

Guidelines
For
Competency Based Training Programme
In
DNB- NEONATOLOGY



NATIONAL BOARD OF EXAMINATIONS

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INTRODUCTION

The aim of the DNB Programme is to provide advanced training in Neonatology to produce competent super-specialists who are able to provide clinical care of the highest order to the newborn infants, and serve as future teachers, trainers, researchers and leaders in the field of Neonatology.

We have defined 12 areas of competence for the Resident neonatologist:

1. Ethics in Practice – The ability of a resident* to display ethical principles in practice including the appropriate use of justice, beneficence, non-maleficence, and the autonomy of patient rights.
2. Collaboration – The ability of a resident to work collaboratively in a medical team; to know how and when it is appropriate to consult with specialists and other members of the healthcare team
3. Global Health Awareness – The ability of a resident to understand the issues pertaining to basic human rights of one's patients; to be familiar with the social determinants of health and with global health priority setting strategies; to understand the role of global burden of diseases; to be familiar with the structure and function of the national or regional health system; and mechanisms for delivering cost-effective health promotion and disease prevention interventions.
4. Patient Safety and Quality Improvement – The ability of a resident to demonstrate active and meaningful engagement in quality improvement with emphasis on patient safety; to know the epidemiology of medical error and harm; to be familiar with detecting and reporting adverse events.
5. Research Principles and Evidence-based Practice – The ability of a resident to understand the basic principles of biostatistics; and to be familiar with epidemiology and clinical research design.
6. Scholarly Activity – The ability of residents to begin to demonstrate a lifelong commitment to reflective learning; and to engage in the creation & dissemination of medical knowledge.

7. Self-Leadership and Practice Management – The ability of the resident to exhibit self leadership skills.
8. Communication and Interpersonal Skills – The ability of the resident to effectively communicate with patients, families, other health care professionals.
9. Health Advocacy and Children’s Rights – The ability of the resident to respond to individual patient health needs and issues as part of patient care; and to understand how to provide effective health care in local communities.
10. Professionalism – The ability of a resident to display professional attributes and professional actions; and to practice as an expert in his field.
11. Assessment, Diagnostic, Procedural and Therapeutic Skills – The ability of a resident to demonstrate skill in a number of assessment and diagnostic tests; to be able to interpret certain routine laboratory tests and to be aware of age specific ranges for those tests; to be able to interpret routine pediatric imaging and other tests.
12. Medical Knowledge of Patient Care – The ability of a resident to show proficiency in taking an appropriate history and physical examination of children across the developmental spectrum from birth through the transition into young adulthood; to be able to form a differential diagnosis and provide appropriate management options.

PROGRAMME GOAL

The goal of DNB Neonatology program is to provide specialized training in Neonatology to produce competent super specialists.

These specialists will be capable of providing care of the highest order to the newborn infants in the community as well as clinical tertiary care centers.

They would subsequently serve as teachers, trainers, researchers and leaders in the field of Neonatology.

They shall recognize the health needs of the community and carry out professional obligations ethically and in keeping with the objectives of the National Health Policy.

PROGRAMME OBJECTIVES

After completing the DNB Neonatology course the student will be able to recognize the importance of Neonatology in the context of health needs of the community & the national priorities in the health sector. Thus the trainee will be able to:

1. Provide primary, secondary, and tertiary care to all newborn infants including intensive care of the highest standard to the critically sick neonates and very low birth weight infants using advanced therapeutic and supportive modalities and skills. Effectively plan therapeutic, rehabilitative, preventive & promotive measures or strategies.
2. Take rationale decision in the face of ethical dilemmas in perinatal –neonatal diseases. Demonstrate empathy & humane approach towards patients & their families & exhibit Interpersonal behavior in accordance with social norms & expectations.
3. Exhibit communication skills of high order and demonstrate compassionate attributes in the field of Neonatology

4. Implement a comprehensive follow up and early intervention program for the “At risk” newborn infants, and plan, counsel and advise rehabilitation of the neurodevelopmentally and physically challenged infants.
5. Analyze neonatal health problem scientifically, taking into account behavioral epidemiology of the perinatal –neonatal morbidity and mortality.
6. Use and maintain the essential neonatal equipment and keep abreast with advances in neonatal care technology.
7. Teach newborn care to medical and nursing students as well as grass root health functionaries and develop learning resource materials for them.
8. Plan and carry out research in neonatal health in clinical, community and laboratory settings. Seek analyze new literature and information on Neonatology, update the concepts, and practice evidence based Neonatology. Demonstrate adequate managerial skills.
9. Have the ability to set up level II and level III Neonatal units independently.
10. Participate in the community programs and at the secondary level of health system endplay the assigned role in the national programmes aimed at the health of mothers and their infants. These super specialists would work as a productive member of the interdisciplinary team consisting of obstetricians, neonatologists, pediatric surgeons, other doctors, nurses and grassroots functionaries providing care to the pregnant mother, the fetus and newborn in any setting of health care system & function as an effective leader of a “Health Team” engaged in Health Care of mothers and their infants.

ELIGIBILITY CRITERIA FOR ADMISSIONS TO THE PROGRAMME

(A) DNB Neonatology Course:

1. Any medical graduate with **MS/DNB in Pediatrics** qualification, who has qualified the **Entrance Examination** conducted by NBE and fulfill the eligibility criteria for admission to DNB **Super Specialty** courses at various NBE accredited Medical Colleges/ institutions/Hospitals in India is eligible to participate in the Centralized counseling for allocation of DNB **Neonatology** seats purely on merit cum choice basis.
2. Admission to 3 years DNB **Neonatology** course is only through **Entrance Examination** conducted by NBE and Centralized Merit Based Counseling conducted by National Board of Examination as per prescribed guidelines.

Duration of Course: 3 Years

Every candidate admitted to the training programme shall pursue a regular course of study (on whole time basis) in the concerned recognized institution under the guidance of recognized post graduate teacher for assigned period of the course.

TEACHING AND TRAINING ACTIVITIES

The fundamental components of the teaching programme should include:

1. Case presentations & discussion- once a week
2. Seminar – Once a week
3. Journal club- Once a week
4. Grand round presentation (by rotation departments and subspecialties)- once a week
5. Faculty lecture teaching- once a month
6. Clinical Audit-Once a Month
7. Mortality meeting – once a month
8. A perinatal meeting with the Deptt of OBG is highly recommended- once a month
9. A poster and have one oral presentation at least once during their training period in a recognized 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.

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 inadequate exposure to the subject in the undergraduate curriculum.

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 free discussion would be encouraged in these symposia. The topics of the symposia would be given to the trainees with the dates for presentation.

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.

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. The strengths and the weaknesses of the study must be outlined in a slide and discussed at length. It is important that for the studies which are Randomised controlled trials the checklist (*CONSORT) must be used. While for the Cohort studies the checklist (STROBE) must be used. This is done to make the journal club more innovative and useful.

Research: The student would carry out the research project and write a thesis/ dissertation in accordance with NBE guidelines. The trainee 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. It needs to be highlighted here that the NBE is very serious about the research done by candidates. The research work done gets assessed by the experts in the field and if not found up to the mark it is rejected and the candidates are/ required to redo it as per the suggestions given by the experts and unless the thesis has been approved by the experts the candidate is not allowed to appear in the exam/ the result is withheld till the research work is cleared by the experts.

