Guidelines

for

Competency Based Training Programme

in

DrNB- Pediatric Neurology

2021

NATIONAL BOARD OF EXAMINATIONS IN MEDICAL SCIENCES
Medical Enclave, Ansari Nagar, New Delhi-110029, INDIA
Email: mail@natboard.edu.in Phone: 011 45593000

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I. PROGRAM GOAL AND OBJECTIVES:

1. Goal

The goal of DrNB in Pediatric Neurology is to produce a Pediatric Neurologist who is clinically competent, skilled, and compassionate. The DrNB graduate must possess skills in the diagnosis and management of neurological disorders affecting the newborn, infant and children thus providing quality care for children with neurological disorders in the country.

2. Objectives

Objectives of this program are:

i. To acquire skills in eliciting complete history, perform examination and arrive at possible differential diagnosis for a child with neurological problem.
ii. To provide scientifically based, comprehensive and rationale management for children with neurological disorders.
iii. To acquire skills in ordering, and interpreting the diagnostic investigations including neuroimaging, neurophysiological, neuro metabolic and neurogenesis tests and correlate it clinically.
iv. To demonstrate skills of professional ism including counselling of patients and families.
v. To acquire basics kills in teaching the medical and paramedical professionals, and develop basic research skills.

3. Competencies in Pediatric Neurology

Subject specific competencies:

i. Clinical Skills: At the end of acquiring a DrNB in Pediatric Neurology, the student should be able to

   a. Elicit, document, and present a detailed neurological history and other relevant histories pertaining to nervous system

   b. Perform and demonstrate the correct method of physical examination including detailed neurological examination in neonates, infants, and children.

   c. Document, organize and present the clinical findings

   d. Analyze the symptoms and signs and propose a provisional diagnosis or differential

diagnosis

e. Formulate a plan for diagnostic evaluation of children with neurological disorders like epilepsy, stroke, neuromuscular disorders, movement disorder, neuro metabolic disorders, neurodegenerative disorder, neuro-infections, and neuro developmental disorders.

f. To set priorities for laboratory studies, electro physiology, imaging, genetic studies as required.

g. Perform and interpret all electro physiological procedures like electoenc ephalogrpahy (EEG), Nerve conduction study (NCV), electromyography (EMG), visual evoked potentials (VEP), brainstem auditory response (BERA), and repetitive nerve stimulation test (RNST).

h. Formulate a plan for sub sequent therapy for children with neurological disorders like neuro-infections, epilepsy, neuro metabolic disorders, cerebro vascular disorders, auto immune disorders, demyelinating disorders, and neuro degenerative disorders.

i. Describe a plan for evaluating and managing neonates with neurological problems including intracranial hemorrhage, neonatal seizure, neonatal meningitis, hypoxic is chemicence phalopathy, kernicterus, metabolicence phalopathies, and congenital infections

j. Decide the evaluation and management of neurological disorders in pediatric intensive care unit including status epilepticus, management of raised intracranial pressure, coma, central nervous system infections, acute flaccid paralysis, and neurological complications of surgical patients and post-operative care of neuro surgical patients.

k. Interpret the reports of all investigations like cerebrospinal fluid analysis, electroence phalography, nerve conduction study, electromyography, evoked potentials, and polysomnography, neuroimaging (CT brain, MRI brain and spine), neuro metabolic investigations and genetic investigations and correlate its findings in clinical context.

l. Decide the evaluation and subsequent management of neurological conditions in children when called for consultations.

m. Explain the principles of rehabilitation emphasizing on the role of physio therapy, occupational therapy, speech therapy and special education

n. Decide the right candidate for administration of Botulinum toxin where indicated, and administration of the same.

o. Decide the extent of disability in children with neurological disorders and be able to calculate the degree of impairment required for disability certification.

ii. Theoretical Knowledge: At the end of acquiring a DrNB in Pediatric Neurology, the student should have acquired comprehensive knowledge about all aspects of Pediatric Neurology and ancillary fields like Developmental Pediatrics, Pediatric Neuro radiology, Clinical Genetics, Pediatric Physical Medicine and rehabilitation, through the prescribed syllabus.

