Guidelines

For

Competency Based Training Programme

in

DrNB- Paediatric Critical Care

2022

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

TABLE OF CONTENT

I. INTRODUCTION

Preamble

Training program for DNB in pediatric Critical Care Medicine aims to produce students who after undergoing complete training are competent to manage a critically sick child. The postgraduate students must gain sufficient knowledge and experience in the diagnosis, treatment and counseling of pediatric patients with acute, serious, and life-threatening medical and surgical conditions. The student should also acquire skills in supervision of paramedical staff and be able to work as a team member of the health care providers. The trainee should be aware of his/her limitations and should be able to decide the point of referral after stabilization and appropriate pre-referral treatment. New Competency based training curriculum shall primarily focus on training Pediatricians with MD/equivalent qualification. The program is designed for wholesome development of the trainee which includes developing his/her administrative skills, scientific knowledge, clinical and research skills. The trainee is also expected to acquire optimum teaching and communication abilities. The core components of clinical services of the specialty of Pediatric Critical Care Medicine revolves around providing life-support therapies under one roof to critically sick pediatric patients (medical, surgical and trauma etc.) who are admitted in the pediatric emergency and Pediatric Intensive Care Unit (PICU). They should also have the expertise to coordinate care of any critically sick pediatric patient admitted in any other ward, before being transferred to PICU.

Need Based Assessment of Course

DNB in Pediatric Critical Care Medicine is a newly instituted postgraduate training program in India and requires strategic planning for successful inception and growth. The course is known in the specialty of pediatric critical care medicine (PCCM), due to the convergence of knowledge and skills with the involvement of various primary specialties, there has been flexibility in the models of training, access, duration of training, regulation and certification systems across the globe. Sepsis and community acquired infections are an increasingly important problem affecting children. Pediatric Critical Care will be required to intensively monitor patients with sepsis, community acquired infections and other diseases to manage serious infections arising with multi-organ dysfunction.

At the end of training in PCCM, the post graduate student should have acquired the following knowledge and skills:

1. General and specialized care of critically sick child
2. Long-term collaborative management plans for larger number of sick pediatric patients
3. Leadership and collaborator for PICU (Pediatric Intensive Care) team
4. Teaching and supportive supervision of junior colleagues including nursing and para-medical staff
5. Integration of information and knowledge with clinical skills
6. Ability to function effectively and efficiently under different clinical scenarios
7. Ability to plan professional development as a contribution to the holistic growth of specialty including patient care, teaching/training and research.

II. OBJECTIVES OF THE PROGRAMME

The trainee must gain experience in the diagnosis and treatment of pediatric patients with acute, serious, and life-threatening medical and surgical diseases. The curriculum of three- year training in Pediatric Critical Care Medicine deals with the cognitive, psychomotor and affective domains covering following learning objectives:

The specific objectives of the course are as follows:

1. Perform resuscitation and management of the acutely ill pediatric patients
2. Plan and organize therapeutic interventions/organ system support in single or multiple organ failure in conditions associated with trauma, burns, infections, metabolic derangements etc.
3. Plan end of life care and withdrawal of life support
4. Organize peri-operative care of surgical / trauma patients
5. Plan and execute infection control procedures, system management and standard operative procedures in the Pediatric Intensive (critical) Care Units
6. Operate the various monitoring gadgets and to detect and manage effectively alterations in their functioning
7. Communicate effectively and empathetically to patients and attendants, about the critical nature of illnesses, end of life care and breaking bad news in contingencies
8. Be a Team Leader and also a member of the team involved in critical care
9. Analyze the quality and implications of ever expanding medical literature and guidelines and apply new knowledge in the delivery of health care
10. Identify and participate in research activities including newer statistical tools and data management
11. Express enthusiasm and positive attitude in the educational process and participate fully in educational and research activities.

II. TEACHING AND LEARNING METHODS

1. CLINICAL & TECHNICAL SKILLS

By the end of the training, trainees are expected to:

a. Be skilled in physical examination and medical history taking as related to critical care medicine.
b. Understand the tools and instruments used for monitoring patients in the PICU and to be able to access and interpret the necessary data.
c. Be able to stabilize a critically ill patient during their initial presentation
d. Establish a differential diagnosis, assessment and plan
e. Prioritize interventions appropriately
f. Act in a timely fashion as directed by the clinical situation.
g. Order and interpret diagnostic studies appropriately
h. Communicate effectively with Consultants and colleagues
i. Begin to develop an understanding of therapeutic options
j. Be able to apply basic critical care physiology and pathophysiology to their patient's care.
k. Maintain appropriate documentation of patient care
l. Effectively supervise junior residents and contribute to their medical education
m. Apply current literature to patient care

