MCh Neurosurgery Curriculum

AIM OF TRAINING

The end product should have acquired knowledge, skills, aptitude and attitudes to be able to function as an independent clinician/consultant and a teacher acquainted with research methodology.

OBJECTIVES

The End Product:

1. Should be well acquainted with the current literature on relevant aspects of the basic, investigative, clinical and operative neurosciences.

2. Should have learned indications and performance skills of common neurosurgical operations.

3. Should have acquired performance skills and ability to interpret relevant clinical investigations.

4. Should be able to diagnose, plan investigations and treat common conditions in the speciality by relevant current therapeutic methods.

5. Should be acquainted with allied and general clinical disciplines to ensure appropriate and timely referral.

6. Should be capable of imparting basic neurosurgical training.

7. Should be able to identify, frame and carry out research proposals in the relevant speciality.

ELIGIBILITY

M S (Gen. Surgery) degree of an Indian University recognized by the Medical Council of India or any other examination recognized for the purpose by the MCI.

TRAINING METHODS

1. Clinical teaching in the OPD, Emergency and Operation theatres. Clinical teaching rounds in Neurosurgery Ward and bed side presentations.

2. Special teaching sessions like Neuro-radiology rounds, Neuro-ophthalmalogy round combined Neurology-Neurosurgery case discussions.

3. Seminars, journal clubs, mortality, morbidity conferences.

4. Treatment planning sessions.

5. Assisting and performing neurosurgical operations.

6. Paper presentations at conferences.

7. Preparation of manuscript for publication.

8. Training in an experimental microsurgical laboratory.

TRANING ON SUB-SPECIALITY OF NEUROSCIENCES

Neuro-Anaesthesiology
There should be a didactic lectures which may be a common programme for the Neurology and Neurosurgery postgraduates. The major thrust in these would be the resuscitation management of coma, life-support systems and monitoring of patients. The Neurosurgery trainees would have additional requirements in which they should know the interaction of anaesthetic drugs with systemic diseases and neurosurgical disease conditions and for this few more didactic lecture would be required. The major thrust would be on continuing training for the Neurosurgery trainees in the operation theatre as a result of the informal discussions which would be taking place during the training period.

Neuro-radiology
Combined Neuro-radiology rounds or meetings twice or thrice a week.

Clinical Neurology Neurophysiology
Candidates should have 2 months (1 month in the beginning and 1 month in the middle of course) training under Neurology department to familiarize themselves regarding common neurological disorders. During this period candidate should also familiarize themselves with the technique and interpretation of EEG/EMG/NCV and evoked potentials.

Neuropathology
It is suggested that there should be a 4 week capsuled training for Neurosurgery trainees or regular once a week Neuropath conference in which they should be familiarized with the techniques of grossing, staining procedures, brain cutting, autopsy methods and tissue processing including frozen sections and should be able to identify histological features of the common neurosurgical disorders. In regard to weightage in the examination it is felt that it should be five percent of the theory and the practical examination.

Neuro-Biochemistry, Neuroimmunology
In regard to both above it is felt that there should be a capsuled course of didactic lectures which should run every alternate year or so to familiarize the trainees with the elements and techniques of neurochemistry and neuro-immunology.
In these subjects it was felt that a total weightage of 1-2% questions of theory and practical should be there.

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VISIT TO OTHER INSTITUTIONS

Candidate in 3rd year should visit other neurosurgical centers recognized by MCI for about 4 weeks to be able to observe difference in approaches to various neurosurgical problems.
It is desirable to have training in certain special areas to be arranged outside the institute, when necessary like micro surgical lab training if not available within the dept.

ESSENTIAL PRE-REQUISITE FOR APPEARING FOR M Ch (NEUROSURGERY) EXAMINATION

1. Logbook of work done (surgical procedures performed/assisted case presentation and other academic activities): rotations, internal assessment report.
2. Publications- paper on review of available clinical material from the department.
3. Attendance, as per laid down rules of the Institute.

EVALUATION OF M Ch (NEUROSURGERY)

1. **Internal assessment – 20% weightage**
To be done by all teachers concerned in the training of the candidate both inside and outside the parent department independently and entered into log book on a standard marking system. The course director will average out and put the final evaluation.

2. **Theory Papers – 30% weightage**
(equally distributed for each paper)
Minimum pass marks 50% in each paper.
Timing of Examinations
a) Part I – at the end of 18months course on basic neurosciences.
b) Part II – at the end of 36 months of training course.

Three papers – Basic Neurosciences (applied), Clinical Neurology and Neurosurgery, advances and operative Neurosurgery.

