CURRICULUM/STATUTES & REGULATION

FOR
02 YEARS MD PROGRAM (LEVEL-IV)
IN

NEONATOLOGY/NEONATAL MEDICINE

Table of Content

AIMS/OBJECTIVES

The objective is to establish clearly defined standards of knowledge and skills to effectively practice neonatal medicine at secondary or tertiary level neonatal units in Pakistan.

LEARNING OUTCOMES

Neonatology/Neonatal Medicine, though a super-specialty of Pediatrics, yet is quite different from General Pediatrics. It has evolved in a highly specialized subject that is required for care of newborns. Training in Neonatology/Neonatal Medicine shall enable the Neonatologists to manage the newborns according to specific guidelines applicable in this age group. It is particularly important for a country like Pakistan where neonatal mortality is one of the highest in the world. Newborns constitute a large proportion of children in our. country while the number of Neonatologists in Pakistan is only few leaving a big gap in provision of specialized newborn care. Training of Pediatricians to become a specialist in field of Neonatology/Neonatal Medicine and their placement at level-II & III healthcare centers shall:

1. Greatly help in reducing the dearth of Neonatologists in Pakistan and
2. Improve newborn care and thus
3. Reduce morbidity and mortality of newborns in our country.

DURATION OF PROGRAM

The duration of MD Neonatology program will be two years.

ELIGIBILTY CRITERIA

Qualified FCPS/MD Pediatrics (Level-III) or equivalent Foreign Qualification recognized by PMC.

COURSE CONTENTS

This document i's divided into following:

1. **Basic characteristics** & **requirements**
2. **Training -----Core knowledge**
3. **Training----- Skills**
4. **Key competences**
5. **Personal development**
6. **Recording of progress in log book**
7. **Assessments** & **examinations**

*1. **BASIC CHARACTERISTICS** & **REQUIREMENTS***	
a) Total two years post-FCPS Pediatrics/ MD Pediatrics training in Neonatal Medicine	
1. Training in approved neonatal unit with rotation in NICU, HDU, special care, transitional care/normal newborn nursery, OPD/follow-up clinic and neonatal emergency	1 year & 5 months
11. High risk obstetrics [1]	2 months[3]
111. Neonatal surgery[2]	2 months[3]
IV. Preventive, social & community based neonatal care	1 months[3]
V. Elective (1 month each) ▪ Diagnostic Radiology (cranial & chest USG) ▪ Echocardiography	2 months
VI. Clinical research	4 hrs/week
b) Documentation in log-book	
c) Two research papers OR one research paper and two case reports published/accepted for publication in PMC approved journal	??
d) Presentation of two clinical audits/year, duly documented in log-book	
e) Attendance in mandatory workshops: 1. Neonatal resuscitation II Neonatal Ventilation	
f) Examination	

1. *Attending perinatal meetings and normal/high risk deliveries.*
2. *Diagnosis of neonatal surgical problems and pre- & post-operative management.*
3. *The rotation need not be completed in one stretch, but may be divided even into 1-3 days per week to complete total required period. This is to ensure better utilization of time and may be done after agreement of both supervisors.*

2.TRAINING----- CORE KNOWLEDGE

EPIDEMIOLOGY:

a) Morbidity & mortality statistics (Pakistan/international comparisons)
b) Factors influencing mortality/morbidity
c) Methods of data collection at national & local level
d) Birth/Death notification and audit

PATHOPHYSIOLOGY OF FETUS:

a) Fetal growth & development and their assessment
b) Conditions affecting fetus and their detection

PHYSIOLOGY OF POST-NATAL ADAPTATION:

a) Physiological changes at birth
b) Respiratory, cardiovascular & other changes at birth
c) Physiology of thermal control at birth

GROWTH & NUTRITION:

a) Breast feeding
b) Essential newborn care
c) Nutrition in term and preterm
d) Enteral feeding
e) Parenteral nutrition
f) Neonatal milk formulae & supplementation
g) Micronutrients, pre- & probiotics
h) Intrauterine growth retardation
i) Post natal growth

INFECTIONS:

a) Pathogenesis of perinatal & neonatal infections
b) Immunology of fetus and neonate
c) Viral infections of fetus and neonate
d) Congenital infections in neonates
e) Meningitis, Sepsis and septic shock
f) Tetanus
g) Hospital acquired infection
h) Fungal infections of neonate

FLUID MANAGEMENT:

a) Pathophysiology of fluids, electrolyte & acid base balance
b) Maintenance of fluid and electrolyte balance