2. CORE PROCEDURAL SKILLS FOR RESIDENTS

In addition to practical training in the following procedural skills, the resident must have an understanding of the indications, contraindications, complications, and pitfalls of these interventions.

a. Airway Management

- Maintenance of an airway
- Ventilation by bag- mask
- Tracheal intubation
- Management of Air leaks

b. Circulation

- Arterial puncture and cannulation
- Insertion of central venous catheters
- Pericardiocentesis in acute tamponade
- Dynamic electrocardiogram interpretation
- Cardioversion and defibrillation
- Electrocardiographic monitoring

c. Additional Procedures

- Thoracentesis
- Paracentesis
- Bronchoscopy
- Peritoneal dialysis

- Hemodialysis
- Bedside Ultrasound for critical care
- Total Parenteral Nutrition

3. RESEARCH

By the end of the first quarter of training, trainee is expected to submit plans for a research project. They should have some broad ideas of potential areas of interest. Over the subsequent 24 months, trainees, with the assistance of the faculty should collect data, analyze and submit the completed project which will be mandatory for their exit exam. The trainee is expected to know the following:

a. Framing a hypothesis/research question
b. Literature search
c. Basics of research methodology
d. Protocol writing
e. Data collection
f. Data handling/interpretation
g. Thesis writing

4. PROFESSIONAL DEVELOPMENT

Training in professional development is an ongoing process. Much of this training will come from interaction with colleagues while working in the PICU. In their behavior, trainees should:

a. Show respect for patients, families and other health care professionals.
b. Develop a dedication to their patient's well-being.
c. Establish effective communication skills with other members of the health care team as well as patients and their families.
d. Respect a patient's privacy and confidentiality.
e. Demonstrate professional responsibility, time management skills and effective work habits.
f. Demonstrate high moral and ethical standards.
g. Develop the attitudes and skills necessary for lifelong learning.
h. Understand how one's own beliefs and biases may affect patient care decisions.
i. The subspecialty trainee should begin to identify personal strengths and weaknesses as related to a career in pediatric critical care medicine.
j. Trainees should be involved in administration by assisting the faculty in day to day administration as and when required.

5. POSTINGS / ROTATIONS

The trainees will be posted as per the following rotations during which they will be undergoing clinical training in all core areas as detailed above

• PICU	18 months
• Pediatric Accident & emergency	11 months
• Neonatal ICU (NICU 1 & 2)	1 month
• Pediatric surgery	1 month

• Trauma/ Neurosurgical ICU	15 days
• Bronchoscopy training	15 days
• Endoscopy	15 days
• Neurophysiology lab	15 days
• Hemodialysis Unit	15 days
• Anesthesia	15 days
• Radiology	15 days
• Elective	1.5 months
TOTAL	**36 months**

6. **TEACHING AND LEARNING METHODOLOGY** given below includes but not limited to Lecture, discussion, student directed learning and Case Based Learning.
   a. Clinical Case Discussion
   b. Morbidity-Mortality Discussion
   c. Audit presentation
   d. Lectures, Seminars and Journal Clubs
   e. Presentation of progress report on the research projects
   f. Simulation Laboratory
   g. Joint inter-departmental academic meets with radiology, microbiology etc.
   h. Departmental Clinical Meetings, Grand Rounds and Clinico-Pathological Meetings
   i. Multi-departmental Combined Grand Rounds / Joint Academic Activities of the Institution

- **Formal Teaching:**
  - **Journal Club:** 1 hour duration - Paper presentation/discussion - once per week.
  - **Seminar:** One seminar every week of one hour duration.
  - **Lecture/discussion:** Lectures on newer topics in place of seminar as per need.
  - **Case presentation** in the ward. Post graduate students will present a clinical case for discussion before a faculty and discussion made pertaining to its management and decision to be recorded in case files
  - **Case conference:** Post graduate students are expected to work up one long case or two short cases and present the same to a faculty member and discuss the management.
  - **Combined Round/Grand Round:** Once a week clinical combined or twice a month involving presentation of unusual or difficult cases. Presentation cases in /grand of rounds and clinical series/research data for the benefit of all clinicians and other related disciplines once in week or fortnightly.
  - **Emergency situation:** Casualty duty to be arranged by rotation among the students with a faculty cover daily by rotation.
  - Bedside clinical training for patient care management. Daily for half to one hour during ward round with faculty and 1-2 hours in the evening by post graduate students /faculty on emergency duty, bed side patient care discussions are to be made.
  - Clinical teaching: In OPD, ward rounds, emergency, ICU and the operation

theatres.

