Residency Program
Doctor of Medicine (MD)
Curriculum (Phase-B)

Neonatology

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Contents

1. Introduction:

1.1. Overview of the Specialty

Neonatal mortality in Bangladesh is among the highest in the world, accounting for approximately two-thirds of infant mortality. Although the infant mortality rate (IMR) has come down from 151 in 1960 to 43 in 2011 (BDHS), the neonatal mortality has not declined in proportionately. Low birth weight (<2500 g), perinatal (birth) asphyxia and sepsis are commonly responsible for death and disability amongst neonates. The high incidence of neonatal mortality and morbidity is contributed to by a number of factors; these include lack of antenatal care, poor delivery practices, compounded by maternal malnutrition, poverty, ignorance, early and frequent pregnancies, unhygienic conditions during delivery and ignorance about proper newborn care.

Training in neonatology in undergraduate and postgraduate medical studies is inadequate, and this crucial subject is not well addressed in the postgraduate curriculum.

Pediatrics, sadly, is still considered to be a branch of medicine in undergraduate studies whereas in most countries it is a major subject. In both medicine and surgery, postgraduate courses in sub-specialties like gastroenterology endocrinology, hematology, nephrology, paediatric surgery, neuro-surgery have developed. Neonatology is a major sub-specialty of Paediatrics. Residents who completed phase A in Neonatology or a post graduation in Paediatrics (FCPS or MD or equivalent) successfully will be promoted to phase B residency.

Newborns are special, as their physiology, pharmacokinetics, disease profile are different from their older counterparts. Therefore their care has to be tailored to suit their needs. Thus skilled manpower needs to be developed to handle newborns who are extremely vulnerable group.

Concepts of newborn care should be demystified. Thus wide range of alternative methods depending on locally available technology should be made available and be used for the care of the newborns in the country.

The aim of the residency phase B is to produce competent Neonatologist who will be able to manage all types of common and uncommon routine and emergency neonatal patients and will be capable conducting training in neonatology.

1.2. Program Overview

Residents will undertake a three year intensive phase B training after completion of phase A training in order to achieve the levels of knowledge, skills and expertise required for clinical practice in the field of Neonatology. The Program encompasses a learner-centered approach to teaching and learning and, as such clearly places the responsibility of knowledge and skills acquisition upon the trainee as a mature adult learner. Through taking ownership of their own learning, trainees are able to identify, organize and manage the nature, focus and content of each and every phase of their learning pathway.

The teaching, learning and assessment of the curriculum is facilitated by the provision of comprehensive, educationally oriented supervision and support, which is provided to all trainees across both the phases of the Program.

2. Aim:

The aim of the Residency in Neonatology is to produce Neonatologists for providing essential and high-standard clinical care, training and to participate in research in newborn health.

Learning Objectives

At the end of the Residency (Neonatology) the student will have:

1) competence in core knowledge of neonatal anatomy including embryology, physiology, pathology, patho-physiology and pharmacology.
2) a thorough knowledge of history-taking, including birth history, family, genetic, socio-economic histories and the ability to perform a comprehensive and accurate physical examination; the ability to arrive at a provisional with differential diagnoses and outline appropriate investigations in order to arrive at a clinical diagnosis.
3) competence in postnatal care and early recognition of high-risk infants.
4) competence in procedural skills as outlined in the annex.
5) 5) capacity to provide primary, secondary and tertiary care to all newborns and organize follow-up care.
6) basic skills in operating and maintaining neonatal equipments and recent advances in technology pertaining to neonatal care.
7) skills in decision-making in ethical dilemmas, and communication skill between doctor-parents, doctor-doctor and doctor-nurse.
8) ability to plan and carry out research in neonatal health.
9) competence in the knowledge and management of public health problems of the newborns in the community.
10) ability to teach newborn care to the medical and nursing students and other health workers and develop learning materials for them.
11) ability to plan, establish and run level II and level III neonatal units independently.

3. Admission Requirements for Phase B Training:

a) Residents who have passed Phase A Final examination in Pediatrics and Allied are eligible for enrolment in the Phase-B Neonatology Program.
b) Candidates who have FCPS/MD in Pediatrics can be enrolled directly into phase-B Program.

