurgery

Course curriculum

Application of new information in patient care

6. Hypothesis generation and planning new research ideas and proposal based on new information

Revision of the syllabus for MCh neurosurgery

Syllabus for the **MCh neurosurgery** program is revised. This revision is based on the inputs obtained from the students, faculty, alumni, and the subject expert. In revision, we attempted to make our syllabus more comprehensive; further we also tried to make our syllabus appropriate to meet the national and the regional health need and disease burden.

We attempted to revise our syllabus while ensuring the minimum syllabus defined by National Medical Council to meet the requirements of the MCh Program.

Over all, almost 25% of syllabus was revised

Lt Col Varun Bajpai VSM
Executive Registrar
SGPGIMS,Lucknow

Sanjay Gandhi Postgraduate Institute of Medical Science (SGPGIMS), Lucknow, India

Department of Neurosurgery

Course curriculum

Syllabus before revision had included the following contents:

1. Anatomy of brain, spinal cord with meninges
2. Anatomy of peripheral nervous system
3. Pathology of central nervous system
4. Basic immunology
5. Molecular biology
6. Epidemiology and basic biostatistics
7. Neuroophthalmology
8. Introduction and general neurosurgery: an overview
9. Infections in neurosurgery
10. Epilepsy: overview and controversies
11. Functional neurosurgery and controversies
12. Neuooncology: basics, approach to a patient and surgical aspects
13. Intrinsic and extrinsic tumors of the brain and skullbase
14. Pain: basic science, non operative and operative treatment

Lt Col Varun Bajpai VSM
Executive Registrar
SGPGIMS,Lucknow

Sanjay Gandhi Postgraduate Institute of Medical Science (SGPGIMS), Lucknow, India

Department of Neurosurgery

Course curriculum

15. Pediatric neurosurgery
16. Peripheral nerve disorders
17. Radiation in neurosurgery: overview and uses
18. Spine surgery
19. Neurotrauma
20. Vascular neurosurgical diseases

Addition done in syllabus of the MCh neurosurgery program after revision

1. Biomarkers of head injury
2. Artificial intelligence and virtual reality in neurosurgery
3. Minimally invasive neurosurgery

4. Fetal neurosurgery
5. Liquid biopsy of gliomas
6. WHO 2021 brain tumor classification
7. Scoliosis

Lt Col Varun Bajpai VSM
Executive Registrar
SGPGIMS,Lucknow

8. Nerve transfer for indications other than brachial plexus injury
9. Restorative neurosurgery

Credit based compulsory modules for MCh Neurosurgery

In addition to the four mandatory courses, defined above, each student will have to complete the following courses available to them. Each of these courses will be for 3 weeks of time

1. Neurointervention
2. Pediatric surgery
3. Pain clinic
4. Neurology
5. Neuropathology
6. Critical Care Medicine

Lt Col Varun Bajpai VSM
Executive Registrar
SGPGIMS,Lucknow

Sanjay Gandhi Postgraduate Institute of Medical Science (SGPGIMS), Lucknow, India

Department of Neurosurgery

Course curriculum

Academic flexibility offered to the students in MCh Neurosurgery

Our syllabus and duration of courses, offered under our programs are regulated, controlled and guided by national medical council. Hence, we cannot change the course duration at the institute level. Though, we offer the following academic flexibility to the students:

1. Student may change the sequence of their rotation in the following areas – Neurointervention, Pediatric surgery, Pain clinic, Neurology, Neuropathology, Critical Care Medicine
2. Depending upon the interest of the student and their research need, the duration of their rotation may be extended or shortened as permitted with in the NMC norms
3. Additional rotation may be completed during off-duty hours, leaves, or vacations
4. Hand-on experience can be obtained during their rotation in these areas
5. Additional research work can be done during their rotation to these areas
6. Students are permitted to mutually exchange their rotations but each of them has to complete the entire set of rotatory postings
7. Student are also permitted to complete their rotatory postings in two or more pieces instead of doing it completely in one go
8. Students are also permitted to complete their rotatory posting under the supervision of a consultant of their choice, if he/she agrees for the same.

Lt Col Varun Bajpai VSM
Executive Registrar
SGPGIMS,Lucknow

Sanjay Gandhi Postgraduate Institute of Medical Science (SGPGIMS), Lucknow, India

Department of Neurosurgery

Course curriculum

Credit based optional modules for MCh Neurosurgery

In addition to the four mandatory courses, and credit based compulsory modules, defined above, each student will have to options to choose additional optional modules as described below

1. Patient safety
2. Hospital infection control
3. Needle stick injury to the health care workers
4. Environmental safety
5. Biomedical waste disposal
6. Antibiotic stewardship program
7. Gender safety
8. Fluid and electrolyte balance
9. Universal health coverage
10. Medical Photography

Lt Col Varun Bajpai VSM
Executive Registrar
SGPGIMS,Lucknow