- Trainee shall be required to participate in the teaching and training programme of Undergraduate students and interns.
- Should have attended two conferences/CMEs/Workshops during tenure.
- The trainee would be required to present one poster/oral presentation, at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.
- **Log Book**
  Trainee students shall maintain a log book of the work carried out by him/her and the training programme undergone during the period of training including details of various procedures. Log book shall be checked and assessed periodically by the faculty members imparting the training.
- **Clinical and Practical Training/posting:**
  Teaching and training of students shall include graded all round patient care responsibilities including resuscitation, clinical diagnosis, invasive diagnostic and therapeutic procedures and advanced decision making in the management of critically sick medical and surgical patients.

  During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially and later to be performed under supervision followed by performing independently. Provision of skills laboratories for cardiopulmonary resuscitation in the medical colleges is mandatory.

7. ACADEMIC SCHEDULE

The teaching programme will be tailored to improve the knowledge, skills and attitude of the trainees. Learning should be essentially self-directed and primarily from clinical work. Encourage e – learning methods. The formal teaching program is meant only to act as supplement / direction. The typical teaching schedule will be as follows:

a. On all days

- 9:00 am to 10:00 am – Consultant sitting rounds, where night resident will present the patient's clinical details and any new development in the clinical status over the last 24 hours.
- 11.00 am to 1:30 pm – detailed bed side clinical rounds. Counseling and interaction with parents/ caregivers.

b. Mondays & Thursdays

- Seminar / topic presentation – Trainees will be reviewing a topic in critical care with adequate audio visual aids.

c. Wednesday

- Case based discussion OR Journal Club – Trainees will be reviewing a topic in critical care with adequate audio visual aids.

d. Friday

- Grand rounds - Teaching rounds by consultant with special emphasis on

critical care issues and proper documentation of patient data.

- Interdisciplinary meetings –e.g. radiological, neurosurgical combined meets etc.

e. Saturday

- Medical care review /mortality meeting- All the children who expired in the previous week will be presented with special emphasis on the probable cause of death and the pathophysiological disturbances.

8. EVALUATION

The candidate will be comprehensively evaluated for his competency in delivering patient care, development of skills and attitude by his performance in PICU rounds, emergency posting, seminars, presentations and other daily academic activities. This will form part of the internal assessment as documented in his log book throughout his posting.

Conditions for Certification

a. Research project and Log book

Each trainee has to compulsory take a research project as part of his Dissertation. They will have to submit a completed project work/report (Dissertation) which will be a mandatory requirement for the exit exams.

The candidates have to maintain a log book of all their activities including case records of interesting patients, academic activities, procedures performed etc.

IV. SYLLABUS

Course Content:

1. **Training Courses**
   Each student would have to undergo the following courses:
   - Pediatric Basic life support (BLS)
   - Advanced Trauma Life Support (ATLS)
   - Pediatric Advanced Life Support (ALS)

The suggested areas and topics which should form the core subject content are:

a. **Cardiovascular Physiology, Pathology, Pathophysiology, and Therapy**
   - Shock (hypovolemic, neurogenic, septic, cardiogenic) and its complications
   - Cardiac rhythm and conduction Disturbances
   - Pulmonary edema—cardiogenic, non-cardiogenic
   - Cardiac Tamponade and other acute pericardial diseases
   - Acute and chronic life-threatening valvular disorders
   - Acute complications of cardiomyopathies and myocarditis
   - Vasoactive and inotropic therapy
   - Pulmonary hypertension and cor-pulmonale
   - Principles of oxygen transport and utilization
   - Perioperative management of patient undergoing cardiovascular surgery
   - Recognition, evaluation, and management of hypertensive emergencies and urgencies
   - Congenital heart disease and the physiologic alterations with surgical repair
   - Noninvasive methods of cardiac output assessment (i.e., aortic Doppler, etc.)

b. **Respiratory Physiology, Pathology, Pathophysiology, and Therapy**
   - Acute respiratory failure
     - Hypoxemic respiratory failure including acute respiratory distress syndrome
     - Hypercapnic respiratory failure
     - Acute on chronic respiratory failure
   - Status asthmaticus
   - Aspiration pneumonia
   - Chest trauma (e.g., flail chest, pulmonary contusion, rib fractures)
   - Broncho-pulmonary infections including bronchiolitis/pneumonia etc
   - Upper airway obstruction
   - Near drowning
   - Pulmonary mechanics and gas exchange
   - Oxygen therapy
   - Mechanical ventilation
     - Pressure and volume modes of mechanical ventilators
     - Positive end-expiratory pressure, intermittent mandatory ventilation,

continuous positive airway pressure, high frequency ventilation, inverse ratio ventilation, pressure support ventilation, volume support (airway pressure release