4. Phase B Curriculum Structure:

The training is designed to develop both the generic and specialty-specific attributes necessary to practice independently as a consultant neonatologist. The aim is to train individuals to provide the highest standard of service to the neonatal patients. This includes the development of positive attitudes towards lifelong learning and the ability to adapt to future technological advances and the changing expectations of society.

5. Placement of candidates:

Each candidate will be placed in newborn services (in the hospital and community) leading to:

- Management of neonatal emergencies
- Regular management of neonates including on postnatal wards
- Delivery room care of the neonate
- Acquisition of practical skills
- Follow-up at Outpatient department
- Participation in decision-making with obstetric colleague
- Rotations

Essential Rotations within 3 yrs of Training

- **Perinatology:** (Dept. of Obstetrics-Gynecology): **Sixty days.** • **Neonatal Surgery** (Dept of Pediatric Surgery): **One month.**
- **Community Neonatology**: **One month** (3 wks in District Hospital / MCWC & 1 wk in Upazila Health Complex).

- **Elective: Two months**. A candidate has to undertake 2 months' elective rotation (eg. Radiology, Imaging & Nuclear Medicine etc) in the parent or other Institutions/ Corporate Hospitals (having standard NICU) in the country or abroad as approved by BSMMU.

Clinical / Bedside Teaching Experience in 3 years

The Trainee will be regularly assigned in the teaching (supervised by the faculties) of junior trainees, postgraduate students, nurses and health education of mothers.

The 3 yrs training period will be classified as year-1, year-2 and year-3. The year-2 trainee will teach year-1 trainee and honorary medical officers (HMOs). The year-3 trainee will teach year-2 trainee and other postgraduate students.

6. Teaching methodology:

Self-directed learning will be encouraged through active participation in

- Ward-rounds
- Bedside teaching
- Hands-on training
- Tutorials
- Clinical presentations
- Journal clubs
- Scientific conferences
- Seminars and symposiums

The candidate will participate in the Perinatal meetings with Dept of Obs and Gynae and other related departments.

The candidate will also be encouraged to participate in CME Programs, workshops/ meetings organized by national and international professional and specialist organizations

7. Record of Training:

The evidence require to confirm through training includes:

- Details of the training rotations, the training plan agreed with weekly timetables and duty rosters; and numbers of practical procedures and outcomes.
- Confirmations of attendance at events in the educational Program, at departmental and inter-departmental meetings and other educational events.
- Confirmation (certificates) of attendance at subject-based/skills-training/ instructional courses.
- Recorded attendance at conference and meetings.
- A properly completed logbook with entries capable of testifying the training objectives which have been attained and the standard of performance achieved.
- CME activity
- Supervisor's reports on Observed performance (in the workplace): of duties, practical procedures, of presentations made and teaching activity: of advising and working with others, of standards of case notes, correspondence and communication with others.

7.1. Logbook:

Residents are required to maintain a logbook in which entries of academic/ professional work done during the period of training should be made on a daily basis, and signed by the supervisor. Completed and duly certified logbook will form a part of the application for appearing in phase Final Examinations.

8. Research:

The sub-specialty of Neonatology is dedicated to promote neonatal health. In addition to acquiring clinical skills, it is recommended that all trainees will participate in a research program during the course. Research may be in clinical and public health aspects of neonatal health. Trainees will acquire skills in research methodology, literature searches, clinical epidemiology, and biostatistics. They also need to develop practical experience in the critical analysis of current literature. Computer skills in literature search, data base management and statistical analyses are essential.

In accordance with the rules of the University, the trainee must produce a thesis. The thesis defense examination should be passed by the trainee prior to final examination.

The candidate will make at least 3 formal presentations to the department, involving

i) Protocol
ii) Mid- course progress and
iii) Final report

Thesis will be submitted prior to the completion of residency as per University rule.

