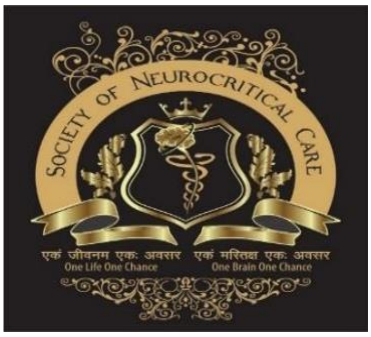

FELLOWSHIP OF NEUROCRITICAL CARE (FNCC)

Need for the course:

The scientific and technological innovations in the field of neurosciences and the unique challenges posed by the critically ill neurological patients makes the need for dedicated neurological intensive care units across medical facilities obvious. Neurocritical care as a dedicated subspecialty of critical care medicine, has been recognized and developed in a big way around the world for the optimization of neurologically injured patients and improving patient outcomes. There is a need for quality training and certification of physicians in this relatively upcoming field for the development of the field and acceptance into the mainstream of critical care. The presence of heterogeneity of institutional structures (open vs closed units), wide variation in procedural requirements, and the logistics of care provision among neurocritical care units necessitates that uniform training standards are set to ensure standardization of neurocritical care practice.

Goals of the course:

The FNCC (Fellowship of Neurocritical Care) is a post-doctoral fellowship programme in neurocritical care, aimed to provide quality training to candidates for the comprehensive, multisystem management of the critically ill patients with neurological and neurosurgical insults, keeping in mind the sound principles of neurocritical care. The course will provide clinical manpower to all the hospitals with dedicated neurocritical care units.

The Society of Neurocritical Care (SNCC-India), in collaboration with the Indian Society of Critical Care Medicine (ISCCM), seeks to assume the accreditation responsibility for the

fellowship programme in Neurocritical Care, so as to ensure uniform training standards. A memorandum of understanding (MoU) of five years has been agreed upon between the two societies for the initiation of the fellowship programme, which may be extended subsequently. The finances of the fellowship programme shall be handled by the ISCCM, as per their education policy. The institutions desirous of seeking accreditation to start the fellowship programme, will provide the ISCCM & SNCC office with the required information on a standard format. The College Board of the ISCCM & SNCC will give its initial approval after on site scrutiny by the inspectors appointed by the College Board, in order to ensure the adequacy of facilities in the concerned institution. The final accreditation will be given at the end of completion of the first batch, subject to the institution providing the details of the training given to the candidates (theoretical and practical). Entry to the course is at the discretion of the institution depending on the fulfilment of candidate eligibility. Exit level examinations are suggested to be conducted by the SNCC (in collaboration with the ISCCM) as per the ISCCM examination policy, and a certificate of fellowship completion is proposed to be awarded at the annual conference of the ISCCM. The prize distribution ceremony for the fellowship programme shall be conducted in the annual conference of the SNCC.

Eligibility criteria for accreditation of institutions offering FNCC programme:

- Institutions interested in starting fellowship programme in neurocritical care can apply only if the neurocritical care unit in their institute has been functioning for more than two years.
- The institute should have a dedicated neuro ICU with at least 10 beds (with at least 5 mechanical ventilators) or >20% of bed strength dedicated to neurologically ill patients, and an annual turnover of at least 400 neurological/neurosurgical cases.
- Institutions should have two full time faculty who are eligible to be considered as teachers:
    a) 1 Senior faculty - should have a post graduate degree with MCI recognised qualification (MD/MS/DNB), with at least 8 years of experience in neurocritical care in a recognized institute
    b) 1 Junior faculty with at least 3 years of experience in neurocritical care.

[Teachers with an MCI recognised Post Graduate Diploma should have atleast 10 years' experience for senior faculty, and atleast 5 years' experience for junior faculty]

The teachers must have at least two original article publications in a peer reviewed journal to be eligible.

The teacher should be a life time member of the ISCCM & SNCC.

Both the teaching faculty should be working in the institute for atleast one year prior to applying for the fellowship.

- The institute applying for the accreditation must give an undertaking in addition to having two eligible teachers that:

  a) In case a teacher leaves the institute they will continue to provide training to the trainee
  b) All facilities in the institute will be provided to the trainee during his period of training in the institute.

  - Institutions that do not enrol candidates for three consecutive years will automatically lose accreditation and will need to apply for re-inspection afresh, through the formal process.
  - Inspection shall be carried out by a team comprising of two inspectors, one appointed by the ISCCM with a critical care background, and the other appointed by the SNCC with a neurocritical care background.
  - The inspection and examination fees would be in accordance with the ISCCM inspection and examination policy.
  - Candidates shall be enrolled twice a year – once in January and then in July. The total number of seats per year remain constant, and the institute may enroll in either batch (January or July). The exit exam for the January batch would be held in March, and for the July batch in August the next year.

