

NATIONAL MEDICAL COMMISSION
Postgraduate Medical Education Board

D 11011/1/22/AC/Guidelines/10

Date: 04-08-2022

**GUIDELINES FOR COMPETENCY
BASED
POSTGRADUATE TRAINING
PROGRAMME FOR DM IN
NEONATOLOGY**

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE SUPER-SPECIALTY TRAINING PROGRAMME FOR DM IN NEONATOLOGY

1. Preamble

The aim of the DM Programme is to impart advanced training in neonatology to produce competent super-specialists who can provide clinical care of the highest order to newborn infants and serve as future teachers, trainers, researchers, and leaders in the field of neonatology. After successfully completing the course, they would work as productive members of interdisciplinary teams consisting of obstetricians, neonatologists, pediatric surgeons, other specialists, nurses, and other healthcare functionaries providing care to the pregnant mother, fetus, and the newborn in any setting of the health care system. This document has been prepared by subject-content specialists of the National Medical Commission. The Expert Group of the National Medical Commission had attempted to render uniformity without compromise to the purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies.

2. SUBJECT SPECIFIC OBJECTIVES

The training program is designed to facilitate the ‘acquisition of learning’ by the postgraduate student in the following three domains of learning:

- Cognitive (knowledge),
- Affective (communication),
- Psychomotor (practice).

2.1 Predominant in Cognitive domain (Knowledge)

The student should:

- Understand the basic sciences (embryology, anatomy, physiology, biochemistry, pharmaco-therapeutics, etc.) related to the field of neonatology.
- Be conversant with the etiology, pathophysiology, diagnosis, and management of common neonatal problems.
- Should understand the importance of providing acute care with the goal of ‘intact survival.’

- Know the common problems in pregnancy, including antepartum and intrapartum assessment, and their impact on fetus and newborn.
- Know the chronic problems in neonates, including respiratory, neurological, metabolic problems, and understand the importance of neurodevelopmental follow-up until childhood.
- Be able to analyze neonatal health problems and develop preventive strategies to decrease neonatal morbidity and mortality at hospital and community level including National programs.
- Know neonatal end of life care and bereavement follow up.

Group/team approach:

At the end of the course, the postgraduate student should be able to:

- Recognize the role of multi-disciplinary and interdisciplinary approaches in managing various neonatal disorders and recognize the importance of family, society, and socio-cultural environment in treating the sick neonate.
- Function as a part of a team, co-operate with colleagues, and interact with the neonate's family to provide optimal medical care.

Evidence-based approach:

At the end of the course, the postgraduate student should be able to critically appraise medical literature in order to provide evidence-based care.

Research Methodology:

The postgraduate student should acquire:

- (a) basic knowledge of research methodology and biostatistics,
- (b) familiarity and participation in clinical and experimental research studies, and
- (c) knowledge in scientific presentation and publication.

Skills:

At the end of the course, the postgraduate student should acquire (a) skills necessary for neonatal patient care. He/She should be able to undertake preparation of oral presentation, medical documents, professional opinion in interaction with patients, caretakers, peers, and paramedical staff - both for clinical care and medical teaching. Effective communication with the patient/caretakers regarding the nature and extent of disease, treatment options, realistic outcomes, and optimal management is essential.

2.2 Predominant in Affective domain (Communication)

The PG student should:

- Acquire adequate communication skills to counsel and support the parents and families of the newborns. Regular clinical rounds and academic presentations during the teaching program should help the trainees to develop patient-centric and family-centric attitudes, knowledge, and communication skills.
- Establish effective communication with the patient's caregivers, including appropriate counseling for sickness, terminal illness, and bereavement care.
- Interact professionally and obtain relevant specialist/ancillary 'services' consultation where appropriate.
- Ensure effective communication and teamwork while teaching others, including undergraduates in a clinical care unit.
- Be able to communicate and work effectively with a multi-disciplinary team and understand the role of other team members, including nurses, physiotherapists, dietitians, psychologists, and others.
- Inculcate ethical principles in all aspects of neonatal, pediatric surgical care/research (professional honesty and integrity, humility, moderation, informed consent, counseling, awareness of 'patients' rights and privileges) and be a role model for other health care team members and respect patient confidentiality.
- Maintain proper etiquette in dealings with patients, caretakers, and other health personnel, including due attention to the 'patient's right to information, consent, and second opinion. Maintain professional integrity while dealing with patients, colleagues, seniors, pharmaceutical companies, and equipment manufacturers.
- Take rational decisions in the face of ethical dilemmas in neonatal - perinatal practice.
- Develop a communication style - both verbal and written, to ensure that the content is accurately understood by the audience.

2.3 Predominant in Psychomotor domain (Practice)

The PG student should:

- Evaluate a patient thoroughly (history, clinical examination), order relevant investigations, and interpret them to reach a diagnosis and plan of management.