HIGH RISK NEWBORN:

a) Extreme preterm/preterm /Low birth weight/SGA/LGA
b) Outcomes associated with perinatal high-risk groups
c) Multiple gestations
d) Screening of preterm for ROP and hearing loss
e) Screening of newborn for prevalent metabolic, endocrine and inherited disorder

RESPIRATORY SYSTEM:

a) Development of respiratory system
b) Apnea and periodic breathing

c) Pneumonia
d) Transient tachypnea of newborn
e) Respiratory distress syndrome
f) Meconium aspiration syndrome
g) Pulmonary hemorrhage
h) Surfactant deficiency
i) Air leak syndromes
j) Chronic lung disease & bronchopulmonary dysplasia
k) Chronic respiratory problems e.g., immotile cilia syndrome
l) Delivery of respiratory support
m) Mechanical ventilation, complications and sequel
n) Respiratory care e.g., physiotherapy

CARDIOVASCULAR SYSTEM:

a) Assessment of CVS
b) Screening for cardiovascular disease at birth
c) Cardiovascular support
d) Cardiac failure
e) Arrhythmias
f) Circulatory shock
g) Persistent pulmonary hypertension
h) Cyanotic Congenital heart disease
i) Acyanotic congenital heart disease

GASTROINTESTINAL SYSTEM & Hepatobiliary system

a) Gastrointestinal development
b) Congenital abnormalities of gastrointestinal system
c) Gastroesophageal reflux
d) Gut microbiome
e) Hyperbilirubinemia
f) Necrotizing enterocolitis
g) Common surgical disorders of gut
h) Disorders of liver

NEUROMUSCULAR:

Neonatal Encephalopathy

- Perinatal asphyxia: prevention, management and its consequences
- Metabolic encephalopathy

a) Hydrocephalus
b) Hypotonia (Floppy baby)
c) Seizures
d) Intraventricular hemorrhage
e) Nerve palsies
f) Neurocognitive outcome

GENITOURINARY SYSTEM:

a) Development of genitourinary system
b) Congenital anomalies of genitourinary system
c) Urinary tract anomalies
d) Acute renal injury/ chronic kidney diseases
e) Urinary tract infections
f) Neonatal hypertension

ENDOCRINE DISORDERS:

a) Disorders of calcium and phosphate
b) Disorders of carbohydrate metabolism
    - Hypoglycemia
    - Hyperinsulinemia
c) Infant of diabetic mother
d) Disorder of adrenal glands (Congenital adrenal hyperplasia & others)
e) Disorders of sexual differentiation
f) Metabolic bone disease
g) Disorder of thyroid gland

METABOLIC CONDITIONS:

a) Metabolic adaptation to post-natal life
b) Inborn errors of metabolism

HEMATOLOGICAL DISORDERS & Neoplasia

a) Anemia
b) Bleeding disorders
c) Thrombotic disorder
d) Red cell disorders
e) Platelet disorders
f) White cell disorders

PHARMACOLOGY IN PERINATAL & NEONATAL PERIOD:

a) Pharmacokinetics of drugs in neonatal period
b) Effects of maternal drug abuse on neonate
c) Influence of maternal medication on newborn
d) Transmission of drugs via breast milk
e) Drug toxicity
f) Drug interactions

CONGENITAL & INHERITED DISORDERS:

a) Dysmorphic syndromes
b) Congenital malformations and their management
c) Genetic investigations & diagnosis

COMMON SURGICAL DISORDERS:

a) Mechanical birth injuries
b) Congenital diaphragmatic hernia
c) Cleft lip/palate
d) Tracheo-esophageal fistula
e) Anorectal malformations/Hirschsprung's disease
f) Intestinal obstruction
g) Development dysplasia of hip
h) Talipes equinovarus
i) Spina bifida

MISCELLANEOUS:

a) Screening for neonatal disease
b) Visual and hearing defects

c) Diagnosis and counseling

d) Early, medium- & long-term sequel of neonatal & perinatal events

e) Ethical issues & legal problems in neonatal care

ORTHOPEDICPROBLEMS OF NEWBORN

a) Skeletal dysplasia

b) Heritable connective tissue disorders

c) Common Neonatal orthopedic problems

COMMON SKIN DISEASES OF NEWBORN

a) Congenital and hereditary disorders of skin

b) Infections of skin

c) Common newborn dermatosis

d) Cutaneous congenital defects

PRACTICAL SKILLS:

a) Cardiopulmonary resuscitation
b) Venous cannulation
c) Venous blood sampling
d) Arterial blood sampling
e) Endotracheal intubation
f) Exchange transfusion
g) Lumbar puncture
h) Heel prick
i) Therapeutic hypothermia
j) Suprapubic aspiration
k) Surfactant administration
l) Umbilical arterial catheterization
m) Umbilical venous catheterization
l) Chest drain insertion (Thoracostomy tube)
m) Percutaneous insertion of central catheter (Long line)
n) Parental counseling

3.TRAINING--- SKILLS

By the end of training period, a candidate is expected to perform all the clinical skills independently.