a. General competencies

- Communication skills - At the end of acquiring a DrNB in Pediatric Neurology, the student should be able to:
  - Develop attitudes and behaviors that are consistent with the team approach to medical care of children with neurological disorders.
  - Develop skills in supervision of and interactions with other medical and nursing personnel involved in the management of the patient.
  - Demonstrate and teach (early) stimulation and rehabilitative care to parents and their families
  - Communicate with children with neuro developmental disorders and lack of communication skills
  - Develop competency in communicating the diagnosis, investigation plan and subsequent management of neurological disorders in children to their parents.
  - To communicate with allied specialists
  - Develop professionalism

b. Research and continuing medical education

- At the end of acquiring a DrNB Pediatric Neurology, the student should be able to:
  - Engage in appropriate research on pediatric neurology related topics
  - Interpret the results of original research papers
  - Develop a basic research protocol

- Perform and interpret summary statistics
- Maintain accurate records of tests results for reasonable periods of times that these may be retrieved as and when necessary
- Make and record observations systematically that is of use for archival purpose and for furthering the knowledge of pediatric neurology.
- Able to systematically write a paper and publishing are Levant journal.
- Present a paper in a conference through an oral presentation and poster presentation.
- Acquire self-directed learning skills by constantly updating his / her knowledge of recent advances in Pediatric neurology and allied subjects.

iii. Teaching

a. Teach pediatric neurology to under graduates, post graduates, nurses and paramedical staff including laboratory personnel.

b. Develop competency in communicating the diagnosis, investigation plan and subsequent management of neurological disorders in children to their parents.

c. Develop professionalism, and must be able to communicate with allied specialists

II. TRAINING, TEACHING AND RESEARCH ACTIVITIES:

1. Training: Recommended guidelines for Clinical Postings:

i. Total duration in Core Pediatric Neurology: 2years (including Ward, OPD, PICU, NICU, Emergency)
ii. Neuro physiology- 6 months (the candidate will continue to do ward work and OPDs, as per requirement of the department.)
iii. Rotations-6 months
iv. Adult neurology – 2 months
v. Developmental Pediatrics including child psychiatry & amp; child psychology – 1 month
vi. Neuro surgery –15 days
vii. Neuro -rehab-15 days
viii. Genetics- 15 days
ix. Neuro radiology -15 days
x. Electives- 1 month

The HOD can decide the distribution of the postings according to feasibility. A general year wise guideline has been provided below: -

a. First year

- Posting in the Pediatric Neurology Ward -10 months in the Ward posting, the DrNB resident will learn the clinical evaluation, diagnosis and management of children admitted with neurological problems such as seizures, meningitis, encephalitis, neuro degenerative disorder set under the supervision of faculty.
- They will also learn procedures such as performing lumbar puncture and interpreting the CSF examination.
- Posting in Adult Neurology-2 month (In dedicated Pediatric hospitals, necessary tie up with adult Neurology hospital nearby which is accredited for DM / DrNB in Neurology for this posting may be done).

b. Second year

- Posting in the Core Pediatric Neurology – 9 months
- Posting in the Clinical Neuro Physiology Lab (EEG, Nerve conduction studies, EMG,

Evoked potential studies) – 3 months

- The DrNB resident will be trained in the procedure and interpretation of EEG, nerve conduction studies, electromyography, and evoked potential studies.

c. Third Year

- Posting in the Clinical Neuro Physiology Lab (EEG, Nerve conduction studies, EMG, Evoked potential studies)-3 months
- The DrNB resident will be trained in the procedure and interpretation of EEG, nerve conduction studies, electromyography, and evoked potential studies.
- Posting in Neurosurgery-15 days. During the Neuro surgery posting, which is 15 days, the candidate is required to attend all the operations and see for himself / herself, the surgical techniques. Post-operative care and complications and selection of cases for surgery are Also taught.
- Posting in Neuro radiology-15 days Posting in Core Pediatric Neurology Ward-5 months
- Elective posting based on the interest of the DrNB candidate-1 months which may be external elective posting- (posting to any other accredited Institute of the candidate's choice is permitted)
- Posting in Genetics unit- 15month
- Posting in Physical Medicine and Rehabilitation - 15days.
- Posting in Developmental Pediatrics/ Child Psychiatry & amp; Psychology -1 month in this posting, the resident will learn the approach to psychiatric problems in children, (which frequently co-exist with neurological problems) such as behavior problems, obsessive compulsive disorder, schizophrenia etc. They will also learn about the use of psycho pharmacological drugs in children.