- Plan and carry out simple investigations/procedures (bedside, laboratory, imaging) independently.
- Provide Basic and Advanced Life Support services in emergencies, e.g., NALS.
- Acquire familiarity with and provide critical care of surgical neonates, including airway support, ventilation, central vascular access.
- Prepare a patient for an elective/emergency surgery and provide specific post-operative care.
- Provide counseling to the patient and primary caretakers for the smooth dispensation of medical care.
- Acquire skills in neonatal procedures (including but not limited to invasive and non-invasive respiratory support, peripheral and central venous access, resuscitation, bladder catheterization, planning and preparation of parenteral nutrition, insertion of chest tubes, sepsis workup, suprapubic urine sampling for culture, lumbar puncture, use of medical equipment such as ventilators, including high-frequency ventilation, exchange transfusion, therapeutic hypothermia, etc.).
- Monitor the post-operative patient in the standard post-op ward / high dependency unit / and in the intensive care setting.
- Provide specific and relevant advice to the patient and family at discharge time for proper domiciliary care, hospital reporting in an emergency, and routine follow-up.

3. SUBJECT-SPECIFIC COMPETENCIES

3.1 Predominant in Cognitive (knowledge) domain

After completing the DM (Neonatology) course, the student be able to :

1. Know and analyze neonatal health problems scientifically, considering the biological basis and socio-behavioral epidemiology of the perinatal-neonatal disease, and be able to advise and implement strategies to prevent neonatal morbidity and mortality.
2. Acquire knowledge on providing evidence-based primary, secondary, and tertiary care of highest quality, 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.

3. Acquire knowledge on developmental assessment of sensory and motor function of infants and coordinate post discharge comprehensive follow up.
4. Acquire knowledge to be able to take rational decisions in the face of ethical dilemma in neonatal - perinatal practice.
5. Plan and carry out research in neonatal health in the clinical, community, and laboratory settings.
6. Teach newborn care to the medical and the nursing students and other paramedical / community health functionaries, and develop learning resource materials.
7. Plan, establish, and manage level II and level III neonatal units independently.
8. Contribute toward the development and adaptation of neonatal care technologies.
9. Organize newborn care in the community and at the secondary health system level and play the assigned role in the national programs aimed at the health of mothers and their infants.
10. Work as a focal point for a multi-disciplinary endeavor for clinical care, education, research, and community action with other stakeholders and partners.
11. Seek and analyze new literature and information on neonatology, update concepts, and practice evidence-based neonatology.
12. Lead development of quality improvement projects & develop standard care practices/ protocols for the unit.
13. Develop skills to train nurses in key components of essential & sick newborn care.

3.2 Predominant in Affective domain (communication and values)

During the course of three years, the postgraduate student is expected to attend instructive courses that facilitate proficiency relevant to this domain (eg., communication skills, biomedical ethics, patient counseling).

After completing the DM (Neonatology) course, the student should be able to do the following:

- Have empathy for patients and their family and should address them as worthy human beings.

- Discuss options, including the advantages and disadvantages of each investigation and treatment. She/he should be able to discuss medical issues with them in 'layperson's language'.
- Become **confident communicator** and well-accomplished professional.
- Acquire communication skills to be able to debate & deliver a scientific lecture and participate in panel discussions, hold group discussions and be able to deliver the knowledge received by him/her during the course.
- Be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
- Always adopt ethical principles and maintain proper etiquette in dealing with patients, relatives, and other health personnel and respect the patient's rights, including the right to information and second opinion.
- Acquire communication skills of a high order to write reports, interact with peers, and paramedical staff, and with students for effective teaching.
- Demonstrate humane and compassionate attributes befitting a caring neonatologist.
- Acquire communication skills to give a professional opinion and interact with patients and relatives in a caring manner.

3.3 Predominant in Psychomotor domain (skills)

A. At the end of the course, the student should acquire the following skills (table 1):

Table 1: Must know, desirable to know and observed skills

Must know skills <i>These are mandatory skills. The student should be able to perform the following procedures independently:</i>	Desirable skills <i>These are good to know skills. The student should be able to perform the following procedures independently or as a part of a team and/or interpret the results of:</i>	Observed skills <i>These are mandatory skills but need to be ONLY observed</i>
Common neonatal procedures to be performed: 1. Endotracheal intubation: 30 2. Surfactant administration: 30 3. Application of CPAP: 20 4. Intravenous cannulation: 30 5. Lactation support and management of feeding problems: 30 6. Peripheral arterial cannulation: 20 7. Arterial stab sampling: 10 8. Oro/nasogastric tube insertion: 30 9. Lumbar puncture: 30 10. Partial exchange transfusion: 5 11. Double volume exchange transfusion: 5 12. PICC line: 10 13. Umbilical venous line (excluding for Exchange Transfusion): 10 14. Umbilical arterial line: 10 15. Peripheral arterial line: 10 16. Suprapubic puncture: 5 17. Intercostal chest drains: 5 18. Orotracheal intubations of <750 g infants: 10 19. Total parenteral nutrition: 10 20. Cranial ultrasonography: 25 21. Functional Echocardiography: 25 22. Therapeutic hypothermia: 5 23. Independent & safe neonatal transport of sick neonates, intra and inter hospital: 15 24. Neurodevelopmental follow up and organizing developmental supportive care: 30 (Figures in parenthesis indicate no. of procedures) Laboratory investigations 25. Perform the following basic tests in the side lab: microscopy of body fluids and peripheral smear, point of care screening tests, hematocrit, bilirubin by spectrophotometry, and blood gas analysis.	1. Nasotracheal intubations 2. Bone marrow 3. Liver Biopsy 4. Peritoneal dialysis 5. Ventricular tap 6. Ultrasonography of kidneys, urinary bladder, and chest to detect gross abnormalities 7. Postural care and oromotor therapy 8. Amplitude integrated EEG 9. Developmental assessment using common tools e.g. DASII (Disability scale), BSID (Bayley Scales of Infant Development), etc. 10. Early intervention.	1. Assist the ophthalmologist, visualize the retina for retinopathy of prematurity and be able to provide post-ROP care in at least 20 eyes 2. Observe neonatal surgery 3. Observe neonatal cardiac surgery 4. Observe perinatal autopsy 5. Observe house-keeping protocols and asepsis routines of individual units.