- Ventilation, pressure regulated volume control ventilation), negative pressure ventilation, differential lung ventilation, pressure control and noninvasive ventilation, spilt lung ventilation, one lung ventilation
- Indications for and hazards of mechanical ventilation (VILI)
- Criteria for extubation and weaning techniques
- Permissive hypercapnia
- High- frequency oscillatory ventilation

- Airway Maintenance
  - Airway Emergency airway management
  - Endotracheal intubation/rapid sequence intubation
  - Tracheostomy, open and percutaneous
  - Long-term intubation vs. tracheostomy
- Ventilatory muscle physiology, pathophysiology, and therapy, including polyneuropathy of the critically ill and prolonged effect of neuromuscular blockers
- Pleural diseases: empyema, various effusions, and pneumothorax
- Pulmonary chylothorax, hemorrhage, and hemoptysis
- Noninvasive ventilation
- Chest Physiotherapy /Postural drainage

c. Renal Physiology, Pathology, Pathophysiology, and Therapy

- Renal regulation of fluid balance and electrolytes
- Renal failure: Prerenal, renal, and postrenal
- Hyperosmolar states
- Electrolyte disturbances
- Acid-base disorders and their management
- Principles of renal replacement therapy and associated methodologies (peritoneal dialysis, hemodialysis, peritoneal dialysis, CRRT, SLED) etc
- Ultrafiltration, continuous arteriovenous hemofiltration, and continuous veno- venous hemofiltration) Drug modification in renal failure, calculating eGFR
- Rhabdomyolysis
- Systemic diseases that involve the kidney (hemolytic uremic syndrome)

d. Central Nervous System Physiology, Pathology, Pathophysiology, and Therapy

- Approach to a child presenting with Coma
- Hydrocephalus and shunt function and dysfunction
- Perioperative management of patient undergoing neurologic surgery
- Brain death evaluation and certification
- Diagnosis and management of persistent vegetative states
- Management of increased intracranial pressure, including intracranial pressure monitors Status epilepticus
- Neuromuscular disease causing respiratory failure e.g.

- Guillain-Barré syndrome
- Myasthenia gravis
- Myopathies (Duchenne's, etc.)
- Neuropathy of critical illness

- Traumatic and non-traumatic intracranial bleed
  - Traumatic brain injury – mild, moderate and severe
- Sedation & analgesia: principles and titration
- Neuromuscular blockade: Use, monitoring, and complications
- Invasive ICP monitoring procedure & Ventricular tap / Extra ventricular drain placement

e. Metabolic and Endocrine Effects of Critical Illness

- Nutritional support
  - Enteral and parenteral
  - Evaluation of nutritional needs including indirect calorimetry
  - Immunonutrition and specialty formulas
- Endocrine
  - Adrenal crisis and insufficiency (primary and secondary)
  - Disorders of antidiuretic hormone metabolism
  - Diabetes mellitus
  - Ketotic and nonketotic hyperosmolar coma
  - Hypoglycemia
  - Pheochromocytoma
  - Insulinoma
  - Disorders of calcium, magnesium, and phosphate balance
  - Inborn errors of metabolism
- Electrolyte disorders including Na, K, Mg, Ca, PO4 etc.

f. Infectious Disease Physiology, Pathology, Pathophysiology, and Therapy

- Antibiotics: Pharmacodynamics and pharmacokinetics
  - Various antibacterial agents and newer emerging classes of antibiotics
  - Antifungal agents
  - Ant tuberculosis agents
  - Antiviral agents
  - Agents for parasitic infections
- Infection control for special care units
  - AMR
  - Universal precautions
  - Isolation and reverse isolation
- Sepsis definitions (sepsis, severe sepsis, septic shock)
- Systemic inflammatory response syndrome
- Tropical Infections, Emerging viral diseases (COVID-19 and its complications)
- Health care associated and opportunistic infections in the critically ill
- Adverse reactions to antimicrobial agents
- ICU support of the immune-suppressed patient
  - Acquired immunodeficiency syndrome

- Transplant
- Pediatric malignancies

- Occupational hazards to healthcare workers
- Evaluation of fever in the ICU patient

g. Physiology, Pathology, Pathophysiology, and Therapy of Acute Hematologic and Oncologic Disorders