PRACTICAL PROCEDURES:

a) Resuscitation of the newborn
b) Blood sampling by arterial and venous punctures
c) Intravenous infusion
d) Blood transfusion
e) Exchange transfusion
f) Lumbar puncture
g) Endotracheal intubation
h) Mechanical ventilation
i) Pleural drainage of pneumothorax
j) Peritoneal tap
k) Supra-pubic aspiration

l) Percutaneous insertion of central catheter (Long line)

m) Umbilical arterial catheterization

n) Umbilical venous catheterization

o) Surfactant administration

CLINICAL PRACTICE:

a) History & Examination of sick and healthy newborns

b) Assessment of gestational age

c) Specific neonatal problems including deformation and malformation

d) Developmental and neurological assessment of an older infant at follow-up

e) Assessment of disability

f) Counseling

DIAGNOSTIC SKILLS:

a) Interpreting:

1. Chest and abdominal x-rays
11. Ultrasound examination of CNS and abdomen
111. Common laboratory and microbiological investigations
IV. ECG
v. Echocardiogram report

b) Indications and interpretation of:

1. Specialized investigations e.g., MRI, CT scans
11. EEG, evoked potentials

4.KEY COMPETENCIES

RESUSCITATION:

a) Fully understand physiology and treatment involved

b) Institute and lead neonatal resuscitation

NEUROLOGY:

a) Clinical assessment

b) Seizures

c) Preterm and term brain injury including Hypoxic ischemic encephalopathy

d) Mechanical birth injuries

e) Congenital malformations
f) Investigation and management of neurological disorders

THERMOREGULATION:

a) Initiate and manage thermal environment of preterm and term babies

FLUID BALANCE:

a) Manage fluid balance
b) Fully understand physiology and management of related conditions

HAEMATOLOGY AND TRANSFUSION:

a) Diagnose & manage hematological disorders in the newborn
b) Full understanding of blood products available for transfusion and their appropriate use

METABOLIC AND ENDOCRINE DISORDERS:

a) Recognition, assessment, investigations and management of common metabolic, acid base and endocrine disorders e.g. IDM, hypo- and hyperglycemia, hypocalcemia, hypomagnesemia.

IMMUNITY AND INFECTION:

a) Vulnerability of the newborn to infection
b) Development of immunity
c) Management of infections

NUTRITION, FEEDING, GASTRO-INTESTINAL DISEASE:

a) Importance and principles of neonatal enteral & parenteral nutrition
b) Recognition and treatment of common complications related to nutrition
c) Recognition & management of problems associated with breast feeding
d) Recognize common congenital GI and hepatic anomalies and acquired diseases
e) Provide comprehensive nutritional support to well and sick newborn babies

PERINATAL MANAGEMENT:

a) Participation in perinatal-neonatal meetings
b) Recognizing a high-risk birth and plan management as a team with obstetrician
c) Stabilization of preterm & other normal and high-risk newborns in delivery room

CARDIORESPIRATORY INTENSIVE CARE:

a) Institute and maintain full cardiorespiratory intensive care for preterm and sick newborn babies
b) Circulatory support
c) Ventilatory modalities
d) Managing complications
e) Plan care for babies with chronic-respiratory disease
f) Awareness of potential long-term complications

CONGENITAL ANOMALIES AND GENETIC DISEASE:

a) Recognize common congenital anomalies
b) Investigating babies with congenital anomalies
c) Using literature and database searches to identify rare conditions
d) Communicate information to parents

FAMILY CARE AND CARE OF THE WELL NEWBORN BABIES:

a) Normal growth and development
b) Morphological variations of normal
c) Common minor problems e.g. feeding problems
d) Communication with other healthcare professionals and parents