9. Assessment:

The assessment for certification of the MD degree of the University is comprehensive, integrated and phase-centered attempting to identify attributes expected of specialists for independent practice and lifelong learning and covers cognitive, psychomotor and affective domains. It keeps strict reference to the components, the contents, the competencies and the criteria laid down in the curriculum. Assessment includes both **Formative Assessment and Summative (Phase final) Examinations.**

9.1. Formative Assessment:

Formative assessment will be conducted throughout the training phases. It will be carried out for tracking the progress of residents, providing feedback, and preparing them for final assessment (Phase completion exams).

There will be Continuous (day-to-day) and Periodic type of formative assessment.

- **Continuous (day-to-day) formative assessment** in classroom and workplace settings provides guide to a resident's learning and a faculty's teaching / learning strategies to ensure formative lesson / training outcomes.
- **Periodic formative assessment** is quasi-formal and is directed to assessing the outcome of a **block placement** or **academic module completion**. It is held at the end of Block Placement and Academic Module Completion. The contents of such examinations include **Block Units** of the Training Curriculum and **Academic Module Units** of the Academic Curriculum.

9.1.1. End of Block Assessment (EBA):

End of Block Assessment (EBA) is a periodic formative assessment and is undertaken after completion of each training block, assessing knowledge, skills and attitude of the residents. Components of EBA are written examination, structured clinical Assessment (SCA), medical record review, and logbook assessment. Unsatisfactory block training must be satisfactorily completed to be eligible for phase final examination

9.1.2. Formative assessment for Academic modules for Biostatics and Research Methodology and Medical Education to be done in the first nine months of Phase B training. Residents getting unsatisfactory grade must achieve satisfactory grade by appearing the re-evaluation examination to be eligible for the Phase B Final Examination.

9.2. Summative Examination:

Assessment will be done in two broad compartments.

a) **Compartment A:** Consist of 3 (three) components.
   1. Written Examination (Consisting of 2 papers).
   2. Clinical Examination (One long and four short cases).
   3. SCA and Oral (10 stations SCA, Oral one board consisting of 2 examiners).

Every Resident must pass all the 3 components of compartment-A separately. Candidates will be declared failed if he/she fails in one or more component (s) of the examination. He/she then have to appear all the 3 components in the next Phase B Final Examination.

b) **Compartment B:** Thesis and Thesis defense.

9.2.1. Written Examination:

Two Papers: Contents of written papers listed in Annexure II

Question type and marks:

- Two Papers (Paper I and Paper II); 100 marks each; Time 3 hrs for each paper. Pass marks-60% of total of 2 papers.
- **Each paper will consist of Two Groups:**
- **Group A:**
  - 10 short questions (5 marks each)
  - These will assess the knowledge of different level and its application

- **Group B:**
  - 5 scenario based problem solving questions (10 marks for each).
  - The questions should focus to assess the capability of handling clinical problem independently and comprehensively as a specialist.
  - Suggested format:–
    - A scenario followed by question(s).
    - Questions may include diagnosis, differential diagnosis, investigation plan, treatment, follow up and patient education.

9.2.2. Clinical Examination: Long case and Short case:

- There will be one long case and four short cases.

i) **Long case: Marks-100**
  - Directly observed
  - Two examiners for each examinee.
  - History taking and examination by the examinee – 30min.
  - Discussion on the case 20 min.(presentation 6min, crossing 6x2min and decision 2min).
  - Examiners will not ask any question nor stop the examinee in any way during history taking and physical examinations.
  - Discussion should be done preferably as per structured format and proper weightage on different segments of clinical skills.

ii) **Short cases : Marks-100**
  - Four in number
  - Time 20-30 min. (Time will be equally divided for each short case)
  - Crossing should be done with proper weightage on different segment of clinical skills.

iii) **Pass marks: 60% of total of Long and Short Cases**

9.2.3. Structured Clinical Assessment (SCA): Marks-100

- 10 stations : 5 min each

9.2.4. Oral Examination: Marks-100

- One board consisting of 2 examiners.
- 20 minutes (9+9+2).

