1. Fellowship in Pediatric Neurology

1. Information related course

Pediatric Neurology has evolved as a separate discipline in India over the last 30 years requiring a different set of clinical approach, diagnostic and management skills and research as compared to adult Neurology. The goal of postgraduate education for the award Fellowship in Pediatric Neurology is to bring out competent pediatric neurologists who shall recognize the health needs of the society provide quality health care and carry out professional obligations ethically to fulfil the objectives of national health policy. Very few centres in India have got fellowship in Pediatric Neurology seats and it is a highly demanding super specialty branch in Pediatrics.

This program shall primarily focus on training pediatricians (MD/equivalent degree) on scientific knowledge and management skills required to practice academic Pediatric Neurology. During the training period they shall master the competencies in Pediatric Neurology and basic medicine that are required for Pediatric Neurology practice from the primary to tertiary level of health care system. In addition, they should also acquire basic skills in teaching the medical and paramedical professionals, research skills, organizational competency and social health care capabilities. Thus the major components of the curriculum shall cover theoretical knowledge, practical and clinical skills, attitude skills and training in research methodology and social care.

Eligibility for the course - MD in Paediatrics / DNB Pediatrics

Admission – Eligibility – cum- Entrance Exam and Interview at Institute - Dr D Y Patil Medical College, Hospital and Research Centre, Pimpri, Pune.

SUBJECT SPECIFIC LEARNING OBJECTIVES -

1. **Clinical Skills**: The aim of the course is to impart thorough and comprehensive training to the candidate in the various aspects of the specialty to enable him:

- To function as Faculty/consultant in the specialty
- To plan and set up independent Pediatric Neurology Unit catering to clinical and investigative Pediatric Neurology
- The trainee should be able to:
  - i.) achieve competence in the neurological examination and neuro-developmental assessment of the newborn, infant, and older children,
  - ii.) know the utility, limitations, and interpretation of the results of lumbar puncture, EEG, EMG, evoked potentials, Cranial US, CT, MRI, MRA, MR Spectroscopy, Cerebral Angiography, and Isotope scans.

2. **Teaching skills**:

The Pediatric Neurologist should have the skills of a teacher also. The DM candidates would be actively involved in teaching the undergraduate and post graduate students. They will take periodic teaching sessions for the nursing students. By the completion of two years they would be involved in the development of clinical neuro-evaluation protocols which would facilitate the diagnosis and management of many neurological illnesses. Their teaching skills will be assessed and shall form part of the internal assessment.

3. **Research Methodology**:

The post graduate student should develop competencies

- to develop protocols for conducting applied research in Neurosciences
- to understand basics of statistics for conducting research programmes and interpret of results of research studies.
- Able to conduct human behavior studies,
- Understand pharmaco- economics and non-linear mathematics in research studies. They will also develop the basic skills required to perform clinical studies such as case reports and series, retrospective studies, and proposals for prospective studies. The candidate will be required

to conduct at least one investigative project during the course and will have at least one publication in an indexed journal.

4. **Group Approach**:
An integral component of a Pediatric Neurology program is team-work, especially with neuro/epilepsy surgery and physical medicine and speech therapy and behavioral therapy. The residents will be encouraged to conduct a formal joint neurology conference with the allied specialties once a week where the surgical and differently abled cases for the week will be formally discussed to formulate the management plan.

5. At the end of the course the student should be able to describe the following:
The trainee should be able to:

a. Achieve competence in the neurological examination and neurodevelopmental assessment of the newborn, infant, and older children.

b. Independently diagnose and manage all common neurological diseases in children

c. Diagnose and manage neuro-developmental disorders

d. Know the utility, limitations, and interpretation of the results of lumbar puncture, EEG, EMG, evoked potentials, Cranial US, CT, MRI, MRA, MR Spectroscopy, Cerebral Angiography, and Isotope scans

e. Independently develop research projects/treatise relevant to discipline of Pediatric Neurology.