SYLLABUS

Since the students are trained with the aim of practicing as independent specialists, this course content will be mainly a guideline. They have to manage all types of cases and situations and seek and provide consultation. The emphasis shall therefore be on the practical management of the problem of the individual cases and the community within the available resources.

Basic Sciences

- Basic genetics
- Fetal and neonatal immunology
- Applied anatomy and embryology
- Feto-placental physiology
- Fetal growth
- Neonatal adaptation
- Drug formulary and neonate
- Physiology and Development of Respiratory system
- Physiology and development of Cardiovascular system, developmental defects, physiology and hemodynamics of congenital heart disease.
- Physiology and Development Nervous system
- Physiology and Development of gastrointestinal system
- Physiology and Development of Renal system
- Physiology and Development of Hematopoietic system
- Physiology and Development of Endocrinal system
- Metabolic pathways pertaining to glucose, calcium and magnesium
- Biochemical basis of inborn errors of metabolism
- Electrolyte balance

- Development pharmacology
 - Mechanism of disease
 - Science and the Emergence of Neonatal Medicine
 - Fetal and neonatal immunology
 - Mechanism of disease
 - Applied anatomy and embryology
 - Feto-placental physiology
 - Neonatal adaptation
 - Outcome following Preterm Birth
 - Developmental Care
 - Counseling and Support for Parents and Families
 - Ethical and Legal Aspects of Neonatology
 - Ethics and the law
 - Antenatal Diagnosis and Fetal Medicine
 - Fetal Growth, Intrauterine Growth Restriction and .
 - Small-for-Gestational-Age Babies
 - Maternal Illness in Pregnancy
 - Care around Birth
 - Resuscitation and Transport of the Newborn
 - Stabilization and Resuscitation of the Newborn
 - Neonatal equipment
1. Mendelian inheritance
- Autosomal dominant
 - Autosomal recessive
 - X-linked recessive
 - X-linked with incomplete penetrance
 - X-linked dominant

2. Multifactorial inheritance
3. Mitochondrial inheritance genetic diagnosis

- Chorionic villus sampling
- Amniocentesis
- Prenatal umbilical blood sampling

(a) Noninvasive

- Ultrasonography
- Maternal blood screening

1. Postnatal

- (a) Karyotyping
- (b) Fluorescent in situ hybridization
- (c) Comparative genomic hybridization
- (d) Molecular analysis
- (e) Metabolic analysis
- (f) Newborn screening

A. Chromosomes abnormalities

1. Autosomal

- (a) Trisomy
- (b) Deletions
- (c) Translocations
- (d) Duplications
- (e) Inversions
- (f) Contiguous gene syndromes

2. Sex chromosomes

- (a) Turner syndrome
- (b) Klinefelter syndrome

B. Genetic abnormalities

1. Short stature
2. Overgrowth syndromes
3. Neuromuscular disorders
4. Facial and limb abnormalities
5. Osteochondrodysplasia
6. Craniosynostosis
7. Storage disorders
8. Connective tissue disorders
9. Hamartoses

C. Miscellaneous

1. Pharmacogenetics
2. Trinucleotide expansion
3. Imprinting
4. Anticipation
5. Associations
6. Sequences
7. Genetic counseling
8. Embryonic basis of malformation
9. Environmental factors in fetal development
10. Ethical and social implications of genetic testing

Perinatology

- Perinatal outreach services
- Perinatal and neonatal mortality,
- Morbidity, epidemiology (Perinatal Audit)
- High risk pregnancy & impact on the fetus

- Fetal monitoring
- Intrapartum monitoring and procedures
- Genetic counseling
- Diagnosis and management of fetal diseases
- Fetal intervention
- Fetal origin of adult disease
- High risk pregnancy-detection monitoring and management.
- Fetal monitoring-clinical and electronic invasive and non- invasive
- Assessment of fetal risks and decision for termination of pregnancy

A. Fetus

1. Intrauterine growth and role of placenta
2. Fetal assessment
3. Fetal diagnostics
4. Fetal therapy
5. Prevention of fetal disease
6. Gestational age determination

B. Mother

1. Maternal screening
2. Effects of maternal systemic disease on fetus and newborn
3. Oligohydramnios and polyhydramnios
4. Impact of maternal medications on fetus and newborn
5. Impact of maternal substance use and abuse on fetus and newborn
6. Aspects of pregnancy, labor and delivery that affect the newborn
7. Risk determinants for preterm delivery (maternal and fetal)
8. Impact of multiple gestations
9. Impact of reproductive technologies (including ethical issues)

C. Normal newborn infants

1. Nomenclature and definitions
2. Delivery room management
 - (a) Temperature control
 - (b) Assessment
3. General examination of a neonate
4. Transition and neonatal adaptation to extrauterine life
 - (a) Maturation assessment
 - 1) Appropriate-for-gestational-age (AGA)
 - 2) Large-for-gestational-age (LGA)
 - 3) Small-for-gestational-age (SGA)
 - 4) Preterm, term, post-term
5. Routine care
 - (a) General
 - 1) General
 - 2) Vitamin K
 - 3) Eye prophylaxis
 - 4) Feeding requirements
 - a. Calories
 - b. Fluid
 - (b) Screening
 - 1) General
 - 2) Glucose
 - 3) Hematocrit
 - 4) Serologic test for syphilis
 - 5) Expanded metabolic screening
 - a. Thyroid function
 - b. Phenylketonuria
 - 6) Hearing

(c) Umbilical cord care

(d) Physiologic events

- 1) Stool
- 2) Urination
- 3) Vital signs
- 4) Spitting vs vomiting
- 5) Jaundice

6. Aspects of drug therapy unique to the newborn
7. Discharge plans (including nutritional counseling)
8. Home birth
9. Identification of danger signs
10. Newborn immunizations/infection prevention and control
11. Determinants of neonatal mortality (local and global)
12. Growth charts (see also *Growth and Development*)

D. Abnormal newborn infants

1. General
2. Resuscitation
 - (a) Ventilation
 - (b) Suctioning
 - (c) Perfusion
3. Major patterns of malformations
4. Neonatal birth injuries and trauma
5. Very-low-birth-weight infant
6. Conditions, diseases
 - (a) Hypoxia, ischemia, asphyxia
 - (b) Polycythemia, hyperviscosity
 - (c) Neonatal jaundice