3. **Practical Examinations**
Total weightage 50%
Distributed as follows:
a) Clinical - 10%
b) Radiology, Pathology and general viva - 20%
c) Operative neurosurgery viva – 20%
Minimum pass marks 50%

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Teaching Programme

- **1st year-**

Months 0-3 : orientation to the institution and department-introduction to OPD, ward and patient care routine

- Introduction to case record maintenance
- Introduction to diagnostic procedures – LP, Intubation, CT , MRI, Angiogram, etc

Months 3-6 : allocation of patient beds

- Comprehensive record mountainous
- Planning and execution of diagnostic cascade
- Planning and execution of pre and post operative care
- Attending emergency consultations
- Attending cases in emergency and casualty services
- Assisting in operative procedures
- 2 weeks interaction & training programme in research methodology under Department of statistics and/or Department of PSM

Months 6-12.further refinement of the above

- Attending operation theatres
- Independently attending emergency and casualty calls
- Performing elective and emergency (EDH, EDH, ICH, etc) operations under supervision

- **2nd year-**

Months 12-18: assisting juniors in their patient care responsibilities:

- Performing advanced diagnostic procedures
- Performing assigned operations
- Assisting seniors in complicated neurosurgical procedures

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- Documentation of clinical case material archiving, supervising clinical and operative work of juniors

Months 18-24: assisting juniors in operative procedures

- Performing complicated diagnostic procedures – DSA, etc

- Performing simple operations under supervision (lumbar disc – MLD, laminectomy, anterior cervical discectomy, VP shunt, etc

- Supervising clinical and operative work of juniors

- **3rd year-**

Months 24-36 : providing peer support to juniors in all above activities.

- Rotations through allied specialties like neurology, radiology and pathology

- For exposure in advanced aspects of neurosurgery

- Undertaking camps surveys clinical studies etc, as part of departmental activity from time to time

- Performing higher level of surgeries like gliomas, meningiomas, etc independently under supervision

- In addition to the patient care the candidates will have responsibilities in the following areas.

Clinical responsibilities:

1st yr-diagnosis of all neuro surgical disorders and patient care

2nd yr- management of complex neurosurgical disorders as well as complications of surgery and inter disciplinary problems

3rd yr-practice of protocol based management and development of such management protocols

List of operative procedures to be performed:

The following list is a compilation of operative procedures that will be performed by trainees as part of the Mch (neurosurgery) programme in university. The time frame under which these procedures will be performed based on the degree of competence and knowledge required. As the trainee progresses through the course he will assist juniors in performing procedures under the earlier category. Similarly he will assist seniors in

performing procedures under the higher category as a build up to the performance of higher category procedure.

This list consists of the most common procedures as currently practised. Additional procedures will be added to each category as and when they evolve. The classification will again be based on the degree of training and expertise required to perform those new procedures.

This schedule is meant to serve as a guideline for trainees as well as for trainers. It is incumbent on both to make all efforts to fulfill the requirement. It is suggested that atleast a majority of procedures in each category upto category 4 be performed mandatorily.

Category 1 0-6 months

- Tracheostomy
- Burr hole
- Craniotomy opening and closure
- Exposure of spine

Category 2 6-12 months

- VP Shunt / TP shunt
- Craniotomy for EDH, SDH
- Assisting complicated procedures
- Lumbar laminectomy

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Category 3 12-18 months

- Lumbar disc surgery – MLD, Laminectomy and discectomy
- Craniotomy for tumors
- Posterior fossa exposure
- Assisting major procedures

Category 4 18-24 months

- Anterior cervical discectomy and fusion
- Lumbar fusion
- Craniotomy for CSF rhinorrhoea
- Gliomas

Category 5 24-30 months

- Spinal Instrumentation
- Cranioplasty
- Craniotomy for major tumors

Category 6 30-36 months

- Meningiomas
- Transsphenoidal surgery
- Neuroendoscopy
- Detethering and Myelomeningocoele closure

Teaching learning responsibilities

1st yr- presenting journal clubs, UG medical teaching, PG teaching of surgical trainees, and trainees in other specialities, teaching para medical staff

2nd yr- presenting seminars, critical appraisal of presentation of papers, presenting papers in regional and national conferences

3rd yr- developing and reading specific projects related to neurosurgery, guiding juniors and peers in academic activities and presentations

Schedule of departmental activities

PG departments of neurosurgery have evolved a variety of departmental training activities. The following schedule shall serve as a guideline with further refinements being made wherever necessary

Activity	frequency
• Clinical rounds	thrice weekly
• Journal clubs	once weekly
• Seminars	once weekly
• Audit/ statistical meeting	once weekly
• Inter departmental meetings	
▪ Neurology	fortnightly
▪ Radiology	fortnightly
▪ Pathology	monthly
▪ Inter-institutional	monthly/bi-monthly

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Orientation

Library

- The PG student will become familiar with books, periodicals and other publications pertaining to neurosurgery. A list of such books will be on record in the dept.

- Laboratory procedures

The candidate will familiarize himself or herself with the different diagnostic procedures in neurosurgery through a process of interactions with the depts.

Research

The component of research shall be promoted by encouraging the candidates to undertake projects during 1st 2 years of course. This objective can be achieved by an intra mural programme or by enrolling pg's in extra mural programme providing the necessary training.