9.2.5. Pass marks in SCA and Oral: 60% of total (SCA and Oral.)

9.3. Thesis Evaluation:

- **Marks: Thesis writing-200; Defense-100: Marks for acceptane-60% of total.**

- To be evaluated by 3 (three) evaluators:- 2 subject specialists and one academician preferably involve in research and teaching research methodology.
- Among the subject specialists one should be external.
- Evaluators should be in the rank of Professor/Associate Professor.
- Supervisor will attend the defense as an observer and may interact only when requested by the evaluators.
- Thesis must be submitted to the controller of Exam not later than 27 months of enrolment in Phase-B.
- Thesis must be sent to the evaluators 2 (Two) weeks prior to assessment date.
- Evaluation will cover Thesis writing and its defense.
- For thesis writing evaluator will mark on its structure, content, flow, scientific value, cohesion, etc.
- For defense – Candidate is expected to defend, justify and relate the work and its findings.
- Assessment must be completed in next 3 months.
- Outcome of the assessment shall be in 4 categories – "Accepted", "Accepted with minor correction", "Accepted with major correction" and "Not Accepted".

9.3.1. Description of terms:

- **Accepted:** Assessors will sign the document and resident will bound it and submit to the Controller of Examinations by 10 days of the examination.
- **Accepted with minor correction:** Minor correction shall include small inclusion/exclusion of section; identified missing references, correction of references and typographical and language problem. This should be corrected and submitted within 2 weeks.
- **Accepted with major correction:** Task is completed as per protocol with acceptable method but some re-analysis of result and corresponding discussion are to be modified.

- To be corrected, confirmed by Supervisor and submit within 3 (Three) weeks.

- **Not Accepted:** When work is not done as per protocol or method was faulty or require further inclusion or confirmation of study.

- To complete the suggested deficiencies and reappear in defense examination during its next Phase Final Examination.
- Candidate has to submit his/her thesis and sit for examination and pay usual examination fess for the examination.

9.3.2. Residents must submit and appear Thesis defense at notified date and time. However non- acceptance of the Thesis does not bar the resident in appearing the written, clinical and oral exam.

9.4. Qualifying for MD/MS Degree:

On passing both the compartments, the candidate will be conferred the degree of MD/MS in the respective discipline. If any candidate fails in one compartment he/she will appear in that compartment only in the subsequent Phase-B exam.

10. Supervision and Monitoring:

Training should incorporate the principle of gradually increasing responsibility, and provide each trainee with a sufficient scope, volume and variety of experience in a range of settings that include inpatients, outpatients, emergency and intensive care. All elements of work in training rotation must be supervised with the level of supervision varying depending on the experience of the trainee and the clinical exposure. Outpatient and referral supervision must routinely include the opportunity to personally discuss all cases. As training progresses the trainee should have the opportunity for increasing autonomy, consistent with safe and effective care for the patient. Trainees will at all times have a named Supervisor responsible for overseeing their education.

Supervisors are responsible for supervision of learning throughout the program to ensure patient and/or laboratory safety, service delivery as well as the progress of the resident with learning and performance. They set the lesson plans based on the curriculum, undertake appraisal, review progress against the curriculum, give feedback on both formative and summative assessments as well as sign the logbook and portfolio. The residents are made aware of their limitations and are encouraged to seek advice and receive help at all times.

The Course Coordinator of each department coordinates all training and academic activities of the program in collaboration with the Course Manager. The Course Director of each faculty directs, guides and manages curricular activities under his/her jurisdiction and is the person to be reported to for all events and performances of the residents and the supervisors.

11. Curriculum Implementation, Review and Updating:

Both Supervisors and Residents are expected to have a good knowledge of the curriculum and should use it as a guide for their training Program.

Since Neonatology as historically been rapidly changing specialty the need for review and up-dating of curricula is evident. The Curriculum is specifically designed to guide an educational process and will continue to be the subject of active redrafting, to reflect changes in both Neonatology and educational theory and practice. Residents and Supervisors are encouraged to discuss the curriculum and to feedback on content and issue regarding implementation at Residency Course Director. Review will be time tabled to occur annually for any minor changes to the curriculum. The curriculum will be reviewed with input from the various subspecialties Neonatology.

12. Phase B Syllabus:

The educational process in Neonatology aims to provide basic knowledge, intellectual, clinical and transferable skills to produce competent gastroenterology specialist. These specialists will be capable of providing specialized care of the highest order to neonatal patients with gastrointestinal disorders in the community as well as clinical tertiary centers. They shall recognize the health needs of the community and carry out professional obligations ethically and keeping their standards by engaging in continuing medical education. The program also aims to introduce the candidate to the basics of scientific medical research.