- (d) Intracranial hemorrhage
- (e) Respiratory distress
 - 1) General
 - 2) Respiratory distress syndrome
 - 3) Pneumothorax
 - 4) Meconium aspiration syndrome
 - 5) Congenital pneumonia
 - 6) Transient tachypnea of the newborn
- (f) Persistent fetal circulation (pulmonary hypertension)
- (g) Cyanosis (nonrespiratory)
- (h) Bronchopulmonary dysplasia/chronic lung disease
- (i) Sepsis (including meningitis)
- (j) TORCH infections, including HIV
- (k) Recognition and stabilization of surgical emergencies
- (l) Necrotizing enterocolitis
- (m) Intestinal obstruction
- (n) Tracheoesophageal fistula
- (o) Abdominal-intestinal wall defect
- (p) Infants affected by maternal disorders (eg, diabetes, systemic lupus erythematosus)
- (q) Anemia (hemolytic anemia including blood group incompatibility)
- (r) Multiple congenital anomalies
- (s) Apnea
- (t) Deformations (amniotic bands, positional deformations)
 - 1) Congenital/acquired hydrocephalus
 - 2) Congenital hip dislocation/dysplasia
 - 3) Ambiguous genitalia
 - 4) Abnormal skin findings (rashes, nevi, vascular malformations)
- (u) Retinopathy of prematurity
- (v) Hypothermia and cold injury

- (w) Hypoglycemia (including refractory hypoglycemia)
- (x) Acute respiratory failure including ventilatory support
- (y) Neonatal transport and pre transport stabilization

E. Comprehensive discharge planning and follow-up plans

1. Outcome for survival and factors influencing outcome
2. Care and follow-up of low birth weight and high risk infants

Neonatology

- Neonatal resuscitation
- Management of normal newborn
- Management of LBW, VLBW, ELBW infants
- Management of sick neonate
- Emergency neonatal care
- Thermoregulation
- Neonatal transport
- Fluid & electrolyte management
- Neonatal ventilation
- Blood gas and acid base disorders
- Neonatal assessment
- Assessment of gestation, neonatal behavior, neonatal reflexes
- Developmental assessment, detection of neuromotor delay, stimulation techniques

Respiratory system

- Neonatal airways: physiology, pathology; management

- Pulmonary diseases: hyaline membrane disease, transient tachypnea, aspiration Pneumonia, pulmonary air leak syndromes, pulmonary hemorrhage, developmental defects
- Oxygen therapy and its monitoring
- Pulmonary infections
- Miscellaneous pulmonary disorders

A. General

1. History
2. Physical Examination
3. Interpretation of laboratory results
4. Therapeutic approaches

B. General signs and symptoms (including distress and severe respiratory distress)

1. Stridor
2. Respiratory failure
3. Cough (acute and chronic)
4. Apnea (including sleep apnea)
5. Wheezing
6. Tachypnea
7. Hemoptysis
8. Cyanosis
9. Clubbing
10. Danger signs for respiratory compromise
11. Snoring or features of sleep obstruction

C. Upper airway

1. General
2. Croup
3. Epiglottitis
4. Foreign body

D. Lower airway

1. Vascular anomalies
2. Congenital malformations
3. Bronchiolitis
4. Aspiration syndromes
5. Bronchiectasis
6. Tracheomalacia
7. Tracheitis
8. Foreign body aspiration
9. Pulmonary syndromes related to disorders such as sickle cell disease

E. Infectious disorders

1. Tuberculosis
2. Pertussis
3. Others (eg, bronchitis, tracheitis, epiglottitis)

F. Parenchymal

1. Pneumonias
2. Trauma
3. Drowning, near drowning, acute respiratory distress syndrome
4. Hypoplastic lung
5. Malformations of lung
6. Lung abscess
7. Hydatid cyst
8. Pulmonary eosinophilia (Loeffler's syndrome)

G. Newborn infants

1. Bronchopulmonary dysplasia (chronic lung disease of infancy)
2. Diaphragmatic hernia
3. Respiratory distress syndrome

4. Tetralogy of Fallot
5. Pulmonary maladaptation

H. Cystic fibrosis

I. Primary ciliary dyskinesia (dysmotile cilia syndrome)

J. Extrapulmonary

1. Pleural fluid/empyema
2. Pneumothorax, pneumomediastinum
3. Thoracic deformities
4. Mediastinal masses including lymph nodes

K. Pulmonary hypertension and cor pulmonale

L. Respiratory sleep disorders

M. Sudden infant death syndrome

N. Diagnostic testing

1. Pulmonary function testing

IMMUNODEFICIENCY DISORDERS

1. History
2. Physical Examination
3. Interpretation of laboratory

Symptoms of potential immunodeficiency

A. Screening tests

B. Immune deficiency disorders

C. Immune dysregulation syndrome

D. Care of the immunocompromised child

1. Prevention
2. Management
3. Nutrition

4. Immune deficiency
-
- E. HIV infection
 - F. Auto-immune disorders
 - G. General
 1. History
 2. Physical Examination
 3. Interpretation of laboratory results
 4. Therapeutic approaches
 - H. Signs and symptoms of potential immunodeficiency
 - I. Screening tests
 - J. Immune deficiency disorders
 - K. Immune dysregulation syndrome
 - L. Care of the immunocompromised child
 5. Prevention
 6. Management
 7. Nutrition
 8. Immune deficiency
 - M. HIV infection
 - N. Auto-immune disorders

Cardiovascular system

- Fetal circulation, transition from fetal to neonatal physiology
- Examination and interpretation of cardiovascular signs and symptoms
- Special tests and procedure (Echocardiography, angiography)
- Diagnosis and management of congenital heart diseases
- Rhythm disturbances

- Hypertension in neonates
- Shock: pathophysiology, monitoring, management Gastrointestinal system

A. General

1. History
2. Physical examination
3. Interpretation of laboratory results
4. Therapeutic approaches

B. General issues

1. Blood pressure measurement
2. Chest pain
3. Syncope
4. Murmur
5. Circulatory failure and shock

C. Congestive heart failure

1. Diagnosis
2. Management

D. Congenital heart disease

1. General
2. Cyanotic disease
 - (a) Diagnosis
 - (b) Management
3. Acyanotic disease
4.
 - (a) Diagnosis
 - (b) Management
5. Antenatal management

E. Acquired heart disease

1. Infectious and post-infectious diseases
2. Infective endocarditis

3. Rheumatic fever and rheumatic heart disease
4. Myocarditis
5. Pericarditis/pericardial effusion
6. Post-cardiac surgery disorders
7. Kawasaki disease

F. Rate and rhythm disorders, ischemia

G. Systemic diseases affecting the heart (including metabolic disorder)

Disorders of liver and biliary system

- Bilirubin metabolism
- Neonatal jaundice, Prolonged hyperbilirubinemia, Kernicterus
- Congenital malformations
- Necrotising enterocolitis

GASTROENTEROLOGY AND HEPATOLOGY

A. General

1. History
2. Physical examination
3. Interpretation of laboratory results
4. Therapeutic approaches

B. Abdominal pain

1. Acute
 - (a) General
 - (b) Appendicitis
 - (c) Cholecystitis, cholelithiasis
 - (d) Pancreatitis
 - (e) Intussusception, volvulus, malrotation
 - (f) Trauma

(g) Obstruction

2. Chronic

(a) Functional

(b) Irritable bowel syndrome

(c) Peptic disorder

(d) *Helicobacter pylori*

C. Abdominal distention (mass, ascites)

D. Vomiting/esophageal disorders

1. Gastrointestinal and non-gastrointestinal causes of vomiting
2. Vomiting from infectious and noninfectious causes
3. Structural causes of vomiting
4. Disorders associated with chronic vomiting
5. Motility disorders (including trauma)
6. Caustic ingestion, foreign body
7. Gastroesophageal reflux
8. Eosinophilic esophagitis