2. Teaching Activities:

i. Seminar (Once weekly)
ii. Clinical Case presentation (Once weekly)
iii. Journal Club (Once monthly)
iv. Mortality meet discussion (Once a month)
v. Difficult case / neuro electro physiology meeting (Once fort nightly)

vi. Neuro radiology Conference: in conjunction with the Department of Radiology: Once weekly to fortnightly (as feasible)

vii. Faculty lecture (Once monthly), including Guest Faculty Lecture(Oncein3months)

viii. Symposium – once in 3 months. This will be jointly prepared by 3-4 residents and can be multi-disciplinary as per the topic.

ix. A poster and have one oral presentation at least once during their training period in a recognized National or International conference.

The rounds should include bedside sessions, file rounds & documentation of case history and examination, progress notes, round discussions, investigations and management plan) interesting and difficult case unit discussions.

The training program would focus on knowledge, skills and attitudes (behavior), all essential components of education. It is being divided into theoretical, clinical and practical in all aspects of the delivery of the rehabilitative care, including methodology of research and teaching.

a. Theoretical: The theoretical knowledge would be imparted to the candidates through discussions, journal clubs, symposia and seminars. The students are exposed to recent advances through discussions in journal clubs. These are considered necessary in view of an in adequate exposure to the subject in the under graduate curriculum.

b. Symposia: Trainees would be required to present a minimum of 20 topics based on the curriculum in a period of three years to the combined class of teachers and students. A 9 free discussion would be encouraged in these symposia. The topics of the symposia would be given to the trainees with the dates for presentation.

c. Clinical: The trainee would be attached to a faculty member to be able to pick up methods of history taking, examination, prescription writing and management in rehabilitation practice. Bedside: The trainee would work up cases, learn management of cases by discussion with faculty of the department.

d. Journal Clubs: This would be a weekly academic exercise. A list of suggested Journals is given towards the end of this document. The candidate would summarize and discuss the scientific article critically. A faculty member will suggest the article and moderate the discussion, with participation by other faculty members and resident doctors. The contributions made by the article in furtherance of the scientific knowledge and

limitations, if any, will be highlighted.

3. Research:

i. The student would carry out the research project and write a thesis / dissertation in accordance with NBE guidelines.

ii. He / she would also be given exposure to partake in the research projects going on in the departments to learn their planning, methodology and execution so as to learn various aspects of research.

III. PEDIATRIC NEUROLOGY SYLLABUS:

The following is the comprehensive list of topics which will be covered over the three- year period.

1. These topics will be covered / taught through a combination of didactic teaching, seminars, journal clubs, difficult case meetings, clinical case presentations and hands-on wards and clinic case discussions and management rounds.

2. Multi-disciplinary meetings with allied specialties (Neuroradiology, Neuro rehabilitation, Pathology, Neurosurgery, Child Psychology and Psychiatry etc.,) will be made part of teaching roster (through combined seminars and case discussions) to broaden the Trainee's' approach and outlook

i. Development of the Infant and young child
   a. Anatomy of Neuro development (Including embryology of nervous system)
   b. Physiology of Neuro development
   c. Assessment of normal development
   d. Variations of the normal development
   e. Developmental surveillance of at-risk neonates and infants
   f. Approach to infants and children with global developmental delay
   g. Diagnosis and management of children with Cerebral Palsy
   h. Screening and interventions for Autism spectrum disorders
   i. Screening and interventions for Attention deficit per activity disorders
   j. Evaluation and management of children with Learning disorders / Scholastic difficulties
   k. Intellectual disability: Comprehensive evaluation and rehabilitation

ii. Malformations of Nervous system
   a. Normal embryology and anatomy of the Nervous system
   b. Common CNS malformations: Identification and holistic evaluation
   c. Medical and Surgical management of CNS malformations

iii. Seizures and Epilepsy in childhood

a. Epileptic Seizures and non-epileptic events
b. Febrile seizures
c. Classification and evaluation of epilepsy
d. Epilepsy syndromes in childhood
e. Status epilepticus
f. Pharmacy therapy of epilepsy
g. Refractory epilepsy
h. Surgical management of epilepsy
i. Non-pharmacological treatments of refractory epilepsy-ketogenic diet and vagal nerve stimulation.