Contents for MD Neonatology Residency: Phase B Syllabus

A) Basic Sciences

- Feto-placental anatomy and physiology
- Basic genetics
- Foetal and neonatal immunology
- Applied microbiology
- Pharmacology of fetal and neonatal health

- Neonatal adaptation
- Foetal and intrauterine growth
- Development and maturation of lungs, respiratory control, lung functions, ventilation, gas exchange, ventilation perfusion
- Physiology and development of cardiovascular system, development defects, physiology and haemodynamics of congenital heart disease
- Development and maturation of nervous system, cerebral blood flow, blood brain barrier, CSF circulation
- Foetal and neonatal endocrine physiology
- Haematology in relation to foetal and newborn life
- Renal physiology
- Physiology of gastrointestinal tract, digestion, absorption
- Fluid and electrolyte balance
- Acid base balance
- Metabolism of glucose, calcium and magnesium

B) General Topic

- Basic medical statistics and research methodology
- Ethics in perinatology / neonatology

Research methodology

- Biostatistics
- Ethics in perinatology/neonatology
- Principles of education (objectives, curriculum, assessment and use of media)
- Computer, informations technology, internet

C) Perinatology

- Perinatal and neonatal mortality, morbidity, epidemiology

- Basics of fetal monitoring
- Participation in decision-making with obstetric colleague regarding high risk pregnancy
- Prenatal diagnosis and foetal interventions
- Antenatal counseling
- Foetal origin of adult disease
- Applied obstetrics for neonatal health, foetal assessment
- Maternal conditions affecting foetal health

D) Neonatology

1. Assessment of the newborn
- History and physical examination of the newborn
- Identifying the high- risk infant
- Assessment of gestational age, prematurity, postmaturity large-for-gestational age, and small-for-gestational age

(**Note**: Please record the contents of the curriculum in logical sequence)

2. Neonatal resuscitation
- Causes of delayed onset of regular respiration
- Physiology of asphyxia
- Resuscitation of the newborn and complication
- Care of the asphyxiated infant

3. The normal term baby
- Care in the delivery room
- Routine postnatal care

4. Temperature regulation Physiology
- Clinical effects of cold and overheating
- Management of temperature control - hypothermia and hyperthermia

5. The low birth weight infant
6. Multiple births

7. Respiratory management
- General physiologic support.
- Ventilatory support

8. Fluid therapy fluid and electrolyte management
9. Nutritional management
- Growth assessment of the neonate
- Nutritional requirements in the neonate
- Breast-feeding and lactation management
- Total parenteral nutrition

10. Early childhood development (ECD), neonatal behaviour, neonatal reflexes
    - Developmental assessment, detection of neuromotor delay, stimulation techniques

11. Ethical dilemmas and decision making
12. Neonatal radiology and imaging
- Common radiologic and imaging techniques
- Radiographic examples and interpretation

13. Malformation
14. Haematological abnormalities
- ABO/ Rh incompatibility
- Anemia
- Polycythemia
- Bleeding and haemorrhagic disorders of the newborn
- Blood products used in the newborn
- Arterial and venous thrombosis

15. Neonatal hyperbilirubinaemia
16. Cardiac abnormalities
- Evaluation of heart diseases
- Congenital heart disease
- Heart failure
- Arrhythmias in the neonatal period
- Interpretation ECG and echocardiogram

17. Shock in newborn life
18. Pulmonary diseases. (Arrange sequentially)
- Air leak syndromes (RDS,)
- Apnea and periodic breathing
- Chronic lung disease
- Respiratory distress syndrome
- Me conium aspiration
- Persistent pulmonary hypertension of the newborn
- Transient tachypnea of the newborn
- Pneumonia
- Diaphragmatic hernia

19. Neonatal infections
20. Neurologic diseases
- Hypoxic ishchaemic encephalopathy
- Hydrocephalus
- Intracranial haemorrhage
- Neonatal seizures
- Neural tube defects
- Meningitis