Skills Training and Simulation (All medical colleges are mandated to have simulation labs by NMC)

- ✚ The postgraduate students are encouraged to utilize low and hi-fidelity mannequins; individual task trainers are to be made available in the department for skill practice.
- ✚ Sessions in workshop mode are specially organized for new trainees to teach neonatal resuscitation, cranial ultrasonography, functional echocardiography, PICC line insertion, CPAP (Continuous Positive Airway Pressure) & neonatal ventilation.
- ✚ Simulation sessions on team training and communication also must be organized.

B. Should be able to interpret the results of the following procedures and take necessary action:

- ✚ Biophysical profile, CTG and FHR patterns, antenatal doppler, interpretation of genetic tests, interpret metabolic screen/diagnosis.
- ✚ Ultrasonography to detect position of tubes and lines; interpret plain x-ray images related to all parts of the body and contrast studies of GIT, MCU; interpretation of cranial CT scan (both NCCT and CECT), MRI (T1 weighted, T2-weighted, DWI and flair); basic interpretation of nuclear scans (HIDA, DRCG, EC, bone scan); basic interpretation of FDG-L-dopa PET-CT scan for hyperinsulinemia; interpretation of electrophysiological tests (BERA, VEP, aEEG); use of wide-angle cameras to image retina for ROP.
- ✚ Risk prediction for probable fetal neonatal outcome, counseling, and decision making.
- ✚ Participate in morbidity and mortality review (death audits).

C. The student should be able to observe or perform under supervision the following procedures –desirable skills:

- Community-based death surveillance and audit
- Partnership with IT for newer and simpler LMIC specific technology innovation
- Systematic reviews

SYLLABUS

Course contents

I. Cognitive domain

A) Basic sciences as applied to neonatology

- Basic genetics
- Fetal and neonatal immunology
- Mechanism of diseases
- Applied anatomy and embryology
- Feto-placental physiology
- Neonatal adaptation
- Thermo-regulation
- Development and maturation of lungs, respiratory control, lung functions, ventilation, gas exchange, ventilation-perfusion.
- Physiology and development of the cardiovascular system, developmental defects, physiology and hemodynamics of congenital heart disease.
- Fetal and intrauterine growth.
- Development and maturation of nervous system, cerebral blood flow, blood-brain barrier, special senses.
- Fetal and neonatal endocrine physiology
- Developmental pharmacology
- Developmental hematology,
- Development of liver functions and bilirubin metabolism
- Renal physiology
- Physiology of gastrointestinal tract, sucking, swallowing, digestion, absorption.
- Fluid and Electrolyte balance
- Metabolic pathways including pathways of glucose, calcium, and magnesium
- Biochemical basis of inborn errors of metabolism

B) General topics

- Research methodology
- Biostatistics
- Ethics in perinatology/neonatology
- Principles of education (objectives, curriculum, assessment, and use of media)
- Computer, information technology, internet, telemedicine, neonatal networking
- Biotechnology, and basis of working of common equipment
- Counseling – antenatal, discharge counseling, breaking bad news, lactation counseling, grieve counseling.

C) Perinatology

- Perinatal and neonatal mortality, morbidity, epidemiology

- Perinatal pathology, autopsy, microbiology
- High-risk pregnancy: detection, monitoring, and management
- Fetal monitoring, clinical, electronic; invasive, and non-invasive
- Intrapartum monitoring and procedures
- Assessment of fetal risk and decision for termination of pregnancy
- Diagnosis and management of fetal diseases
- Medical diseases affecting pregnancy and fetus, psychological and ethical considerations
- Optimal timing of delivery in various medical and obstetric conditions
- Fetal interventions
- Fetal origin of adult disease.

D) Neonatal resuscitation

Successful completion of the neonatal resuscitation program (NRP).