iv. Infections of the Central Nervous System

a. Acute bacterial (Pyogenic) meningitis
b. Aseptic meningitis
c. Chronic meningitis including tubercular meningitis
d. Brain abscess
e. Acute encephalitis
f. Cerebral malaria
g. Acute febrile encephalopathy (Acute Encephalitis Syndrome)
h. Neuro cysticercoids
i. Neurological manifestations of HIV in children
j. Subacute Sclerosing Panenc ephalitis (SSPE)
k. Congenital infections
l. Neonatal CNS infections (Meningitis, Ventriculitis, Abscess)
m. Laboratory diagnosis of CNS infections

v. Neuro Immunology

a. Demyelinating disorders of the CNS
b. ADEM, optic neuritis, acute transverse myelitis, Neuro my elitis optics (NMO), Multiple sclerosis

c. Immunologically mediated diseases affecting the CNS gray matter, peripheral nervous system

d. Autoimmune encephalitis

e. Opsoclonu smyoclonusataxia syndrome

f. Systemic vasculitides with nervous system manifestations

vi. Neuro Degenerative Disorders

a. Classification and approach to a child with neuro regression (Gray matter, white matter, cerebellar and basal ganglia disorders)

b. Grey matter degenerative brain disorders

c. Leukodystrophies and leukoencephalopathies

d. Diagnostic evaluation of children with suspected degenerative disorder

e. Management

f. Genetic counseling

g. Recent advances in therapies

vii. Neuro metabolic disorders including mitochondrial disorders

a. Classification, evaluation and approach to child with suspected neuro metabolic disorder

b. Diagnostic evaluation (Biochemical, molecular and histological)

c. Dietary management of Metabolic disorders

d. Long-term management, follow-up and prenatal counseling

viii. Genetics

a. Patterns of Inheritance

b. Chromosomal abnormalities

c. Approach to child withdysmorphism

d. Uses and interpretation of various genetic tests in the diagnosis of neuro genetic disorders (Karyotyping, FISH, MLPA, Chromosomal microarray, clinical exome sequencing, whole exome sequencing, Whole genome sequencing and Sanger sequencing)

ix. Toxic and Nutritional disorders

a. Toxic disorders: Acute and chronic exposure to Lead, thallium, arsenic, mercury, aluminum, organic toxins, alcohol, bacterial toxins

b. Neuro logical manifestations of Nutritional deficiencies (Protein energy malnutrition, Cobalamine and Thiamine deficiency, infantile tremor syndrome etc.,)

x. Neuro cutaneous syndromes (Phakomatoses)

a. Spectrum of neuro cutaneous syndromes

b. Neuro fibromatosis

c. Tuberous Sclerosis Complex

d. SturgeWeber Syndrome etc.

e. Hypomelanos is of I to and Incontinentiapigmenti

f. Other neuro cutaneous syndromes

xi. Movement disorders

a. Approach to child with movement disorder

b. Chorea: Approach and management

c. Dystonia: Approach and management

d. Tic disorders: Evaluation and treatment

e. Approach to child with Ataxia

xii. Cerebrovascular disorders (Stroke in children)

a. Epidemiology of pediatric stroke

b. Arterial is chemic stroke(AIS)

c. Cerebral Sino venous thrombosis (CSVT)

d. Hemorrhagic stroke

e. Perinatal stroke (Presumed perinatal and Neonatal stroke)