E. Diarrhea

1. Diarrhea caused by infectious mechanisms (acute, prolonged and persistent diarrhea)
2. Diarrhea caused by noninfectious mechanisms/chronic nonspecific diarrhea
3. Dysentery
4. Management of diarrhea

F. Constipation/encopresis (see *Psychosocial*)

G. Jaundice and liver diseases

1. Neonates and infants
 - (a) Bilirubin metabolism
 - (b) Breast-milk jaundice
 - (c) Infectious and noninfectious causes of jaundice

2. Young children and adolescents (infectious and noninfectious causes of jaundice, obstructive jaundice)

H. Gastrointestinal bleeding

1. Upper versus lower gastrointestinal bleeding
2. Polyps
3. Meckel diverticulum
4. Ulcer disease
5. Hepatomegaly (caused by viral hepatitis, chronic hepatitis, cirrhosis of liver, portal hypertension, etc)

A. Malabsorption

1. General
2. Mucosal disease (celiac disease)
3. Pancreatic insufficiency (cystic fibrosis, Shwachman syndrome)
4. Enzyme deficiency (lactase, sucra/se-isomaltase)
5. Short-gut syndrome, including bacterial overgrowth
6. Fat malabsorption and chronic liver disease (biliary atresia, cystic fibrosis)

B. Inflammatory bowel disease

Neurology

- Clinical neurological assessment
- EEG, ultrasonography, CT scan
- Neonatal seizures
- Intracranial hemorrhage
- Brain imaging
- Hypoxic ischemic encephalopathy
- Neuro-muscular disorder
- Degenerative diseases
- CNS malformation

Renal system

- Development disorders
- Renal functions
- Fluid and electrolyte management
- Acute renal failure (diagnosis, monitoring, management).

A. General

1. History
2. Physical examination
3. Interpretation of laboratory results
4. Therapeutic approaches

B. Normal function, physiology and developmental issues

C. Common manifestations of nephrologic disorders

1. Proteinuria

2. Hematuria
 - (a) Persistent microscopic hematuria
 - (b) Causes of gross and microscopic hematuria
 - (c) Nonhematogenous etiology of red urine
3. Dysuria
4. Voiding problems
 - (a) Nocturnal
 - (b) Organic
 - (c) Functional, daytime incontinence
 - (d) Voiding dysfunction

D. Congenital nephrologic disorders

1. Renal dysplasia
 - (a) Unilateral multicystic dysplastic kidney
 - (b) Autosomal-dominant polycystic kidney disease
 - (c) Autosomal-recessive polycystic kidney disease
 - (d) Renal agenesis
2. Structural abnormalities
 - (a) General
 - (b) Hydronephrosis
 - (c) Hydroureter and megaureter
 - (d) Ureterocele
 - (e) Vesicoureteral reflux
3. Abnormalities of the urethra
 - (a) Posterior urethral valves
 - (b) Urethral stricture

4. Hereditary nephropathy (eg, familial nephritis, autosomal-dominant polycystic kidney disease, autosomal-recessive polycystic kidney disease)

E. Acquired nephrologic disorders

1. Infection of the urinary tract
 - (a) Pyelonephritis
 - (b) Cystitis
2. Acute glomerulonephritis
3. Nephrotic syndrome
4. Hemolytic-uremic syndrome
5. Henoch-Schoenlein purpura
6. IgA nephropathy
7. Acute non-traumatic renal injuries
8. Disorders secondary to metabolic diseases and other systemic disorders

F. Nephrotic syndrome

G. Other renal conditions

1. Renal failure
 - (a) Acute renal failure
 - (b) Intrinsic renal failure
2. Chronic kidney disease (chronic renal failure)
3. End-stage kidney disease and transplantation (including renal replacement therapy)
4. Trauma
 - (a) Renal injuries
 - (b) Urethral injury
5. Toxins

6. Urinary tract stones
7. Renal tubular disorders
8. Nephrogenic diabetes insipidus
9. Renal rickets

H. Blood pressure/hypertension

1. Normal vs abnormal blood pressure
 - (a) Complications of blood pressure measurement (eg, “White Coat”)
 - (b) Definition of hypertension in children and adolescents
2. Evaluation of elevated blood pressure in childhood
3. Primary/secondary hypertension
4. Therapy of hypertension
5. End-organ effects of hypertension

I. Diagnostic evaluation (including imaging of renal disorders)

A. General

1. History
2. Physical examination
3. Interpretation of laboratory results
4. Therapeutic approaches

B. Disorders of the bladder

1. Injury from drugs and how to prevent bladder toxicity
2. Cystitis
3. Self-induced or factitious bladder injury
4. Neurogenic bladder

C. Male

1. Congenital abnormalities
 - (a) Hypospadias

- (b) Cryptorchidism
- (c) Micropenis
- (d) Phimosi
- (e) Undescended testes

2. Acquired abnormalities

- (a) Testicular torsion
- (b) Infection
 - 1) Orchitis
 - 2) Epididymitis
 - 3) Urethritis

- (c) Trauma
- (d) Testicular masses
- (e) Varicocele
- (f) Urethral valve

D. Female

1. Congenital abnormalities

- (a) Imperforate hymen
- (b) Labial adhesions

2. Acquired abnormalities

- (a) Ovarian torsion
- (b) Ovarian cyst
- (c) Vulvovaginitis

Endocrine and metabolism

- Glucose metabolism, hypoglycemia, hyperglycemia
- Calcium disorders

- Magnesium disorders
- Thyroid disorders
- Adrenal disorders
- Ambiguous genitalia
- Inborn errors of metabolism

Hematology

- Physiology
- Anemia
- Polycythemia
- Bleeding and coagulation disorders
- Rh hemolytic disease
- Blood Component therapy Nutrition

A. General

1. History
2. Physical examination
3. Interpretation of laboratory results
4. Therapeutic approaches

B. Erythrocyte disorders

1. Nutritional anemias
 - (a) Iron deficiency
 - (b) Vitamin B12, folic acid deficiency
2. Hemolytic anemias
 - (a) Membrane disorders
 - (b) Enzyme abnormalities

- (c) Hemoglobinopathies
- (d) Immune-mediated anemias

3. Aplastic and hypoplastic erythrocyte disorders
 - (a) Diamond-Blackfan syndrome
 - (b) Transient erythroblastopenia of childhood
 - (c) Drug induced
4. Anemias secondary to systemic disorders
5. Polycythemia

C. Leukocyte disorders

1. Quantitative leukocyte disorders
 - (a) Congenital and immune-mediated neutropenia
 - (b) Acquired, nonimmune neutropenia
 - 1) Sepsis
 - 2) Drugs
2. Qualitative leukocyte disorders

D. Platelet disorder

1. Thrombocytopenia
2. Thrombocytosis

E. Pancytopenia

1. Decreased production
 - (a) Congenital (Fanconi anemia)
 - (b) Acquired aplastic anemia
2. Increased destruction

- F. Coagulation disorders
 - 1. Congenital and acquired bleeding and thrombotic disorders
 - 2. Thrombophilias
- G. Transfusion medicine (including component therapy)