E) Essential newborn care

- Breastfeeding, lactation support
- Kangaroo Mother Care
- Prevention of infections
- Counseling
- Danger signs
- Newborn screening

F) Neonatal ventilation

- Mechanical ventilation
- Continuous positive airway pressure, high flow nasal canula
- High-frequency ventilation
- Clinical uses of surfactant and administration
- Inhaled nitric oxide therapy

G) Blood gas and acid-base disorders

H) Neonatal assessment and follow up

- Assessment of gestation, neonatal behavior, neonatal reflexes
- Assessment of vision & hearing, detection of neuromotor delay, stimulation techniques
- Growth monitoring
- Immunization

- Early intervention and goal directed therapies.

I) Care of low birth weight babies

J) Specific body systems

i) 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.

ii) Cardiovascular system

- Fetal circulation, the transition from fetal to neonatal physiology
- Examination and interpretation of cardiovascular signs and symptoms
- Special tests and procedures (Echocardiography, angiography)
- Diagnosis and management of congenital heart diseases
- Rhythm disturbances
- Hypertension in neonates
- Shock: pathophysiology, monitoring, management.

iii) Gastrointestinal system

- Disorders of liver and biliary system.
- Bilirubin metabolism
- Neonatal jaundice: diagnosis, monitoring, management, phototherapy, exchange transfusion.
- Kernicterus
- Prolonged hyperbilirubinemia
- Congenital malformations
- Necrotising enterocolitis

iv) Nutrition

- Fetal nutrition
- Physiology of lactation
- Breastfeeding
- Lactation management, breast milk banking, maternal medications and nursing

- Feeding of Low Birth Weight neonate
- Parenteral nutrition
- Vitamins and micronutrients in newborn health

v) Renal system

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

vi) Endocrine and metabolism

- Glucose metabolism, hypoglycemia, hyperglycemia
- Calcium disorders
- Magnesium disorders
- Thyroid disorders
- Adrenal disorders
- Ambiguous genitalia
- Inborn errors of metabolism

vii) Hematology

- Physiology
- Anemia
- Polycythemia
- Bleeding and coagulation disorders
- Rh hemolytic disease

viii) Neurology

- Clinical neurological assessment
- Neonatal seizures
- Intracranial hemorrhage
- Neurophysiology, EEG, BERA etc.
- Brain imaging
- Neonatal encephalopathy :Hypoxemic ischemic , metabolic etc
- Neuro-muscular disorders
- Degenerative diseases
- CNS malformation

ix) Surgery and orthopedics

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

x) Neonatal infections

- Intrauterine infections
- Superficial infections
- Diarrhea
- Septicemia
- Meningitis
- Osteomyelitis and arthritis
- Pneumonia
- Perinatal HIV
- Miscellaneous infective disorders including HBV and Candidemia
- Outbreak and its management
- Establishing an infection control program, audits, establishing HIC committee

xi) Neonatal Imaging

- X-rays, ultrasound, MRI, CT Scan etc.

xii) Neonatal ophthalmology

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

xiii) Neonatal ENT disorders

xiv) Neonatal dermatology

K) Transport of neonates

Understanding of safe neonatal support/transport

L) Neonatal procedures

M) Organization of neonatal care

N) Follow up care of the high risk NICU graduate

- Establishing a high risk follow up program

- Identification of early signs of growth and development disorders (Neuromotor / Neurodevelopmental Assessment techniques)
 - Amiel Tison, Hammersmith, General movements, DDST, TDST, DASII, BSID
- Early intervention therapy
- Counseling

O) Community neonatology

- Vital statistics, health system;
- Causes of neonatal, perinatal death
- Neonatal care priorities and National programs
- Neonatal care at primary and secondary levels
- Role of low cost interventions
- Role of different health functionaries
- Traditional practices
- IMNCI training,
- Regionalization and neonatal health system organization

P) Other topics of contemporary importance: Neonatal metabolic screening, neonatal palliative care, stress in NICU & management, leadership skills and capacity building.

II. Psychomotor and affective domain

A: The Postgraduate student should be able to perform the following skills independently:

1. Core skills listed above (see page no: 7)

2. Developmental assessment and follow up

- Should be competent to perform structured neurological examination of infants and young children in follow-up as well as their developmental assessment using common standard screening tools used in the high-risk follow-up clinic.
- It is desirable for trainees to learn definitive developmental assessment tool. Should be able to organize and coordinate multi-disciplinary care of these infants during follow-up.

3. Infection control, antimicrobial resistance, and antibiotic stewardship

- Should be familiar with and **implement evidence-based infection control and biomedical waste management measures.**
- Should have an understanding of mechanisms of development of antimicrobial resistance.