xiii. Neonatal Neurology

a. Neuro logical assessment of neonate

b. Neonatal encephalopathy: Approach

c. Neonatal seizures
d. Hypoxic is chemic encephalopathy
e. Encephalopathy of prematurity
f. Intra ventricular Hemorrhage and Hydrocephalus
g. Meningitis and Ventriculitis
h. Cranial ultrasonography
i. Approach to neonate with suspected IEM
j. Floppy neonate: Evaluation and management
k. Hemorrhagic disease of newborn
l. CNS malformations
m. Floppy neonate

xiv. Brain tumors
a. Features and Classification
b. Evaluation and management
c. Role of Radiotherapy

xv. Spinal cord disorders
a. Approach and localization of spinal cord disorders
b. Spinaldy sraphism (Types, evaluation and management)
c. Vascular, Nutritional and Inflammatory disorders of spinal cord
d. Neuro genic bladder: Evaluation and management

xvi. Neuro muscular disorders
a. Approach and Evaluation
b. His to pathological changes in different disorders
c. Developmental disorders of muscle (Congenital myopathies)
d. Muscular dystrophies
e. Endocrine and metabolic myopathies
f. Inflammatory myopathies (including Guillain Barre syndrome)

g. Disorders of Neuro muscular transmission
h. Spinal muscular atrophy
i. Autonomic neuropathies
j. Advances in treatment of neuro muscular disorders
k. Brachial plexus injuries: Diagnosis and management
l. Hereditary neuropathies
m. Approach to floppy infant and floppy child

xvii. Coma in Pediatric Patient/Brain Death
a. Approach to child with coma
b. Neurological Monitoring of a comatose child
c. Coma in Pediatric population/metabolic coma
d. Brain death in children
e. Management of child with raised in tracranial pressure

xviii. Neurological manifestations of systemic diseases
a. Metabolic encephalopathies
b. Disorders of acid/base/ electrolyte disturbances
c. Neurological complications of pulmonary, gastrointestinal, hepatic, renal, cardiac, hematological, neoplastic and endocrine diseases

xix. Neurological and Neurosurgical emergencies
a. Management of hydrocephalus
b. Surgical management of raised in tracranial pressure
c. Traumatic brain injury
d. Management of Refractory status epilepticus

xx. Clinical Epidemiology and Research Methodology
a. Study designs
b. Hypothesis testing
c. Biostatistics

d. Critical appraisal of a journal article

xxi. Ethics in Medicine

a. Ethical dilemmas in neuro critical care
b. End of life care in chronic neurological illnesses
c. Ethics in research and publication

xxii. Neuro informatics

a. Use of technology in neurology education/training
b. Tele medicine in Child Neurology
c. Role of technology in health care access

xxiii. Rehabilitation in Pediatric Neurology

a. Early intervention: Principles and practice
b. Principles of physiotherapy
c. Orthoses and Assistive devices
d. Treatment of spasticity
e. Occupational therapy
f. Orthopedic management of children with Cerebral palsy

xxiv. Community Pediatrics

a. National Programme
b. Acute flaccid paralysis (AFP) surveillance
c. Vaccine prevent able neurological disorders

xxv. Non-epileptiform paroxysmal disorders and sleep disorders

a. Headache
b. Breath holding spells
c. Syncope
d. Parasomnias

xxvi. Neuro endocrine 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

xxvii. Neuroimaging

a. Principles of neuroimaging (Neuro sonogram, CT and MRI)
b. Imaging in epilepsy
c. Newer imaging modalities
d. Metabolic imaging
e. Interventional radiology

xxviii. Electrophysiology

a. Electroencephalography
b. Nerve conduction studies
c. Needleelectromyography and single fiber EMG (SFEMG)
d. Evoked potentials

xxix. Therapeutic advances in neurological disorders

a. Gene therapy
b. Regenerative medicine (Stem cell therapy)
c. Exon skipping
d. Therapies for Lysosomal storage disorders
e. Precision medicine

xxx. Basic neuro anatomy including localization of neurological lesion in central nervous system and peripheral nervous system

IV. LOGBOOK:

A candidate shall maintain a logbook of operations (assisted / performed) during the training period, certified by the concerned post graduate teacher / Head of the department / senior consultant. This logbook shall be made available to the board of examiners for their perusal at the time of the final examination.