NUTRITION

- C. Normal nutritional requirements
 - 1. General requirements
 - 2. Mineral
 - 3. Vitamins
 - 4. Fat
 - 5. Protein
 - 6. Caloric intake
- D. Infant feeding
 - 1. Breast-feeding
 - 2. Formula-feeding
 - 3. Introduction of solid food
- E. Deficiency states and hypervitaminosis (including rickets)
 - 1. Vitamin deficiency states
 - 2. Mineral deficiency states
 - 3. Protein, calorie deficiency states (acute and chronic malnutrition including stunting, wasting and underweight)
 - 4. Hypervitaminosis
- F. Principles of nutritional support
 - 1. Infant and young child feeding (IYCF) support
 - 2. Tube feeding, enteral nutrition
 - 3. Parenteral nutrition
 - 4. Weight loss

G. Nutritional problems associated with specific diseases, conditions

1. Gastrointestinal disorders
2. Renal disease
3. Hepatic disease
4. Cardiac disease
5. Cystic fibrosis
6. Hematologic-oncologic disease
7. Neurologically handicapped children
8. Burns
9. Allergies
10. Athletes
11. Vegetarians
12. Failure to thrive (management of moderate to severe malnutrition)

H. Obesity (prevention and management)

I. Weight loss

J. Eating disorders (anorexia nervosa/bulimia)

Fetal nutrition

- Physiology of lactation
- Lactation management
- Parenteral nutrition
- Vitamins and micronutrients in newborn health
- Human Milk Banking

IMMUNOLOGY

A. General

1. History
2. Physical Examination
3. Interpretation of laboratory results
4. Therapeutic approaches

B. Signs and symptoms of potential immunodeficiency

C. Screening tests

D. Immune deficiency disorders

E. Immune dysregulation syndrome

F. Care of the immunocompromised child

1. Prevention
2. Management
3. Nutrition
4. Immune deficiency

G. HIV infection

H. Auto-immune disorders

Surgery and Orthopedics

- Diagnosis of neonatal surgical conditions
- Pre and post operative care
- Neonatal anesthesia
- Metabolic changes during anesthesia and surgery
- Orthopedic problems

Neonatal infections

- Intrauterine infections
- Superficial infections
- Diarrhea
- Septicemia
- Meningitis
- Osteomyelitis and arthritis
- Pneumonias
- Perinatal HIV
- Miscellaneous infective disorders & fungal infections

Neonatal ophthalmology

- Development aspects
- Retinopathy of prematurity
- Sequelae of perinatal infections

A. General

1. History
2. Physical examination
3. Interpretation of laboratory results
4. Therapeutic approaches

B. Normal vision development

C. Extraocular

1. Alignment and movement disorders
 - (a) Strabismus

(b) Nystagmus

2. Conjunctivitis
3. Orbital and periorbital (preseptal) cellulitis
4. Sty, chalazion
5. Nasolacrimal duct obstruction
6. Ptosis

D. Intraocular

1. Childhood glaucoma
2. The white pupil (retinoblastoma)
3. Cataracts
4. Papilledema, papillitis
5. Retinopathy of prematurity
6. Optic neuritis
7. Hemorrhagic problems

E. Miscellaneous

1. Amblyopia
2. Foreign bodies
3. Corneal abrasions
4. Trauma to the eye
5. Be able to evaluate trauma to the eye; including hyphema
6. Recognize the clinical signs of a blow-out fracture of the orbit
7. Tumor or hemangioma affecting vision
8. Disorders of refraction (including myopia and hypermetropia)
9. Blindness and visual defects
10. Uveal tract disorders

Ocular manifestations of systemic disorder

Neonatal Hearing assessment

Community neonatology

- Vital statistics
- Health system
- Neonatal care priorities
- Care at primary, secondary & tertiary level of care

Immunizations

1. Indications and schedules
 - (a) Awareness of local/regional schedules
2. General contraindications
 - (a) Immune deficiency
 - (b) Egg allergy
 - (c) HIV –positive in household
3. Prevention by active immunization
 - (a) Influenza vaccine
 - (b) Meningococcal vaccine
 - (c) Pneumococcal vaccine
 - (d) Hepatitis vaccines
 - (e) Tetanus vaccine
 - (f) Diphtheria-tetanus combination
 - (g) Pertussis vaccines (cellular and acellular)
 - (h) DTaP and Tdap vaccines
 - (i) Measles vaccine
 - (j) Rubella vaccine

- (k) Poliovirus vaccine
- (l) Hemophilus influenzae type b vaccine
- (m) Varicella vaccine
- (n) human papillomavirus (HPV)
- (o) rotavirus
- (p) Specific endemic diseases and schedules (eg, recombinant Calmette-Guerin bacillus (BCG))

4. Catch-up immunizations
5. Live versus killed vaccines
6. Travel indications and needs

A. Screening

1. Principles of screening tests
2. Blood pressure
3. Hematocrit
4. Lead

Neonatal Dermatology

Organization of neonatal care

- Community neonatology
- Vital statistics, health system;
- Causes of neonatal, perinatal death
- Neonatal care priorities
- Care at secondary level of care
- Care at primary health centre
- Role of different health functionaries
- National Programmes
- National Neonatology Forum

Neonatal Imaging

- *Neonatal imaging*
- X-rays, ultrasound, MRI, CT Scan etc.
- Developmental aspects
- *Neonatal dermatology*
- Transport of Neonates.
- Neonatal Procedures
- Community neonatology
- Developmental assessment and follow up
- Organization of neonatal care
- Adoption
- Recent Advances
- Laboratory Medicine
- Neonatal procedures
- Therapeutic agents
- Biomedical equipments, use & maintenance

General Topics

- Research methodology
- Teaching methodology
- Biostatistics
- Epidemiology
- Ethics and bioethics
- Health economics

- Health Information System
- Ethics in Perinatology / Neonatology
- Medical education
- Computer & Information technology

Biostatistics, Research Methodology and Clinical Epidemiology

Ethics

Medico legal aspects relevant to the discipline

Health Policy issues as may be applicable to the discipline

Competencies

List of Skills

1. Clinical

- Neonatal examination & anthropometry
- Developmental assessment
- Neonatal resuscitation
- Neonatal ventilation: CPAP, Mechanical ventilation
- Blood sampling: Capillary, venous, arterial
- Insertion of peripheral venous, umbilical venous and umbilical arterial catheters
- Monitoring

2. Invasive, non-invasive

- Enteral feeding (katori-spoon, gavage, breastfeeding)

- Lactation management
- Parenteral nutrition
- Endotracheal Intubation
- Lumbar puncture and ventricular tap
- Placing of 'chest tube'
- Exchange transfusion
- Bed side tests: shake test, sepsis screen, hematocrit, glucose estimation, urine examination, CSF examination, Kleihauer technique, Apt test etc.
- Neonatal drug therapy
- Nursery house keeping routines
- Infection control & Universal precautions
- Handling, effective utilization and trouble shooting of neonatal equipment.
- Decision making, clinical diagnosis, planning & interpretation of investigations
- Management of Neonatal problems Communication
- Communication with parents, families and communities
- Interdepartmental communication
- Human behavior studies

3. Education / Training

- Teaching skills
- Learning skills
- Participatory and small group learning skills

- Preparing learning resource material

4. Self-Directed Learning

- Learning needs assessment, literature search, evaluating evidence Research Method
- Framing of research question
- Designing and conducting study
- Analyzing and interpreting data
- Publication & writing a paper • Review & presentation of research findings

Training program :

There will be structured training program. The students are expected to learn in phasic manner starting with basic care progressing to advanced care management.