Eligibility of candidates applying for fellowship:

- Neurologists, anaesthesiologists, general physicians, emergency medicine physicians, and neurosurgeons may apply for the fellowship programme.

- The candidate applying for the fellowship in neurocritical care (FNCC) should possess an MD/MS or an equivalent degree (DNB) from an MCI recognised institute, with at least six months of experience in critical care.
- Candidates with a diploma from an MCI recognized institute are eligible with a two year experience post-graduation that includes atleast six months experience in critical care.
- Candidate selection will be based on a personal interview of the candidate at the individual institution.
- Each candidate should be a member of the ISCCM & SNCC.

Number of seats:

The number of seats in any institute would depend upon the number of teachers available. For each senior teacher (plus a junior teacher, as elaborated above), one candidate may be taken for the fellowship course (FNCC). The institute shall not be allotted more than 2 seats for enrolment per year, irrespective of the number of teachers. The prospect of increasing the number of seats in any institute would be a prerogative of the ISCCM/SNCC, and shall be considered after 4-5 years of the course in the respective institute.

Duration of the course:

The FNCC would be spread over a year, with a compulsory two month rotation in general critical care. The course would include clinical rounds and normal clinical work in the neurointensive care unit (NICU), including procedures undertaken in the NICU, any ongoing research, academic discussions, and journal clubs.

Curriculum:

The candidate is expected to perform clinical duties in the neurointensive care unit of the institute for the entire duration of his/her fellowship, along with a compulsory two-month rotation posting in the general critical care unit of the hospital, anytime during the one-year tenure. Apart from clinical rounds, the candidate would be expected to perform all ICU procedures, including intubations, central venous/ arterial line placements and bronchoscopies etc, under expert supervision. The candidate is also expected to participate in

the research projects, if any, ongoing in the NICU. He/she is expected to take active part in departmental academics, including presentations, journal clubs, case discussions etc, and is expected to attend clinical conferences and neuro-workshops during his/her tenure as a fellow in neurocritical care.

Evaluation:

An evaluation team, consisting of two examiners from the ISCCM, and two from the SNCC, including one internal examiner, will conduct an exit examination for the candidates at the end of their term, comprising theory and Viva Voce. The choice of examiners will be at the discretion of the college boards of the ISCCM/SNCC, and cannot include more than two local examiners (from the same city). Examination would be conducted each year in March (for the January batch), and August (for the July batch). The fellowship degree shall be awarded on successful completion of the examination by the SNCC/ISCCM.

The theory examination will be a 3 hour paper for **100 marks** [25 MCQs (50 marks) and 10 short notes (50 marks)], and will cover the entire neurosciences, including basic sciences, general critical care management, neurosurgical patient management, and management of common neurological disorders.

The Viva Voce would be **200 marks**, with three case presentations (40 marks each), and 4 table vivas, which would include i) Neuromonitoring equipment and Neuro-radiology (20 marks), ii) Pharmacology (20 marks), iii) Neurological emergencies & post op care of neurosurgical patients (20 marks), and iv) General critical care (20 marks).

The theory question papers shall be set by the same examiners as those conducting the viva voce. An aggregate of 50% in theory and 50% in practical would be required for thecandidate to pass the examination.

The examination will be conducted as per the ISCCM examination policy. The exact dates and venue of examination will be communicated to the candidates and the institutions well in advance.

Successful candidates shall receive passing certificates at the Annual Conference of ISCCM, duly signed by the President/Chancellor, Vice Chancellor, and Secretary of the College Boards of both ISCCM and SNCC. Award ceremony for the fellowship program shall be held in the annual conference of the SNCC.

Stipend:

The institutions are required to pay a monthly remuneration to the candidate as per their hospital policy.