21. Gastrointestinal problems (feeding problems, diarrhea, vomiting, NEC, anorectal malformation, Hirschsprung's disease,)
22. Renal diseases
- Acute renal failure
- Haematuria
- Urinary tract infection
- Congenital abnormalities of urogenital system
- Congenital nephrotic syndrome

23. Neonatal transport

24. Community newborn care
- Epidemiology of newborn health
- Neonatal morbidity and mortality
- Present newborn care in the community
- Essential newborn care (steps)
- Traditional beliefs and practices about newborn care
- National programs for the newborn
- Interventions to reduce neonatal morbidity and mortality
- Maternal health issues that affect newborn health
- Maternity services in relation to newborn health
- Research issues in newborn health

25. Birth injuries
26. Orthopaedic problems
- Fractures
- Skeletal malformations
- Congenital dislocation of hips

27. Auditory and ophthalmologic problems
28. Rickets and disorders of calcium and magnesium metabolism
- Rickets
- Hypocalcemia
- Hypercalcemia
- Hypomagnesemia
- Hypermagnesemia
- Metabolic bone disease of prematurity

29. Endocrine and metabolic disorders
- Hypoglycaemia
- Hyperglycaemia
- Galactosaemia
- Thyroid disorders
- The neonate with ambiguous genitalia

- Congenital adrenal hyperplasia
- Inborn errors of metabolism

30. Neonatal dermatological problems
31. Surgical diseases of the newborn

- Surgical emergencies in the newborn

Common surgical conditions

- Post-operative care

32. Neonatal screening
33. Criteria for admission to neonatal unit
34. Discharge planning
35. Follow-up of high-risk infants

- Goals of the neonatal follow-up clinic
- Risk factors for development of disability, parameters requiring follow-up
- Multidisciplinary evaluation and intervention
- Studies for neurologic evaluation - neuroimaging and electroencephalographic studies

E) Neonatal Pharmacology

1. Commonly used medication
2. Effects of drugs and substances on lactation and breast-feeding
3. Effects of drugs and substances taken during pregnancy
4. Infant of a drug-abusing mother

Procedures (Clinical skill development)

1. Oro and naso-gastric intubation
2. Heel-prick (capillary blood sampling)
3. Venous access
4. Arterial ac cases
5. Placement of long lines

6. Techniques of photo therapy
7. Exchange transfusion
8. Placement of CPAP tube/prong
9. End tracheal intubation
10. Intra-cardiac injection
11. Chest tube placement
12. Bladder catheterization
13. Bladder aspiration
14. Lumbar puncture
15. Bone marrow aspiration
16. Abdominal paracentesis
17. Cerebral ventricular tap
18. Neonatal ventilation: CPAP, IMV; newer modes of ventilation
19. Neonatal examination, anthropometry and developmental assessment Neonatal pharmacology
    - Nursery housekeeping routines and asepsis procedures
    - Universal precautions
    - Handling, effective utilization and trouble shooting of neonatal equipment.
    - Neonatal EEG and Imaging

G) Problem Solving Skills On

1. Hypothermia
2. Hyperthermia
3. Cyanosis
4. Respiratory distress
5. Apnoea and bradycardia ("A"s and "B"s)
6. Pallor
7. Feeding problems
8. Seizures

9. Poor perfusion
10. Hypotension and shock
11. Arrhythmia
12. No stool in 24 hours
13. No urine output in 48 hours
14. Bleeding from upper G.I. tract
15. Bloody stool
16. Eye discharge (conjunctivitis)
17. Pneumothorax
18. Pneumoperitoneum
19. Pulmonary haemorrhage
20. Blood gas abnormalities
21. Hypertension
22. Traumatic delivery
23. Post-delivery antibiotics
24. Unconjugated hyperbilirubinaemia
25. Conjugated hyperbilirubinaemia
26. Hypoglycaemia
27. Hyperglycaemia
28. Hypokalaemia
29. Hyperkalaemia
30. Hyponatraemia
31. Hypernatraemia
32. Polycythaemia
33. Sedation and analgesia in a neonate
34. Is the baby ready for discharge?
35. Counseling parents and caregivers
36. Death of an infant/Bereavement