The logbook should show evidence that the before mentioned subjects were covered (with dates and the name of teacher(s). The candidate will maintain the record of all academic activities under taken by him/her in logbook.

1. Personal profile of the candidate including the address, contact number, parent contact details,
2. Educational qualification / Professional data
3. List of leaves availed during the course
4. Posting schedules with due signature on completion of posting from the concerned faculty including extramural postings along with written feedback of the faculty
5. Record of bed side case presentation, journal clubs, seminars, symposium including inter departmental meets presented during the tenure
6. Record of oral paper or /and poster presented in national or international conferences
7. Record of conferences, CME sat tended during the training period
8. Record of research publications and other publications during the training period
9. Procedures carried out including EEG, NCV, EMG, BERA, VEP, Lumbar puncture, botulinum toxin administration, and any other procedure
10. Every candidate, at the time of practical examination, will be required to produce performance record (logbook) containing details of the work done by him/her during the entire period of training as per requirements of the log book. It should be duly certified by the supervisor as work done by the candidate and counter signed by the administrative Head of the Institution.
11. In the absence of production of logbook, the result will not be declare.

V. TEXTBOOK FOR PEDIATRIC NEUROLOGY:

Textbook:

S. No	Textbook	Authors	Publisher
1.	Swaiman's Pediatric neurology: Principles And practice	Kennith FS waiman, Stephen Ashwal,	Elsevier publishers
2.	DeJong's the neurological examination	William W Campbell Richard J Barohn	Wolters Kluwer, Lippincott William And Wilkins
3.	Localization in clinical neurology	Paul W Brazis Joseph C Masden	Wolters Kluwer, Lippincott William And Wilkins
4.	Fenichel's Pediatric Neurology: A sign and Symptom approach	JEric Pina Garza	Elsevier
5.	Volpe's Neurology of Newborn	Joseph J Volpe	Elsevier
6.	Aicardi's Diseases of Nervous system in childhood	Alexis Arzimanoglou	Mac Keith Press
7.	Movement disorders in childhood	Harvey S Singer Joseph Jankovic Jonathan W Mink	Saunders ,Elsevier
8.	Acute Pediatric Neurology	Thomas Sejersen Ching H Wang	Springer
9.	Diagnostic imaging: Pediatric Neuroradiology	James Barkovich	Amirsys ,Elsevier
10.	Pediatric Neuroradiology: clinical practice essentials	Choudhary AsimF	
11.	Inborn metabolic diseases: Diagnosis and treatment	Jean Marie Saudbary Matthias Baumgartner	Springer
12.	Electro myography and Neuromuscular disorders-clinical electro physiologic correlations	David C Preston Barbara E Shapiro	Elsevier
13.	Niederm eyer Electro encephalo graphy: Basic principles, clinical applications and related fields	Donald L Schomer Fernando H Lopes	OUPUSA

14.	EEG in clinical practice	K Radhakrishnan JMK Murthy	Paras medical books
15.	Fischand Spehlmann EEG primer	Bruce J Fisch	Elsevier
16.	IAP text book of Pediatric Neurology	Anoop Verma PAM Kunju	Paras Medical Books
17.	Epileptic syndromes in infancy, childhood and adolescence ,6thEd	Michelle Bureau, Pierre Genton, Charlotte Dravet	John Libbey Eurotext
18.	De Myer's The neurologic examination: A programmed text 6thedition	Jose Biller	Mc Graw Hill
19.	A Clinical guide to Inherited Metabolic diseases,3rded	Clarke J	Cambridge University press,2005
20.	Neurology of hereditary metabolic diseases In children	Lyon G, Kolodny E, Pastores G	3rdedition

Journals

1. Annals of Indian Academy of Neurology Epilepsies
2. Epilepsy and Behavior Epilepsy Research
3. European Journal of Pediatric Neurology Journal of Child Neurology
4. Journal of Developmental and Behavioral Pediatrics. Journal of Pediatric Neurology
5. Lancet Neurology Pediatric Neurology Seizure
6. Seminars in Pediatric Neurology Developmental Medicine & Child Neurology