SUBJECT SPECIFIC THEORETICAL COMPETENCIES

The student should acquire the following theoretical competencies under cognitive and affective domains:

Cognitive Domain

1. Diagnosis of routine and complex clinical problems on the basis of pediatric neurology.
2. Interpret laboratory data in relation to clinical findings with reasonable accuracy
3. Should be able to teach pediatric neurology to undergraduates, postgraduates, nurses and paramedical staff including laboratory personnel.
4. To carry out research on pediatric neurology related topics.
5. Maintain accurate records of tests results for reasonable periods of time so that these may be retrieved as and when necessary
6. Make and record observations systematically that is of use for archival purpose and for furthering the knowledge of pediatric neurology.
7. Able to systematically write a paper and publish in a relevant journal.
8. Able to present a paper in a conference through an oral presentation and poster presentation.
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9. Able to supervise and work with subordinates and colleagues in a the department.
10. Subject himself/herself to continuing education and constantly update his/her knowledge of recent advances in Pediatric neurology and allied subjects.

Affective Domain

Communication with children and their parents

- Communication with children
- Communication with allied specialists
- Behavioural Skills
- Professionalism

TEACHING PROGRAMME

1. **Bedside Clinical Teaching/Demonstrative Teaching.**

Clinical Case discussions: Clinical discussion is the core of postgraduate programs like DM Pediatric Neurology. On an average there shall be at least one case discussion per week. The discussion should cover all the aspects from basics to the latest advances. Active involvement of the faculty shall be encouraged to maintain a high standard of training.

2**. Symposia and faculty lectures**: Symposia shall be much more frequent than formal lectures. Maximum involvement of students and faculty shall be ensured Formal lectures by faculty – senior and junior – on various subjects will be an integral part of the schedule. However the number of such lectures shall be minimized to encourage self learning. Instead lecture topics shall be assigned as home work also.

3. 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.

4. The Log books shall be checked and assessed periodically by the faculty members imparting the training.

5. The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.

6. Electrophysiology and Imaging rounds: Discussions on EEG, other electro diagnostic modalities and newer trends in Pediatric Neurology shall be done once in a week (EEG, VEEG, BERA, VEP, NCV and EMG

7. MRI , MRS, MRA and 64 slice CT). This is of great importance in view of the fast advances occurring in the field of Pediatric Neurology. This is in addition to the separate posting to these segments

8. **Joint neurology conference**: An integral component of a pediatric Neurology program is teamwork, especially with neuro/epilepsy surgery and physical medicine and speech therapy and behavioral therapy. The residents will be encouraged to conduct a formal joint neurology conference with the allied specialties once a week where the surgical and differently abled cases for the week will be formally discussed to formulate the management plan.

9. **Journal clubs**: Journal club is an integral part of a postgraduate training programme. This helps the students and faculty to update their knowledge in the latest developments in the field of medicine. It not only imparts new information but also trains the candidates to objectively assess and criticize the various articles and studies which will be useful in ensuring practice of evidence based medicine. 10. Teaching rounds: Teaching rounds shall be strengthened. A detailed teaching round at least once in a week improves the patient care in addition to enhancement of the clinical skills of the students as well as the faculty.

11. **Guest lectures**: Guest lectures shall be arranged as frequently as possible. Senior faculty from other departments, faculty from other institutions in the state and visiting national and international faculty shall be invited for guest lectures or clinical discussions and demonstrations. The topics shall cover not only medical subjects but also other aspects like communication skills, social problems etc.

12. The department should encourage e-learning activities.

13. Clinical clubs; monthly clinical clubs were interesting fully worked up cases will be presented

ASSESSMENT

FORMATIVE ASSESSMENT during the training includes:

Periodic internal assessment to improve the standards of the postgraduate training a periodic internal objective assessment is needed.

A few such methods are

a) Theory and practical examination at end of the course

b) At the end of 1 year, internal assessment both in theory and clinical should be made for every candidate. Internal assessment will be made in day-to-day work of the trainee who involves patients' care, learning bedside case presentation and research.

Formative assessment will be conducted as follows:

Continuous: This will be based on a report by the unit in charge at the end of every semester on a scale of 1-5 (5 being the highest). The consultant would assess the progress of the candidate in cognitive abilities and psychomotor and communication skills. The candidates will be asked to maintain a log book providing the following details:

(a) Details of presentation in the departmental journal clubs, seminars, case discussion etc., participation and presentations of papers in national conferences.
(b) Publication of review and research articles – 2 Publications
(c) Presentations in National and International Pediatric Neurology Conferences
(c) Creation of learning resource material. Formulating algorithms for investigation of various neurological disorders eg encephalitis.
(d) Details of procedures conducted with complications and outcome.

SUMMATIVE ASSESSMENT (FINAL ASSESSMENT)
The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000. 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 Fellowship exit Examination will be in two parts:

1. Theory Examination

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 the examination as a whole.