- Should have an understanding, **practice and implement various components of antibiotic stewardship.**
- 4. Organization of neonatal care and regionalization of neonatal care**
- 5. Adoption procedures and laws**
- 6. Lactation management, kangaroo mother care, and enteral feeding support**
- 7. Education / Training**
 - a. Teaching skills
 - b. Learning skills
 - c. Participatory and small group learning skills
 - d. Preparing learning resource material
- 8. Effective and safe use of teleconsultations/telemedicine**
- 9. Research methods and activities**

Should have knowledge and understanding of and perform the following:

 - a. Identifying researchable issues and framing research questions
 - b. Choosing appropriate study design and conducting a study
 - c. Analyzing and interpreting data
 - d. Publication and writing a paper
 - e. Review and presentation of research findings
 - f. Critically appraising published literature of various study designs
 - g. Systematic reviews, meta-analysis, and GRADING of evidence

10. Research Activities

The postgraduate student should be able to perform the following under supervision:

- **Thesis:** The postgraduate students in superspecialty courses are not required mandatorily to submit thesis, but, they may be encouraged to conduct chosen research programs for which research protocol may be submitted within the first six months of the course. Progress on the conduct of the research project will give the student valuable training for the future. This may be reviewed every semester, and feedback given to the student by the guide. The PG student will make at least 3 formal presentations (i) Protocol, (ii) mid-course progress and (iii) final report. It is desirable that at least one research paper based on the above project is published or submitted for publication during the three year PG training period.

- **Quality Improvement Project:** A minimum of one quality improvement project must be carried out by the postgraduate student.
- **Data analysis:** Using the existing database of patient records, the postgraduate student will be expected to perform one complete data analysis based on a pre-defined approved research question.
- **Follow-up of high-risk infants :** A minimum of 15 high risk infants must be followed up for one year, and a record of all assessments and their interpretation maintained.
- **Publications**

The following minimum number of publications will be expected from a DM neonatology postgraduate student by the end of the course:

- Letters to the editor : 1
- Case reports/series: 1
- Original articles: 1
- Presentations: a minimum of 02 research presentations in conferences/workshops.

11. Data handling skills

The postgraduate student would be expected to have learned the basics of data entry into Excel, transferring data to a statistical software program, and performing basic analysis.

12. Bio-medical equipment

- The postgraduate student should become thoroughly familiar with parts, accessories, setting-up, maintenance, preventing infection, and basic troubleshooting of all the equipment used in neonatology.
- The should have participated in the entire purchase process from planning to the installation of at least one equipment costing above Rs. 100,000.
- The postgraduate student should know about equipment inventory and maintenance details of the equipment.

13. Communication skills

The postgraduate student should be able to demonstrate interpersonal and communication skills that result in effective information exchange and teaming with 'infants' families and professional colleagues. He/She should be able to effectively

communicate: with parents, families, and community, with colleagues and other healthcare providers and with health authorities.

14. The postgraduate student should be able to **conduct Perinatal Death audits and community-based death surveillance and response.**

15. Quality and safety in healthcare

- a. The candidate should be well versed with concepts and determinants of quality and safety.
- b. Should be able to work in inter-professional teams to optimize patient safety and quality.
- c. Should be able to communicate effectively for patient safety.
- d. Should be able to anticipate, recognize & manage situations leading to errors & poor quality.
- e. Should be well versed with the methods and tools of quality improvement.
- f. Should be able to identify medical errors and adverse events, should be able to respond effectively to mitigate harm, ensure disclosure and should be familiar with the methods of analysis and preventing recurrences.

16. Medical Ethics, Laws and Professionalism

The postgraduate student must demonstrate a commitment to carrying out professional responsibilities and adherence to ethical principles. They should be familiar with principles of ethics, evolution of laws over time at national and international levels and current ethical standards of treatment and research at national and international level. They should be familiar with various laws governing medical practice in the country. The postgraduate student will be expected to inculcate and demonstrate :

- Compassion, integrity, and respect for others
- Responsiveness to patient needs that supersedes self-interest
- Respect for patient privacy and autonomy
- Accountability to patients, society and the profession
- Sensitivity and responsiveness to a diverse patient population

17. Essential and desirable workshops during the duration of the course: The student should enroll in the listed workshop as and when they are organized in the unit or outside the unit depending on the clinical responsibility and availability of leave of absence. The idea is to facilitate learning and expand horizon in critical thinking.

Table 2: Essential and desirable courses and workshops

Essential:	1. Online certification in Research Methodology Course on SWYAM platform* 2. Neonatal Resuscitation Program (NRP) 3. Lactation Management 4. Neurodevelopmental supportive care 5. Neonatal Ventilation (Basic) 6. POCQI 7. Kangaroo mother care 8. Death certificate ICD 10 ** 9. Neonatal Ventilation (Advanced) 10. Functional Echocardiography 11. Cranial ultrasonography
Desirable	1. Neonatal EEG 2. Therapeutic Hypothermia 3. Developmental assessment (DASII/BSID/Griffiths etc)

**Must undertake online certification in Research Methodology Course on SWYAM platform*

***Must undertake online certificate course on death certificate filling by ICMR DHR*

TEACHING AND LEARNING METHODS

Postgraduate teaching program

General principles

Acquisition of practical competencies being the keystone of postgraduate medical education, PG training should be skills-oriented. Learning in PG program should be essentially self-directed and primarily emanating from clinical and academic work. The formal sessions are merely meant to supplement this core effort.