First year: Neonatal resuscitation protocol Care of normal newborn, low birth weight, preterm & sick neonates Neonatal ventilation Communication skills Research methodology

Second year: All of above plus Neonatal surgery Total parenteral nutrition High frequency ventilation Neonatal autopsy Neonatal radiology including imaging techniques Perinatology Community neonatology Teaching methodology Analytical & managerial skills

Third year: All of above plus Recent advances Fetal medicine National programs Rotation Total period of DNB course is 36 months.

Of this, at least 27 – 30 months will be spent in the newborn services, 3 - 6 months will be meant for essential rotations in related specialties and the rest up to three months will be for either optional rotations, extramural rotation or for the new born services as deemed necessary.

Essential rotation:

- Perinatology: Obstetrics 1 month
- Neonatal surgery 15 days
- Community neonatology 1 month
- Extramural 2 months

Optional Rotations :The department will have flexibility of additional rotations for up to 3 months in the above mentioned areas or in other relevant areas such as (neonatal cardiology, cardiac surgery, rehabilitation services, genetics, perinatal pathology, imaging, neonatal ophthalmology, epidemiology & biostatistics, information & educational technologies etc.) depending upon the strength of the disciplines and functional requirements at the concerned institutions.

Extramural rotation Extramural rotations or elective rotations for a maximum period of 2 months will be possible during end of the 2nd year of training.

The candidates can undertake up to 2 months elective rotation at parent or other institutions in the country centers approved by the Department. There will be a continuous interaction between the Neonatology department and the allied departments to ensure that the students achieve these skills during their peripheral postings. Under no circumstances however, would the training in neonatal services be of less than 27 months (3/4 of total course)

All these postings are desirable but are not absolutely mandatory. The department must assess that the departmental work does not get adversely affected on account of the prolonged absence of these residents from the parent department

THESIS PROTOCOL & THESIS

The candidates are required to submit a thesis at the end of three years of training as per the rules and regulations of NBE.

Guidelines for Submission of Thesis Protocol & Thesis by candidates

Research shall form an integral part of the education programme of all candidates registered for DNB degrees of NBE. The Basic aim of requiring the candidates to write a thesis protocol & thesis/dissertation is to familiarize him/her with research methodology. The members of the faculty guiding the thesis/dissertation work for the candidate shall ensure that the subject matter selected for the thesis/dissertation is **feasible, economical** and **original**.

Guidelines for Thesis Protocol

The protocol for a research proposal (including thesis) is a study plan, designed to describe the background, research question, aim and objectives, and detailed methodology of the study. In other words, the protocol is the 'operating manual' to refer to while conducting a particular study.

The candidate should refer to the NBE Guidelines for preparation and submission of Thesis Protocol before the writing phase commences. The minimum writing requirements are that the language should be clear, concise, precise and consistent without excessive adjectives or adverbs and long sentences. There should not be any redundancy in the presentation.

The development or preparation of the Thesis Protocol by the candidate will help her/him in understanding the ongoing activities in the proposed area of research. Further it helps in creating practical exposure to research and hence it bridges the connectivity between clinical practice and biomedical research. Such research exposure will be helpful in improving problem solving capacity, getting

updated with ongoing research and implementing these findings in clinical practice.

Research Ethics: Ethical conduct during the conduct and publication of research is an essential requirement for all candidates and guides, with the primary responsibility of ensuring such conduct being on the thesis guide. Issues like Plagiarism, not maintaining the confidentiality of data, or any other distortion of the research process will be viewed seriously. The readers may refer to standard documents for the purpose.

The NBE reserves the right to check the submitted protocol for plagiarism, and will reject those having substantial duplication with published literature.

PROTOCOL REQUIREMENTS

1. All of the following will have to be entered in the online template. The thesis protocol should be restricted to the following word limits.
 - Title : 120 characters (with spacing) page
 - Synopsis [structured] : 250-300
 - Introduction : 300-500
 - Review of literature : 800-1000
 - Aim and Objectives : Up to 200
 - Material and Methods : 1200-1600
 - 10-25 References [ICMJE style]
2. It is mandatory to have ethics committee approval before initiation of the research work. The researcher should submit an appropriate application to the ethics committee in the prescribed format of the ethics committee concerned.

Guidelines for Thesis

1. The proposed study must be approved by the institutional ethics committee and the protocol of thesis should have been approved by NBE.
2. The thesis should be restricted to the size of 80 pages (maximum). This includes the text, figures, references, annexures, and certificates etc. It should be printed on both sides of the paper; and every page has to be numbered. Do not leave any page blank. To achieve this, following points may be kept in view:
 - a. The thesis should be typed in 1.5 space using Times New Roman/Arial/ Garamond size 12 font, 1” margins should be left on all four sides. Major sections viz., Introduction, Review of Literature, Aim & Objectives, Material and Methods, Results, Discussion, References, and Appendices should start from a new page. Study proforma (Case record form), informed consent form, and patient information sheet may be printed in single space.
 - b. Only contemporary and relevant literature may be reviewed. Restrict the introduction to 2 pages, Review of literature to 10-12 pages, and Discussion to 8-10 pages.
 - c. The techniques may not be described in detail unless any modification/innovations of the standard techniques are used and reference(s) may be given.
 - d. Illustrative material may be restricted. It should be printed on paper only. There is no need to paste photographs separately.
3. Since most of the difficulties faced by the residents relate to the work in clinical subject or clinically-oriented laboratory subjects, the following steps are suggested:
 - a. The number of cases should be such that adequate material, judged from the hospital attendance/records, will be available and the candidate will be able to collect case material within the period of data collection, i.e., around 6-12 months so that the trainee is in a position to complete the work within the stipulated time.
 - b. The aim and objectives of the study should be well defined.
 - c. As far as possible, only clinical/laboratory data of investigations of patients or such other material easily accessible in the existing facilities should be used for the study.

- d. Technical assistance, wherever necessary, may be provided by the department concerned. The resident of one specialty taking up some problem related to some other specialty should have some basic knowledge about the subject and the trainee should be able to perform the investigations independently, wherever some specialized laboratory investigations are required a co-guide may be co-opted from the concerned investigative department, the quantum of laboratory work to be carried out by the candidate should be decided by the guide & co-guide by mutual consultation.
4. The clinical residents are not ordinarily expected to undertake experimental work or clinical work involving new techniques, not hitherto perfected OR the use of chemicals or radioisotopes not readily available. They should; however, be free to enlarge the scope of their studies or undertake experimental work on their own initiative but all such studies should be feasible within the existing facilities.
5. The DNB residents should be able to freely use the surgical pathology/autopsy data if it is restricted to diagnosis only, if however, detailed historic data are required the resident will have to study the cases himself with the help of the guide/co-guide. The same will apply in case of clinical data.
6. Statistical methods used for analysis should be described specifically for each objective, and name of the statistical program used mentioned.