Theory papers: There shall be 4 theory papers with the following titles:
Paper – I: Basic Sciences – Neuro anatomy, Neuro physiology, Neurochemistry, Neuropathology, Neuro Microbiology, Parasitology, Immunology, Epidemiology and Genetics
Paper – II: Epilepsy, Neurophysiology, Neurodevelopmental Disorders, Neonatal Neurology
Paper – III - Neurogenetics, Neuroimmunology, Neurodegenerative disorders, Neurometabolic disorders, Neuromuscular disorders, Neuro oncology, Traumatic brain injury, Neuro-criticare, Miscellaneous
Paper – IV: : Recent Advances in Pediatric Neurology
Thematic concepts relevant to clinical pediatric neurology Practical/Clinical and Oral examination
- One long case, 2 short cases stressing the relevant allied specialities
- Structured viva voce

(a) Patient management problems
(b) General viva (including radio imaging investigations, interpretation of genetic/metabolic investigations, neurophysiological records etc)

- A maximum of 900 marks will be awarded.
- The candidate must obtain at least 50% (i.e. 450) marks to pass the examination
- Of the 900 marks, 50 marks will be for the Internal Assessment.
- A total of 800 marks, will be assigned to the Final Examination (Theory 400, Practicals 400).
- It will be essential to pass theory and practical both separately in the Final Examination by securing at least 50% marks in each

Syllabus

The broad course contents are outlined below:

Learning in the fellowship course will eventually be self directed and will take place while working in the clinics and through interactions in the rounds. Apart from the faculty of the division of child neurology, members of the department faculty and members of other departments will also be involved in the didactic teaching of respective fields as follows.

(I) **Development of the Infant and young child**
(a) Anatomy of Neurodevelopment
(b) Physiology of Neurodevelopment
(c) Assessment of normal development
(d) Variations of the normal development
(e) The abnormal child; Early markers of CP etc

(f) Approach to a child with developmental delay

(II) **CNS malformations**
(a) Normal anatomy of the CNS
(b) Common CNS malformations
(c) Surgical management of CNS malformations

(III) **Seizure disorders in childhood**
(a) Seizures and non-seizures
(b) Febrile seizures
(c) Classification /evaluation and management of epilepsy
(d) Epileptic syndromes
(e) Status epilepticus
(f) Intractable epilepsy
(g) EEG in seizure disorders
(h) Surgical management of seizure disorders

(IV) **Infections of the CNS**
(a) Acute pyogenic meningitis
(b) Neonatal meningitis
(c) Chronic meningitis
(d) Brain abscess
(e) Acute encephalitis
(f) Cerebral malaria
(g) Acute febrile encephalopathy
(h) Neurocysticercosis
(i) HIV encephalopathy
(j) SSPE
(k) Congenital infections
(l) Laboratory diagnosis of CNS infections

(V) **Autoimmune and Post infectious diseases**
(a) Primary demyelinating diseases of the CNS
(b) ADEM, optic neuritis, acute transverse myelitis
(c) Immunologically mediated diseases affecting the CNS gray matter , peripheral nervous system
(d) Systemic vasculitides with nervous system manifestations

(VI) **Neurodegenerative disorders** (in co-ordination with the Departments of Pathology and Radio diagnosis)
(a) Classification, Approach to a patient – gray matter, white matter
(b) Diagnosis (including histopathology and neurogenetics)
(c) Management
(d) Antenatal counseling

(VII) **Neurometabolic disorders including mitochondrial disorders** (in co-ordination with the Departments of Pathology and Radiodiagnosis)
(a) Classification, evaluation and approach to a patient
(b) Neurogenetics
(c) Management including antenatal counseling
(d) Role of histopathology

(VIII) **Chromosomal anomalies**
(a) Autosomal abnormalities
(b) Sex chromosomal abnormalities
(c) Chromosomal abnormalities in various dysmorphic syndromes

(IX) **Toxic and nutritional disorders**

(a) Toxic disorders: lead, thallium, arsenic, mercury, aluminum, organic toxins ,alcohol, bacterial toxins

(b) nutritional disorders; protein energy malnutrition, Vitamin deficiencies, infantile tremor syndrome

(X) **Neurocutaneous syndromes**

Neurofibromatosis, Tuberous Sclerosis, Sturge Weber Syndrome etc.