National programmes

The PG's will be familiarized with national programmes pertaining to Neurosurgery. The department will encourage intra departmental activities that will increase awareness of these programmes. All programmes directly applicable for neurosurgery and for implementation will be duly implemented

Regulations

The PG's will be sensitised to regulations to various acts such as The medical Council Of India act, Code of Medical Ethics, Transplantation of human organs Act etc. This will be done through a process of informal contact and engagement of experts in the field

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Lecture/Seminar presentation Schedule with Topics

The following is a general list of topics to be covered during the course. This list is only representative, and any topic relevant to the science of neurosurgery may be included. Teaching learning evaluation will, therefore, not be confined to, but shall include the topics listed below.

Basic Sciences as applied to neurosurgery

- Surgical anatomy of central nervous system
- Normal physiology of central nervous system
- Neurosurgical biochemistry
- Neurosurgical endocrinology
- Physiology and pharmacology of central nervous system
- Genetic determinants of neurosurgical diseases
- Embryology and normal development of central nervous system
- Embryology of congenital anomalies of central nervous system
    1. Arachnoid cyst
    2. Encephalocele
    3. Myelomeningocele
    4. Craniosynostosis
    5. Dandy-walker malformation
    6. Chiarri malformations
    7. Requires further elaboration
- Neuro otology and Neuro ophthalmology
- Neurosurgical examination and diagnostic techniques
    1. Lumbar puncture
    2. CT, MRI,,DSA and other imaging modalities

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Infections and inflammations of central nervous system

- Host defence mechanisms against central nervous system infections
- Bacterial infections of CNS-diagnosis and management
- Management of acute and chronic meningitis.
- Management of subdural empyema
- Diagnosis and management of cerebra abcess
- Diagnosis and management of ventriculitis.
- Diagnosis and management of spinal infections.
- Diagnosis and management of discitis.

Neurosurgical trauma

- Diagnosis and management of extradural haematoma, subdural haematoma, cerebral contusions
- Diagnosis and management of spinal cord injuries.
- Diagnosis and management of penetrating brain trauma.
- Diagnosis and management of cerebrovascular injuries.

Spinal cord disorders

- Evaluation and management of spinal cord tumors.
- Evaluation and management of degenerative spine diseases

Neuro oncology

- Overview of cancer biology and principles of neuro oncology
- Pediatric neuro oncology
- Benign and malignant tumors of CNS in adults

    1. Meningioma
    2. Glioma
    3. Ependymoma
    4. Pituitary gland tumors

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5. Intra ventricular tumors

Radiotherapy in CNS tumors
Chemotherapy in CNS tumors
Immunotherapy in CNS tumors
Gene therapy in CNS tumors
Other advanced therapeutic modalities in neurosurgical tumors
Peripheral nerve surgeries

Pediatric neurosurgery

- Encephalocele
- Myelomeningiocele
- Spina bifida
- Spinal dysraphism
- Craniosynostosis

Neurovascular surgery

- Congenital malformations
- Aneurysms
- Cerebrovascular accidents

Electrophysiological disorders

- Mesial temporal lobe sclerosis
- Hippocampal sclerosis
- Surgeries for intractable seizures

Neuro urology

- Neurophysiology and pharmacology of micturition and continence
- Patho physiology of neurovescical dysfunction

1. CNS disorders
2. Spinal trauma
3. Spinal dysraphism
4. Disabilities

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Operative neurosurgery

- surgical approaches to the brain
- surgical approaches to the spine
- Endoscopic neurosurgery
- Functional neurosurgery
- Endovascular procedures (In collaboration with department of radiology in house or external)
- Stereotactic surgery and Neuro-navigation

Practical training and postings

Practical training has been elaborated in the teaching programme section

Postings :

I year: Wards and ICU

II year: Wards, ICU , OT and 1month neurology and radiology postings

III year: OT ,ICU, Post operative duties and 1month of pathology and 1 of observer posting in the neurosurgery department in an another recognized institute, 3 months trauma posting in NIMHANS/other equivalent institutions.

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Format of logbook

Table 1: Academic activities attended

Name: Admission year

College:

Date	Type of activity Specify Seminar, Journal club, Presentation, UG/PG teaching	Particulars

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Table 2 : Academic presentations made by the student

Name: Admission year:

College:

Date	Topic	Type of presentation Specify Seminar, Journal club, presentation, UG teaching etc

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Table 3 : Diagnostic and Operative procedures performed

Name : Admission year:

College:

Date	Name	ID No	Procedures	Category O,A,PA,PI

Key : O-Washed up and observed
A-Assisted a more senior Surgeon
PA-Performed procedure under the supervision of a senior surgeon
PI-Performed independently

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Periodic Evaluation of Training, internal assessment and other assessment programmes

Monitoring of teaching/learning activities

Activity	Periodicity of assessment	method
1.journal clubs	Monthly	Faculty and peer review as per check list
2.seminars	Monthly	
3.theory knowledge	Six monthly	Written test
4.clinical performance	Six monthly	Clinical exam
5.operative work	Six monthly	Log book
6.research and presentation	Six monthly	Logbook and faculty peer review using check-list

Apart from the regular evaluation programmes a mock exam (theory and practical) will be conducted 1 month prior to the final university examination.

The performance of candidates under these heads will be conveyed to them every 6 months and a record will be maintained in the dept. The Department Head or Director will fulfill all University requirements pertaining to such assessment and keep the University posted 6 monthly.

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