General Layout of a DNB Thesis:

- **Title-** A good title should be brief, clear, and focus on the central theme of the topic; it should avoid abbreviations. The Title should effectively summarize the proposed research and should contain the PICO elements.
- **Introduction-** It should be focused on the research question and should be directly relevant to the objectives of your study.
- **Review of Literature** - The Review should include a description of the most relevant and recent studies published on the subject.
- **Aim and Objectives** - The 'Aim' refers to what would be broadly achieved by this study or how this study would address a bigger question / issue.

The 'Objectives' of the research stem from the research question formulated and should at least include participants, intervention, evaluation, design.

- **Material and Methods-** This section should include the following 10 elements: Study setting (area), Study duration; Study design (descriptive, case-control, cohort, diagnostic accuracy, experimental (randomized/non-randomized)); Study sample (inclusion/exclusion criteria, method of selection), Intervention, if any, Data collection, Outcome measures (primary and secondary), Sample size, Data management and Statistical analysis, and Ethical issues (Ethical clearance, Informed consent, trial registration).
- **Results-** Results should be organized in readily identifiable sections having correct analysis of data and presented in appropriate charts, tables, graphs and diagram etc.
- **Discussion**—It should start by summarizing the results for primary and secondary objectives in text form (without giving data). This should be followed by a comparison of your results on the outcome variables (both primary and secondary) with those of earlier research studies.
- **Summary and Conclusion-** This should be a précis of the findings of the thesis, arranged in four paragraphs: (a) background and objectives; (b) methods; (c) results; and (d) conclusions. The conclusions should strictly pertain to the findings of the thesis and not outside its domain.
- **References-** Relevant References should be cited in the text of the protocol (in superscripts).
- **Appendices** -The tools used for data collection such as questionnaire, interview schedules, observation checklists, informed consent form (ICF), and participant information sheet (PIS) should be attached as appendices. Do not attach the master chart.

Thesis Protocol Submission to NBE

1. DNB candidates are required to submit their thesis protocol within 90 days of their joining DNB training.
2. Enclosures to be submitted along with protocol submission form:
 - a) Form for Thesis Protocol Submission properly filled.
 - b) Thesis Protocol duly signed.
 - c) Approval letter of institutional Ethical committee. (*Mandatory, non receivable of any one is liable for rejection*)

Thesis Submission to NBE

1. As per NBE norms, writing a thesis is essential for all DNB candidates towards partial fulfillment of eligibility for award of DNB degree.
2. DNB candidates are required to submit the thesis before the cut-off date which shall be 30th June of the same year for candidates appearing for their scheduled December final theory examination. Similarly, candidates who are appearing in their scheduled June DNB final examination shall be required to submit their thesis by 31st December of preceding year.
3. Candidates who fail to submit their thesis by the prescribed cutoff date shall NOT be allowed to appear in DNB final examination.
4. Fee to be submitted for assessment (In INR): 3500/-
5. Fee can be deposited ONLY through pay-in-slip/challan at any of the Indian bank branch across India. The challan can be downloaded from NBE website www.natboard.edu.in
6. Thesis should be bound and the front cover page should be printed in the standard format. A bound thesis should be accompanied with:
 - a. A Synopsis of thesis.
 - b. Form for submission of thesis, duly completed
 - c. NBE copy of challan (in original) towards payment of fee as may be applicable.
 - d. Soft copy of thesis in a CD duly labeled.
 - e. Copy of letter of registration with NBE.
7. A declaration of thesis work being bonafide in nature and done by the candidate himself/herself at the institute of DNB training need to be submitted bound with thesis. It must be signed by the candidate himself/herself, the thesis guide and head of the institution, failing which thesis shall not be considered.

The detailed guidelines and forms for submission of Thesis Protocol & Thesis are available at www.natboard.edu.in.thesis.php.

LOG BOOK

A candidate shall maintain a log book of operations (assisted / performed) during the training period, certified by the concerned post graduate teacher / Head of the department / senior consultant.

This log book shall be made available to the board of examiners for their perusal at the time of the final examination.

The log book 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 undertaken by him/her in log book .

1. Personal profile of the candidate
2. Educational qualification/Professional data
3. Record of case histories
4. Procedures learnt
5. Record of case Demonstration/Presentations
6. Every candidate, at the time of practical examination, will be required to produce performance record (log book) 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 countersigned by the administrative Head of the Institution.
7. In the absence of production of log book, the result will not be declared.

Leave Rules

1. DNB/FNB Trainees are entitled to avail leave during the course of DNB/FNB training as per the Leave Rules prescribed by NBE.
2. A DNB/FNB Trainees can avail a maximum of 30 days of leave in a year excluding regular duty off/ Gazetted holidays as per hospital/institute calendar/policy. This leave shall be processed at the institutional level.
3. Any kind of study leave is not permissible to DNB/FNB Trainees.
4. Under normal circumstances leave of one year should not be carried forward to the next year. However, in exceptional cases such as prolonged illness, the leave across the DNB/FNB training program may be clubbed together with prior approval of NBE.
5. Unauthorized absence from DNB/FNB training for more than 7 days may lead to cancellation of registration and discontinuation of the DNB/FNB training and rejoining shall not be permitted.
6. Any Leave availed by the candidate other than the eligible leave (30 days per year) shall lead to extension of DNB /FNB training. The training institute has to forward such requests to NBE along with the leave records of the candidate since his/her joining and supporting documents (if any) through the Head of the Institute with their recommendation/comments. NBE shall consider such requests on merit provided the seat is not carried over and compromise with training of existing trainees in the Department.
7. Any extension of DNB/FNB training beyond the scheduled completion date of training is permissible only under extra-ordinary circumstances with prior approval of NBE. Such extension is neither automatic nor shall be granted as a matter of routine.
8. DNB/FNB trainees are required to complete their training by a prescribed cutoff date (as per information bulletin of Exit exam) for being eligible to DNB/FNB Exit examination.

9. The eligibility for DNB/FNB Final Examination shall be determined strictly in accordance with the criteria prescribed in the respective information bulletin.
10. candidates join on or after 2018 can avail Maternity / Paternity leave, as per the Central or State Government policies, whichever is applicable to DNB/FNB training institute.
11. DNB/FNB trainees are eligible for stipend either during the leave period or extension of training period as per the policies of DNB/FNB training institute and prevailing rules.

EXAMINATION

FORMATIVE ASSESSMENT

Formative assessment includes various formal and informal assessment procedures by which evaluation of student's learning, comprehension, and academic progress is done by the teachers/ faculty to improve student attainment. Formative assessment test (FAT) is called as "Formative" as it informs the in process teaching and learning modifications. FAT is an integral part of the effective teaching. The goal of the FAT is to collect information which can be used to improve the student learning process.