Syllabus:

I. Neurological disease states: pathology, pathophysiology and therapy

A. Cerebrovascular diseases
   i. Ischemic and hemorrhagic strokes
   ii. Subarachnoid haemorrhage: aneurysmal and other vascular malformations
   iii. Cerebral venous and dural sinus thrombosis

B. Neurotrauma
   i. Traumatic brain injury
   ii. Spinal cord injury

C. Seizures

D. Neuro-oncology: brain and spinal cord tumours

E. Neuromuscular diseases

F. Infections

G. Toxic and metabolic disorders

H. Inflammatory and demyelinating diseases

I. Neuroendocrine disorders

J. Encephalopathies

K. Principles of brain death, organ donation, maintenance of organ donors

II. Neuroradiology:

A. Basic principles of CT and MRI

B. Technical knowledge of Neurointerventional procedures

C. CT angiography and perfusion

D. Imaging of spine

III. Perioperative neuroanaesthesia

A. Pre-operative assessment of a patient

B. Basic principles of anaesthetic management

C. Postoperative care following neurosurgery

IV. General Critical Care: Pathology, Pathophysiology and Therapy

A. Cardiovascular physiology, pathology, pathophysiology and therapy

1. Anatomy and physiology of the cardiovascular system
2. Shock and its complications
3. Vasoactive and inotropic therapy
4. Myocardial infarction and coronary syndromes
5. Neurogenic cardiac disturbances
6. Cardiac rhythm and conduction disturbances
7. Acute valvular heart disease and infective endocarditis
8. Acute features of cardiomyopathies and myocarditis
9. Pulmonary embolism
10. Pulmonary edema: cardiogenic versus noncardiogenic (including neurogenic)
11. Recognition, evaluation and management of hypertensive emergencies
12. Thrombolytic therapy
13. Cardiopulmonary interactions, effects of ventilation on hemodynamics
14. Echocardiography in the critically ill patient
15. Cardiopulmonary resuscitation

B. Respiratory physiology, pathology, pathophysiology and therapy

1. Physiology of pulmonary gas exchange and its abnormalities
2. Ventilatory muscle physiology and its abnormalities
3. Acute respiratory failure: hypoxemic and hypercapnoeic
4. Airway injury: smoke inhalation, aspiration and chemical pneumonitis
5. Bronchopulmonary infections
6. Upper airway obstruction
7. COPD and status asthmaticus
8. Chest trauma, flail chest, pneumo / hemothorax
9. ABG and VBG interpretation
10. Oxygen therapy
11. Airway maintenance
12. Mechanical ventilation: invasive, non-invasive
13. Chest x ray interpretation

14. End tidal CO2 monitoring
15. Sleep apnoea
16. Sedation and weaning protocol

C. Renal physiology, pathology, pathophysiology and therapy
    a. Renal regulation of fluid and water balance and electrolytes
    b. Renal failure: prerenal, renal and postrenal
    c. Derangements secondary to alteration in osmolality and electrolytes
    d. Acid base disorders and their management
    e. Principles of renal replacement therapy
    f. Evaluation of oliguria and polyuria
    g. Drug dosing in renal failure
    h. Management of rhabdomyolysis
    i. Neurogenic disorders of sodium and water regulation (CSW, DI and SIADH)
    j. Use of diuretics in a critically ill patient

D. Metabolic and endocrine effects of critical illness
    a. Enteral and parenteral nutrition
    b. Endocrinology
        i. Disorders of thyroid function
        ii. Adrenal crisis
        iii. Diabetes mellitus
        iv. Disorders of calcium and magnesium balance

E. Physiology, pathology, pathophysiology and therapy of acute gastrointestinal and genitourinary disorders
    a. Upper gastrointestinal bleeding
    b. Acute hepatic failure, pancreatitis
    c. Retention of urine
    d. Urinary tract bleeding

F. Obstetric and gynaecological physiology, pathology, pathophysiology and therapy
    a. Hypertensive disorders in pregnancy
    b. Seizures in pregnancy
    c. Trauma and pregnancy

G. Infectious disease physiology, pathology, pathophysiology and therapy
    a. Antibiotics: antibacterial, antiviral, antifungal, antiparasitic and antituberculousis agents

b. Infection control
c. Hospital acquired infections in the critically ill
d. AIDS
e. Evaluation of fever in the ICU patient
f. Central fever
g. Interpretation of antibiotic concentrations, sensitivities
h. Sepsis, septic shock, SIRS, MODS

H. Haematologic disorders physiology, pathology, pathophysiology and therapy
a. Physiology of coagulation
b. Acute defects in hemostasis
i. Thrombocytopenia, thrombocytopathy
ii. Disseminated intravascular coagulation
iii. Acute hemorrhage
iv. Iatrogenic coagulopathies (warfarin and heparin induced)
c. Anticoagulation and fibrinolytic therapy
d. Principles of blood component therapy
e. Hemostatic therapy
f. Prophylaxis against thromboembolic disease
g. Prothrombotic states

I. General trauma
a. Approach to the management of multisystem trauma
b. Skeletal trauma including the spine and pelvis
c. Electrical injury