Teaching Methodology

The postgraduate student should be given the responsibility of managing and caring for patients gradually under supervision.

Formal teaching sessions and learning opportunities

A. Intramural activities

Teaching and learning during bedside rounds of various areas, case discussions in NICU, wards by self-reflection, and follow up clinics are mainstays. Several organized learning experiences

should be provided to the students to facilitate the refinement of knowledge and skills. Students are expected to actively participate in the teaching program of the department and allied specialties within the department and other departments of the institute. They get regular opportunities to prepare and make presentations in these teaching programs.

Following formal sessions are recommended in order to facilitate learning* :

- Journal club (once 15 days)
- Perinatal round (once 15 days)
- Seminar (once 15 days)
- Clinical case discussion (once 15 days)
- Perinatal audit/CPC (once a month)
- Research review (once a month)
- Neonatal surgery (once 3 month)

**In addition, depending on the strength of the institutions, sessions on imaging, pathology, microbiology, biostatistics/epidemiology, and interdepartmental seminars may be undertaken.*

B. Extramural opportunities

The postgraduate students are encouraged to attend continuing education symposia, workshops, and academic conferences, including meetings of national and international societies, workshops on neonatal resuscitation, CPAP, ventilation, point of care neonatal ultrasound, neonatal functional echocardiography, Developmental assessment, quality improvement, and simulation.

C. Learning by Teaching

The students will participate in teaching junior residents, nurses, nursing students, and trainees from other hospitals coming for observership. They will also be given the exposure of teaching and training during workshops and CMEs organized by the faculty within the institution and outreach activities.

- In addition, the student should attend accredited scientific meetings (CME, symposia, and conferences) once or twice a year.
- Additional sessions on Research methodology, use of computers in Medicine, Biostatistics, ethical and legal issues in the care of the newborn, teaching methodology, hospital waste management, health economics are suggested.
- The postgraduate students shall be required to participate in the teaching and training program of undergraduate and postgraduate students and interns (if available).

- A postgraduate student of a postgraduate degree course in super specialties would be required to present one poster presentation or read one paper at a national/state conference; should write a research paper from his/her work which should be published/accepted for publication/sent for publication during the period of his postgraduate studies

D. Log Book: During the training period, the postgraduate student should maintain a Log Book indicating the duration of the postings/work done in Wards, OPDs, and Casualty. This should indicate the procedures assisted and performed and the teaching sessions attended. The purpose of the Log Book is to:

- a) Help maintain a record of the work done during training,
- b) Enable Consultants to have direct information about the work; intervene if necessary,
- c) Use it to assess the experience gained periodically.

The Log Book should be used to aid the internal evaluation of the student. The Logbook shall be checked and assessed periodically by the faculty members imparting the training. Candidates will be required to produce the logbook original or copy at the time of practical examination. It should be signed by the Head of the Department. A proficiency certificate from the Head of Department regarding the clinical competence and skillful performance of procedures by the student will be necessary before he/she would be allowed to appear in the examination. The teaching faculty are referred to the MCI Logbook Guidelines uploaded on the Website.

E. POSTINGS

Overview

The total period of the DM course is 36 months. Of this, at least 27 months will be spent in the newborn service, 6 months will be meant for essential rotations in related specialties, and the rest 3 months will be apportioned for either elective rotations or the newborn service.

Newborn services

The candidates will have at least 27 to 30 months of posting in the newborn services at concerned institutions. The candidates must get adequate exposure to neonatal follow-up, neonatal emergencies, delivery room care of neonates, and acquisition of practical skills (specified under skills).

Essential Rotations/postings

These rotations may be in the parent institution or at other institution(s), public or private, approved by the Department / Institution. The duration of elective postings may vary based on PG student numbers and clinical load. The postgraduate student can undertake up to 1-2 'months' elective rotation at the parent or any other institution(s), public or private, approved by the Department/institution. The areas to be covered could be genetics, perinatal pathology, anesthesiology, CTVS, epidemiology/ biostatistics, basic sciences, informatics, and education technology etc. Table 1 depicts the overview of the postings.

Table 1: Overview of the duration of postings in different areas*

	Newborn unit & LDR	Essential Rotation 6	Discretionary 3 (Decided in consultation with HOD)
Duration of posting	27-30 months	6 months	3 months
Rotations/ Postings	--	• Obstetrics: 2 • Pediatric/ Neonatal Surgery /PICU / Cardiology: 1 • Community/ SCNU: (urban slums/ home visits/ PHC etc through community medicine): 2 • Elective 1	• Research • Exam leaves • Miscellaneous Leaves

***Every unit has to write learning objectives for their essential rotations**

The postgraduate students are expected to plan at least 6-9 months in advance for all optional electives and have concrete learning objectives. Depending on clinical exigencies and the number of trainees available, the duration of optional electives may be curtailed.