(XI) **Movement disorders** Movement disorders including cerebellar dysfunction Ataxias, chorea, dystonias, Tics etc

(XII) **Cerebrovascular disorders**

(a) Arterial thrombosis
(b) Venous thrombosis/embolism
(c) Intracranial bleed
(d) Stroke
(e) Role of Radioimaging

(XIII) **Neonatal neurology**

(a) Neonatal seizures
(b) Hypoxic encephalopathy
(c) Intraventricular Hemorrhage
(d) Clinical neurological assessment
(e) Role of EEG, Ultrasonography, CT scan
(f) Neonatal seizures
(g) ICH
(h) Brain edema
(i) Neuromuscular disorders
(j) Degenerative disorders
(k) CNS malformations

(XIV) **Brain tumors**

(a) Features , Classification, Evaluation and management
(b) Role of Radiotherapy

(XV) **Spinal cord disorders**

(XVI) **Neuromuscular disorders**

(a) Evaluation and investigation
(b) Histopathological changes in different disorders
(c) Developmental disorders of muscle
(d) Muscular dystrophies
(e) Endocrine and metabolic myopathies
(f) Inflammatory myopathies
(g) Disorders of Neuromuscular transmission
(h) Spinal muscle atrophy
(i) Motor neuron disease
(j) Autonomic neuropathies
(k) Guillain Barre syndrome

(XVII) **Mental Retardation**

(a) Assessment of intelligence quotient
(b) Causes, Evaluation
(c) Prevention / Role of antenatal counseling

(XVIII) **Behavioral and Pervasive disorders** (in co-ordination with the Departments of Psychiatry and with NGO's in the schools and field)
(a) Attention Deficit Hyperactivity disorders (ADHD), Autistic spectrum Disorder
(b) Learning disability

(XIX) **Coma in Pediatric Patient /Brain Death**
(a) Intensive care (posting in PICU and lectures by Consultant PICU)
(b) Monitoring of a comatose child
(c) Coma in Pediatric population/ metabolic coma
(d) Brain death

(XX) **Neurological manifestations of systemic diseases**
(a) metabolic encephalopathies
(b) disorders of acid/base / elecrolyte disturbances
(c) neurological complications of pulmonary, gastrointestinal, hepatic, renal, cardiac, hematological, neoplastic and endocrine diseases

(XX) **Neurological and Neurosurgical emergencies**
(a) Department of Neurosurgery
(b) Neurological Emergencies

(XXII) **Clinical Epidemiology**
(a) research methodology
(b) biostatistics

(XXIII) **Ethics in Medicine**

(XXIV**) Neuroinformatics**
Use of media in education, computer information and technology, internet

(XXV) **Rehabilitation in Pediatric Neurology**
(a) Principles of physiotherapy
(b) Assistive devices
(c) Treatment of spasticity
(d) Occupational therapy

(XXVI) **Community Pediatrics**
(a) National Programmes
(b) AFP surveillance

(XXVII) **Non epileptiform paroxysmal disorders and sleep disorders**
*headache
*breath holding spells
*syncope
* sleep disorders

(XXVIII**) Neuroendocrine and autonomic nervous system disorders**
(a) disorders of Hypothalamus & Pituitary gland in Childhood and Adolescence
(b) disorders of micturition and defecation
(c) disorders of autonomic nervous system

(XXIX) **Neuroimaging**

SUBJECT SPECIFIC PRACTICAL OR PRACTICE BASED COMPETENCIES

Psychomotor Domain

The student should acquire the following skills under the psychomotor domain:

Clinical Skills

1. Detailed history taking
2. Physical and Neurologic examination
3. Blood sampling; capillary, venous and arterial
4. Insertion of peripheral and central lines
5. Pediatric ventilation
6. Care of a comatose child
7. Physiotherapy
8. Lumbar puncture and CSF examination
9. Subdural tap
10. Ventricular tap
11. Neuroradioloical procedures; skull x-ray, cranial ultrasound, CT scan, MRI, radio nuclide brain scan, cerebral angiography,
12. Eletroencephalography
13. Evoked potentials; Visual evoked potential, Brainstem auditory evoked potential
14. Nerve conduction velocity
15. Electromyography
16. Muscle biopsy
17. Nerve biopsy
18. Neurometabolic screening tests (urine)

2. **Duration :** 2 Years
3. **Training Facilities –**

TEACHING AND LEARNING METHODS

- **Training Facilities –**

Besides in-service activities, a pragramme of bedside demonstrations, seminars, tutorials, group discussions, workshops, views and reviews, practice parameters, journal clubs, and lectures is organized regularly. Regular teaching sessions are conducted by two trained well qualified Pediatric Neurologists.