COMMUNICATION SKILLS AND COUNSELING:

a) Communication with parents and staff
b) Discussing prognosis with parents
c) Breaking bad news
d) Handling perinatal death and autopsy report
e) Counseling and communication skills, appropriate approach to distressed and bereaved parents
f) Staff support and team dynamics

5.PERSONAL DEVELOPMENT

a) As a counselor (Conflict resolution skills)
b) As a manager (Workshop by professional administrators)
c) Leadership skills (Lecture by a leader)
d) As a teacher (Lecture by teacher)
e) Clinical governance

6.RECORDING OF PROGRESS IN LOG BOOK

a) Evidence of completion of key areas:
    i. Training in neonatal unit (NICU, HDU, SC, TC, OPD/Follow-up, emergency)
    11. High *risk* obstetrics
    111. Perioperative care in neonatal surgery
    iv. Preventive, social & community based neonatal care
    v. Elective rotation
    vi. Mandatory workshops
b) Documentation of neurological & developmental assessment using a standard neurological/developmental tool
c) Reflective notes at the end of each predefined key area
d) Evidence of attendance at academic meetings (2-3/year)
    (Symposia, seminars, conferences, courses)
e) Record of other CME/CPD activities (Lectures, teaching)
f) Research (One paper to be accepted for publication/published in PMC recognized journal)
g) Reports of clinical audits (At least two/year)
h) Evidence of attendance of mandatory courses

MODULE WISE COMPETENCY TABLE

KEY TO COMPETENCY LEVELS:

1. Observer
2. Assistant
3. Direct Supervision
4. Indirect Supervision
5. Independent (without supervisor around)

Module-1

	Level	Cases
a) Mandatory rotations		
i. High risk obstetrics (2 months)	3	50
ii. Neonatal surgery (2 months)	3	50
iii. Preventive, social & community based neonatal care (1 month)	4	50
iv. Elective (cranial & chest USG, echocardiography (2 month)	3	30
b) **Clinical research:** Completion of two research papers OR one research paper and two case reports		
c) Completion of **clinical audits**	3	2
d) Attendance in **mandatory workshops:** i. Neonatal resuscitation ii. Neonatal ventilation	1	1 workshop each
e) All 17 **key competencies** mentioned in sub-section-4	3	25 each
f) Documentation in **log-book**		

Module-2

	Level	Cases
a) **Clinical research:** Published/accepted for publication in PMC approved journal		
b) Completion and presentation of **clinical audits**	4	2
c) Completion of **personal development** (section-5)		
a) As a counselor (Conflict resolution skills)		
b) As a manager (Workshop by professional administrators)		
c) Leadership skills (Lecture by a leader)	4	1 each
d) As a teacher (Lecture by teacher)		
e) Clinical governance		
d) All 17 **key competencies** mentioned in sub-section-4	4	25 each
e) Documentation in log-book		

CONTINUOUS INTERNAL ASSESSMENT

Competency Based Portfolio
1) **Module-1**
a) Three monthly assessments
i) **Knowledge** & **clinical skills**
1. Mini-CEX (clinical evaluation exercise)
2·. DOPS (Direct observation of procedural skills)
ii) **Attitude** & **work ethics**
1. 360° work place-based evaluation
iii) **Research work**
1. Completion of landmarks for research work
iv) Presentations & **teaching activities**
1. Case in CPC or conferences
2. Mortality meetings
3. Journal clubs
4. Paper/case report in conference/symposium
5. Lectures to postgraduate trainees
b) Continuation of training in second year shall depend upon securing at least 60% marks in first four three monthly assessments.
2) **Module-2**
i) Three monthly assessments to continue
ii) Exit examination
1. Written
o 02 papers: Paper-I of 100 MCQs & Paper-II of 10 SAQs
2. 4 short cases
3. 12-15 TOACS
4. Internal evaluation of 2 years will be given a credit of 30%
Pass marks = 60% in each area of examination/assessment

EXIT EXAMINATION

MD Program Neonatal Examination

Module- I	Internal Assessment at the end of module Written examination (10 SEQ) & clinical examination (short cases)		
Module-II	Written examination	SEQ	10
		MCQ	100 (one best type)
	Each paper of 3 hours duration & Clinical examination (long case)		

Internal Evaluation of two modules shall be given a credit of 10%

Research: Two original research paper published in a PMC/HEC approved journals

Exam Format

- **TOACS:** (15-18 STATIONS)
- **Research Station:** Discussion on Articles & research publication
- **Clinical:**

Short Cases (4)	10 minutes each
Long Cases (1)	60 minutes