Formative assessment is essentially positive in intent, directed towards promoting learning; it is therefore part of teaching. Validity and usefulness are paramount in formative assessment and should take precedence over concerns for reliability. The assessment scheme consists of Three Parts which has to be essentially completed by the candidates.

The scheme includes:-

Part I:- Conduction of theory examination

Part-II :- Feedback session on the theory performance

Part-III :- Work place based clinical assessment

Scheme of Formative assessment

PART – I	CONDUCT OF THEORY EXAMINATION	Candidate has to appear for Theory Exam and it will be held for One day.
PART – II	FEEDBACK SESSION ON THE THEORY PERFORMANCE	Candidate has to appear for his/her Theory Exam Assessment Workshop.
PART – III	WORK PLACE BASED CLINICAL ASSESSMENT	After Theory Examination, Candidate has to appear for Clinical Assessment.

The performance of the resident during the training period should be monitored throughout the course and duly recorded in the log books as evidence of the ability and daily work of the student

1. Personal attributes:

- **Behavior and Emotional Stability:** Dependable, disciplined, dedicated, stable in emergency situations, shows positive approach.
- **Motivation and Initiative:** Takes on responsibility, innovative, enterprising, does not shirk duties or leave any work pending.
- **Honesty and Integrity:** Truthful, admits mistakes, does not cook up information, has ethical conduct, exhibits good moral values, loyal to the institution.
- **Interpersonal Skills and Leadership Quality:** Has compassionate attitude towards patients and attendants, gets on well with colleagues and paramedical staff, is respectful to seniors, has good communication skills.

2. Clinical Work:

- **Availability:** Punctual, available continuously on duty, responds promptly on calls and takes proper permission for leave.
- **Diligence:** Dedicated, hardworking, does not shirk duties, leaves no work pending, does not sit idle, competent in clinical case work up and management.
- **Academic ability:** Intelligent, shows sound knowledge and skills, participates adequately in academic activities, and performs well in oral presentation and departmental tests.
- **Clinical Performance:** Proficient in clinical presentations and case discussion during rounds and OPD work up. Preparing Documents of the case history/examination and progress notes in the file (daily notes, round

discussion, investigations and management) Skill of performing bed side procedures and handling emergencies.

3. Academic Activity: Performance during presentation at Journal club/ Seminar/ Case discussion/Stat meeting and other academic sessions. Proficiency in skills as mentioned in job responsibilities.

FINAL EXAMINATION

The summative assessment of competence will be done in the form of DNB Final Examination leading to the award of the degree of Diplomate of National Board in Neonatology. The DNB final is a two-stage examination comprising the theory and practical part. An eligible candidate who has qualified the theory exam is permitted to appear in the practical examination.

Theory Examination

1. The theory examination comprises of **Three** papers, maximum marks 100 each.
2. There are 10 short notes of 10 marks each, in each of the papers. The number of short notes and their respective marks weightage may vary in some subjects/some papers.
3. Maximum time permitted is 3 hours.
4. Candidate must score at least 50% in the aggregate of **Three** papers to qualify the theory examination.
5. Candidates who have qualified the theory examination are permitted to take up the practical examination.
6. The paper wise distribution of the Theory Examination shall be as follows:

Paper I:

- Basic sciences applied to the specialty
- General considerations of neonatology
- The fetal patient
- Transition and Stabilization
- Research methodology

Paper II:

- The low birth weight infant
- The newborn infant

Paper III:

- Pharmacology
- Beyond the nursery
- Recent advances and Investigations

a) Practical Examination:

1. Maximum Marks: 300.
2. Comprises of Clinical Examination and Viva.
3. Candidate must obtain a minimum of 50% marks in the Clinical Examination (including Viva) to qualify for the Practical Examination.
4. There are a maximum of three attempts that can be availed by a candidate for Practical Examination.
5. First attempt is the practical examination following immediately after the declaration of theory results.
6. Second and Third attempt in practical examination shall be permitted out of the next three sessions of practical examinations placed alongwith the next three successive theory examination sessions; after payment of full examination fees as may be prescribed by NBE.
7. Absentation from Practical Examination is counted as an attempt.
8. Appearance in first practical examination is compulsory;
9. Requests for Change in center of examination are not entertained, as the same is not permissible.
10. Candidates are required not to canvass with NBE for above.

Declaration of DNB Final Results

1. DNB final is a qualifying examination.
2. Results of DNB final examinations (theory & practical) are declared as PASS/FAIL.
3. DNB degree is awarded to a DNB trainee in the convocation of NBE.

RECOMMENDED TEXT BOOKS AND JOURNALS

List of Books

1. Neonatal –Perinatal Medicine Diseases of the fetus and infant Avroy
A Fanaroff Richard J Martin
2. Neonatology Pathophysiology & Management of the Newborn
Gordon Avery Mary Ann Fletcher M.G. MacDonald
3. Avery Diseases of Newborn S. Avery Taeusch Ballard
4. Polin & Fox Fetal and Neonatal Physiology Richard A Polin William
W Fox
5. Robertson's Textbook of Neonatology Janet M Rennie N.R.C
Robertson
6. Neonatology Principles and Practice Dipak K. Guha
7. Manual of Neonatal Care John P. Cloherty
8. Neonatology Management, Procedures, On call problems Diseases
And Drugs Tricia Lacy Gomella
9. Breastfeeding A Guide to the Medical Profession Ruth A. Lawrence
Robert M. Lawrence
10. Physical Diagnosis in Neonatology Mary Ann Fletcher
11. Nelson's Textbook of Neonatology Behrman Kleigman Arvin
12. Assisted Ventilation of the Neonate Jay P. Goldsmith Edward H.
Karatkin

13. Infectious Diseases of the Fetus & Newborn Infant Remington & Klein
14. Neurology of Newborn Joseph J. Volpe
15. Smith's Recognizable Patterns of Human Malformations Kenneth Lyons Jones
16. Moss and Adams Heart Disease in Infants, Children, & Adolescents Including the Fetus & Young Adult Emmanouilides Riemenschneider Allen & Gutgesell
17. The Clinical Recognition of Congenital Heart Disease Joseph K. Perloff
18. Pediatric Cardiology Myung Park
19. Pediatric Hematology Nathan , Oski
20. Medical disorders In Obstetric Practice Michel Deswite
21. Neonatal drug formulary
22. Textbook of Preventive & Social Medicine Park

List of Journals

1. Archives Diseases of Childhood: Fetal & Neonatal edition
2. The Journal of Pediatrics
3. Pediatrics (English Edition)
4. Indian Journal of Pediatrics
5. Indian Pediatrics
6. Clinics in Perinatology
7. Journal of Neonatology
8. Journal of Perinatology
9. Pediatrics Today
10. Archives of Pediatrics and Adolescent Medicine
11. Pediatric Clinics of North America
12. Pediatric Clinics of India

13. Recent Advances in Paediatrics
14. Seminars in Neonatology
15. Seminars in Perinatology
16. The Year Book of Pediatrics
17. Acta Paediatrica: an international journal of Paediatrics

Websites

- www.cochrane.mcmaster.ca/neonatal
- www.nichd.nih.gov/cochrane
- www.neonatology.org
- www.emedicine.com/ped/neonatology.htm
- www.nnfi.org