Community neonatology

As part of mandatory rotations, community neonatology posting shall form an important part of the curriculum to give exposure and experience of organization and delivery of neonatal care at various levels in the community. The trainees will be facilitated to work in district level special care newborn units (SCNUs), Newborn Stabilization Units (NBSUs) under National health Missions of neighboring states, and get exposure to neonatal care in urban slums rural areas in collaboration with the Department of Community Medicine.

F. Research & Quality Health Care

Covered earlier

G. Patient safety

During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently. For this purpose, provision of skills laboratories in medical colleges is mandatory.

4. ASSESSMENT

FORMATIVE ASSESSMENT, during the training program: Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self-directed learning, and ability to practice in the system.

Periodic Evaluation:

Candidates will be evaluated continuously for their performance in all areas such as clinical and investigative work, case presentations, seminars, journal clubs, procedures undertaken/participated in etc. Additional periodic assessment will include theory and practical assessment mimicking the final examination and should be conducted every 6 months. Such an evaluation will help assessing the progress of the trainees and the quality of the training programme. Evaluation will be communicated to trainees and their feedback would be taken into consideration for modifications in the training programme.

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills.

Quarterly assessment during the DM training should be based on:

- 1. Journal based / recent advances learning**
- 2. Patient based /Laboratory or Skill based learning**
- 3. Self-directed learning and teaching**
- 4. Departmental and interdepartmental learning activity**
- 5. External and Outreach Activities / CMEs/Workshops/Conferences**
- 6. Participation/conduct of research project - desirable**

The student to be assessed periodically as per categories listed in Postgraduate Student Appraisal form (Annexure I).

In **Medical disciplines**, the student should be assessed in all aspects of case management including history taking, physical examination, differential diagnosis, cost effective and appropriate investigations, treatment plan, monitoring and evaluation, patient and family counselling and interaction with all the health workers involved in the care of patients and academic presentations.

Clinical skills and performance, academic performance and personal attributes shall be graded on a scale of 1 to 5 (5 being the highest). The academic presentations shall be graded at the time of presentation, by the faculty in-charge. Evaluation on clinical skills shall be done by the unit/department in-charge at the end of every semester.

The student to be assessed periodically as per categories listed in post graduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT

The summative examination would be carried out as per the Rules given in the relevant POSTGRADUATE MEDICAL EDUCATION REGULATIONS.

Essential pre-requisites for appearing for examination include:

1. **Log book** of work done during the training period including rotation postings, departmental presentations, and internal assessment reports should be submitted.
2. At least **two presentations** at national level conference. At least one research paper should be published/ accepted in an indexed journal. **(It is suggested that the local or University Review committee assess the work sent for publication).**
3. **Submission of thesis/ research work (desirable: As per PG Regulations)**

1. Theory

There will be four theory papers, as below:

- Paper I: Basic sciences relevant to the discipline of Neonatology, Perinatology
- Paper II: Core Neonatology
- Paper III: Neonatology and allied specialties
- Paper IV: Recent Advances in Neonatology & community neonatology

2. **Theory and Practical/Oral Examinations:** Theory and Practical/Oral examinations will be conducted as per University guidelines. The theory examination shall be held in advance

before the clinical and practical examination, so that the answer books can be assessed and evaluated before the commencement of the clinical/practical/oral examination.

The practical examination should consist of the following and should be spread over two days, if the number of candidates appearing is more than five. Oral examination shall be comprehensive enough to test the student's overall knowledge of the subject.

1. There should be one long or semi-long case which must be on acute care of a sick neonate. The long case should include: History taking, physical examination, interpretation of clinical findings, differential diagnosis, investigations, prognosis and management.
2. Three short cases from various sections of the specialty.
3. The log book of procedures and interventions shall also be assessed in the practical examination.

Proposed plan for clinical examination (Clinical cases should assess affective domain also) should include:

- ⊖ Intensive care (a neonate receiving intensive care)
 - ⊖ Level II care or ward rounds
 - ⊖ Follow up high-risk newborn
 - Ten Objective Structured Clinical Examination (OSCE) including affective OSCE. One session can be inside ICU with focus on ICU care.
3. **Viva-voce Examination: The viva voce examination should** focus on psychomotor and affective domain, for a minimum period of 20 minutes per candidate. It should include:
- General viva on drugs, equipment, including radio-imaging, investigations i.e. ultrasound/CT/MRI, records, interpretation of 'ABGs', neurophysiologic records such as BERA, EEG; national programs, policy.

Recommended Reading:

1. Fanaroff and Martin's Neonatal-Perinatal Medicine, 2-Volume Set, ISBN: 9780323567114. Richard J. Martin; Avroy A. Fanaroff; Michele C. Walsh.
2. Assisted Ventilation of the Neonate ISBN: 9780323390064. Jay P. Goldsmith; Edward Karotkin; Gautham Suresh; Martin Keszler.
3. Avery's Diseases of the Newborn ISBN: 9780323401395. Christine A. Gleason; Sandra E. Juul.