J. Monitoring
a. Principles of ECG monitoring
b. Invasive monitoring: principles of transducers, calibration, gain adjustment, display techniques
c. Pulse oximetry
d. Capnography
e. Zeroing, calibration and troubleshooting of pressure transducers

V. Administrative and quality management principles and techniques

A. Organization and staffing of critical care units

B. Collaborative practice principles, including multidisciplinary rounds and management
C. Performance improvement, principles and practices
D. Principles of triage and resource allocation, bed management
E. Medical economics: health care reimbursement, budget development
F. Prognostic indices, severity of illness scores and therapeutic intervention scores

VI. Ethics and legal aspects of critical care medicine, communication

A. Death and dying
    i. General legal principles
    ii. Certificate of death
    iii. Medical witness in the court
    iv. Relevant evidence acts IPC and Criminal PC
B. Forgoing life-sustaining treatment and orders not to resuscitate
C. Rights of patients, the right to refuse treatment
D. Living wills, advance directives
E. Terminal extubation and palliative care
F. Rationing and cost containment
G. Emotional management of patients, families and caregivers
H. Futility of care and the family in denial

VII. Principles of research in critical care

A. Study design
B. Biostatistics
C. Manuscript preparation
D. Presentation preparation and skills
E. Institutional Review Boards

VIII. Procedural skills

A. Cardiovascular system
    i. Arterial and central venous cannulation
    ii. 12 lead and dynamic ECG monitoring
    iii. Use of vasoactive medications

iv. Pericardiocentesis
v. Electrical cardioversion and defibrillation

B. Respiratory system
i. Maintenance of an open airway and using airway adjuncts
ii. Direct laryngoscopy
iii. Endotracheal intubation
iv. Cricothyroidotomy and tracheostomy
v. Management of mechanical ventilation
vi. Topical use of respiratory medication (inhalers & nebulizers)
vii. Suctioning, chest physiotherapy & incentive spirometry
viii. Weaning techniques
ix. Fibreoptic bronchoscopy
x. Oxygen therapy devices and their limitations
xi. Chest tube insertion and chest drainage systems
xii. Bedside pulmonary function tests

C. Gastrointestinal system
i. Insertion of a nasogastric/orogastric tube
ii. Formulation of an enteral feeding regimen

D. Haematological disorders
i. Interpretation of coagulation studies
ii. Blood component therapy
iii. Massive transfusion
iv. Plasmapheresis

E. Neurological Monitoring
i. Performance and interpretation of transcranial Doppler
ii. Interpretation of continuous EEG monitoring
iii. Interpretation and management of ICP and CPP data
iv. Interpretation of CT and MRI standard neuroimaging and perfusion studies and biplane contrast neuraxial angiography
v. Management of plasmapheresis and IV Ig
vi. Administration of intravenous and intraventricular thrombolysis
vii. Performance of cisternal and lumbar puncture and sub-arachnoid drain insertion and interpretation of CSF fluid results
viii. External ventricular drain placement and management

ix. Induction and maintenance of therapeutic coma and hypothermia

Suggested books:

1. Gupta and Gelb's Essentials of Neuroanesthesia and Neurointensive Care. 2nd edition. Editors: Arun Gupta, Adrian Gelb, Derek Duane and Ram Adapa, 2018, Cambridge University Press.
2. Neurocritical Care. 2nd edition. Editor: Michel Torbey, 2019, Cambridge University Press.
3. Neurointensive Care. 1st edition. Editor: Hemanshu Prabhakar, 2019, OxfordUniversity Press
4. The Neuro ICU book. 2nd edition. Editor: Kiwon Lee, 2017, McGraw-Hill Education
5. Textbook of Neuroanesthesia and Neurointensive Care. 1st edition. Editor: Hemanshu Prabhakar, 2019, Springer
6. Problem based learning discussions in Neuroanesthesia and Neurocritical care. 1st edition. Editors: Hemanshu Prabhakar, Shobana Rajan, Charu Mahajan, Indu Kapoor, 2019, Springer
7. Essentials of Anesthesia for Neurotrauma. 1st edition. Editors: Hemanshu Prabhakar, Charu Mahajan, Indu Kapoor, 2018, Taylor and Francis, CRC Press.
8. Neuromonitoring Techniques. 1st edition. Editor: Hemanshu Prabhakar, 2017,Elsevier Inc.
9. Complications in Neuroanesthesia. 1st edition. Editor: Hemanshu Prabhakar, 2016, Elsevier Inc.
10. Oxford Textbook of Neurocritical Care. 1st edition. Editors: Martin Smith, G Citerio, A Kofke, 2016, Oxford University Press