TEACHING SCHEDULE

The following teaching schedule is prescribed for the course:

General Pediatric Neurology and Epilepsy and Neuromuscular OPD – Training of fellows on case taking, diagnosis, management and counseling of parents

Grand ward rounds - 3 days a week

Seminars – Twice a week

Case presentation – Once a week

Journal club - Once a week

Neuroradiology (teaching session) - Once in two weeks

Neurophysiology

The resident is imparted training in the technique of application of EEG/EMG/evoked response electrodes. The resident learns to detect various types of artifacts in the EEG and evoked response results.

The student also learns the handling of EEG/EMG and evoked response machines, under the guidance of technical assistant and the consultants. During the first year of the course, training is imparted in the interpretations of nerve conduction studies, EMG, evoked response, and ultrasound studies. The resident is taught the interpretation of EEG

records and reports under the guidance of senior colleagues and consultants in the beginning and independently in the second year of training.

The trainee is made well conversant with each and every aspect of known knowledge about Neuroanatomy, Neurophysiology, Neurochemistry, Neuroradiology, Neuropharmacology and Applied Pediatric Neurology by the end of two year training. Related neuropathology and neurosurgery is also taught through bedsides, teaching rounds lectures, seminars and group discussions.

Postings

During the period of training the candidates follow in-service training-cum-residency programme. The resident works as a Senior Resident and is given gradually increasing responsibility in decision making.
The clinical and investigative aspects of Pediatric Neurology and its allied specialties are Neuroanatomy, Neuropsychiatry, Neuropathology, Neurophysiology, Neurochemistry, Neuroradiology, Neuroanaesthesiology, Neurorehabilitation and Neurosurgery. The day-to-day work of the trainees is supervised by the Consultants of the Department of Pediatric Neurology.
The posting is so organized that the trainee gets posted in various areas of the department like OPD, wards, laboratories etc. He/she participates in the consultation service provided by the department to the Institute.
The trainee will be posted in different specialties as follows:

- Electrophysiology – 1 year, by 3 monthly rotation
- They will be given specialty postings as follows during the second year of their Academic Training
    - Neonatal Neurology - 1 month
    - Neurology (adult) – 1 month
    - Neurosurgery/ Neuropathology - 1 month
    - Neuroradiology - 1 month

4. Teaching Faculty Details

Teaching Faculty Details
1.Dr Shiji Chalipat (Course Coordinator)
Professor &Pediatric Neurologist
In – Charge of Fellowship Programme
NMC Registration NO 2012072090
Expiriance13 years & 9 years in Pediatric Neurology(Regular)

2.Dr Vishwanath Kulkarni
Consultant Pediatric Neurologist
NMC Registration No .2002031278
Experience 11 years & 9 years in Pediatric Neurology

3.Dr Shradha Salunkhe
Professor and Developmental Pediatrician
Registration No 2003083059
Experience 14 years in Pediatrics (Regular)

5. Infrastructure

- Pediatric Neurology Outpatient clinical care is made available on Monday and Thursday with round the clock emergency services throughout the week.
- Neuromuscular OPD on Every Thursday
- Ketogenic diet OPD – Every Thursday by trained senior nutritionist
- In-house EEG machine for short term and long term EEG monitoring, video-EEG, nerve conduction studies, electromyography and evoked potentials.

- Well-equipped Pediatric intensive care unit with good Pediatric Neuro criticare services
- Pediatric Genetics services – Once a week ; conducted by well qualified Pediatric Geneticist
- Neuro-radiology Department – 24 hour service of 3T/1.5 MRI, CT, USG, Interventional radiology department
- Pediatric Physiotherapy Department – College of Physiotherapy
- Child Guidance clinic and Development OPD – Developmental Pediatrician, Clinical psychologist, Occupational therapist, Physiotherapist, Speech therapist, Special Educator
- Neurosurgery Department as well as Epilepsy surgery team
- Ketogenic diet OPD by a trained senior nutritionist
- Pediatrc Orthopedic servies and as well as Physical Medicine Department
- A close interaction with other specialities like psychiatry, neurosurgery ,ophthalmology and PMR is brought forth.
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6. **Fees :** 3,00,000/- (Rupees Three Lakh Only)