4. Beyond the NICU: Comprehensive Care of the High-Risk Infant, ISBN: 9780071748582. William Malcolm.
5. Breastfeeding ISBN: 9780323680134. Ruth A. Lawrence; Robert M. Lawrence.
6. Care of the Jaundiced Neonate ISBN: 9780071762892. David Stevenson; M. Jeffrey Maisels; Jon F. Watchko.
7. Cloherty and Stark's Manual of Neonatal Care ISBN: 9781496343611. Eric C. Eichenwald; Anne R. Hansen; Camilia R. Martin; Ann R. Stark (Editors).
8. Neonatology Principles and practice. Dipak Guha.
9. Fetal and Neonatal Physiology, 2-Volume Set. ISBN: 9780323825559. Richard A. Polin; Steven H. Abman; David Rowitch; William E. Benitz.
10. Fetal and Neonatal Secrets ISBN: 9780323172868. Richard A. Polin.
11. Klaus and Fanaroff's Care of the High-Risk Neonate ISBN: 9780323608541. Avroy A. Fanaroff; Jonathan M. Fanaroff.
12. Manual of Neonatal Respiratory Care ISBN: 9781461421559. Steven M. Donn; Sunil K. Sinha (Editors).
13. Neonatal Cardiology ISBN: 9780071834506. Michael Artman; Lynn Mahony; David F. Teitel.
14. Gomella's Neonatology, latest edition. ISBN: 9781259644818. Tricia Lacy Gomella; Fabien Eyal; Fayezy Bany-Mohammed.
15. Remington and Klein's Infectious Diseases of the Fetus and Newborn Infant, ISBN: 9780323241472. Christopher B. Wilson; Victor Nizet; Yvonne Maldonado; Jack S. Remington; Jerome O. Klein.
16. Rennie and Robertson's Textbook of Neonatology ISBN: 9780702034794. Janet M. Rennie.
17. Smith's Recognizable Patterns of Human Malformation ISBN: 9780323186681. Kenneth Lyons Jones.
18. Volpe's Neurology of the Newborn ISBN: 9780323428767. Joseph J. Volpe (Editor-in-Chief); Terrie E. Inder; Basil T. Darras; Linda S. de Vries.
19. The Harriet Lane Handbook ISBN: 9780323674089. Johns Hopkins Hospital; Helen Hughes; Lauren Kahl (Editors).
20. Red Book 2018 ISBN: 1581109261. David W. Kimberlin; Michael T. Brady; Mary Anne Jackson; Sarah S. Long.
21. Nelson Textbook of Pediatrics ISBN: 9780323529501. Robert M. Kliegman; Joseph St. Geme.

22. Park's Pediatric Cardiology for Practitioners ISBN: 9780323681070. Myung K. Park; Mehrdad Salamat.
23. Atlas of procedures in neonatology. Philadelphia: Wolters Kluwer/Lippincott Williams & Wilkins; 5th ed. Mhairi G MacDonald. Jayashree Ramasethu.

Website:

1. www.cochrane.mcmaster.ca/neonatal
2. www.nichd.nih.gov/cochrane
3. www.neonatology.org
4. www.emedicine.com/ped/neonatology.htm
5. www.pocqi.org
6. www.preterm-eliminatingrop.com
7. www.ihl.org

Journals

3-5 international and two national journals (all indexed).

Student appraisal form for DM in Neonatology											
	Element	Less than Satisfactory			Satisfactory			More than satisfactory			Comments
		1	2	3	4	5	6	7	8	9	
1	Scholastic Aptitude and Learning										
1.1	Knowledge appropriate for level of training										
1.2	Participation and contribution to learning activity e.g., Journal Club, Seminars, CME etc)										
1.3	Conduct of research and other scholarly activity assigned (e.g Posters, publications etc)										
1.4	Documentation of acquisition of competence (eg Log book)										
1.5	Performance in work based assessments										
1.6	Self Directed Learning										
2	Care of the patient										
2.1	Ability to provide patient care appropriate to level of training										
2.2	Ability to work with other members of the health care team										
2.3	Ability to communicate appropriately and empathetically with patients families and care givers										
2.4	Ability to do procedures appropriate for the level of training and assigned role										
2.5	Ability to record and document work accurately and appropriate for level of training										
2.6	Participation and contribution to health care quality improvement										

3	Professional attributes										
3.1	Responsibility and accountability										
3.2	Contribution to growth of learning of the team										
3.3	Conduct that is ethical appropriate and respectful at all times										
4	Scholarship										
4.1	Teaching and mentoring skills appropriate to level of training										
4.2	Ability to formulate research questions, initiate conduct and complete research projects										
4.3	Ability to review and use the published literature appropriately in care of the patient lab or workspace										
4.4	Ability to provide consultations to other specialties as may be required										
5	Space for additional comments										
6	Disposition										
	Has this assessment been discussed with the trainee?	Yes	No								
	If not explain										
	Name and Signature of the assessee										
	Name and Signature of the assessor										
	Date										

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