- Acute defects in hemostasis: Thrombocytopenia/ DIC
- Anticoagulation; fibrinolytic therapy
- Principles of blood component therapy
  - Packed red blood cell transfusions
  - Fresh frozen plasma transfusions
  - Platelet transfusions
  - Specific coagulation factor concentrates
  - Albumin
  - Pharmacologic agents that modify the need for transfusion (i.e., aminocaproic acid, aprotinin)
  - Erythropoietin
- Acute hemolytic disorders including thrombotic microangiopathies
- Acute syndromes associated with neoplastic disease and antineoplastic therapy
- Sickle cell crisis and acute chest syndrome
- Plasmapheresis
- ICU-acquired anemia
- Oncologic emergencies

h. Physiology, Pathology, Pathophysiology, and Therapy of Acute Gastrointestinal, Genitourinary Disorders

- Upper gastrointestinal bleeding, including variceal bleeding
- Lower gastrointestinal bleeding
- Acute and fulminant hepatic failure
- Acute perforations of the gastrointestinal tract
- Perioperative management of surgical patients
- Stress ulcer prophylaxis
- Obstructive uropathy and its complications

i. Environmental Hazards

- Poisoning : Organophosphate poisoning, Hydrocarbon, etc.
- Envenomation : Snake envenomation, Scorpion sting etc.
- Drug overdose and withdrawal: Paracetamol, iron, TCA etc.
- Temperature-Related Injuries : Hyperthermia, heat shock, Hypothermia, frostbite
- Altitude sickness
- Decompression sickness
- Biological and chemical terrorism
- Radiation exposure

j. **Immunology and Transplantation**

- Principles of transplantation (organ donation, procurement, preservation, transportation, allocation, implantation, maintenance of organ donors, national organization of transplantation activities)
- Immunosuppression
- Organ transplantation: Indications preoperative and postoperative care
- Transplant-related infectious disease

k. **Monitoring, Bioengineering, Biostatistics**

- Prognostic indexes, severity, and therapeutic intervention scores
- Principles of electrocardiographic monitoring, and transcutaneous measurements
- Invasive hemodynamic monitoring
  - Principles of strain gauge transducers
  - Principles of arterial, and central venous catheterization and monitoring
  - Echo based evaluation of cardiac function and derived hemodynamic variables
- Noninvasive hemodynamic monitoring
- Thermoregulation
- Central nervous system brain monitoring (intracranial pressure, NIRS, cerebral metabolic rate, electroencephalogram, transcranial Doppler)
- Respiratory monitoring (airway pressure, intrathoracic pressure, tidal volume, pulse oximetry, deadspace/tidal volume ratio, compliance, resistance, capnography, pneumotachography)
- Metabolic monitoring (oxygen consumption, carbon dioxide production, respiratory quotient, indirect calorimetry)
- Use of **Biostatistics** and various tests of significance (SPSS or other softwares)

l. **Ethics**

- Consent
- Study enrollment
- End-of- life decision making and care
- Organ procurement
- Outcome and futility
- Quality of end of life

m. **Administration**

- Team building, Patient safety
- Organization of patient care
- Physician, nurse, and ancillary staff staffing models
- Documentation and compliance
- Mass casualty or disaster

n. **Genetic**

- Congenital disease (polysomy, monosomy,trisomy, etc.)

- Storage diseases
- Polymorphisms
- Fundamentals of Genetic testing
- Genetic counseling

o. **Pharmacology**
- Pharmacokinetics
- Pharmacodynamics
- Safe medication practice
- Drug dosing adjustments in hepatic disease
- Drug dosing adjustments in renal disease

V. COMPETENCIES

By the end of the course, the student should have acquired knowledge (cognitive domain), professionalism (affective domain) and skills (psychomotor domain) as per details given below:

1. Cognitive Domain

a. Each student would have to develop a clear understanding of the physiology, path physiology and therapy of disorders related to critical care. This has to be accomplished by reading textbook of pediatric critical care and various related articles available on scientific/medical journal sites on web.

b. Each student during this period is expected to learn about utilizing the medical literature. This includes the ability to use electronic resources such as PubMed, etc. to search for relevant topics, as well as the ability to critically appraise the merits and deficiencies of an article.

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

a. Use the aspects of applied anatomy, physiology, biochemistry and pharmacology for daily practice in managing a sick child
b. Plan and implement resuscitation and initial management of the acutely ill patients
c. Perform diagnosis, assessment, investigation, monitoring and data interpretation of the actively ill patients
d. Manage critical care in secondary and advanced care facilities
e. Implement therapeutic interventions/organ system support in single or multiple organ failure (MODS)
f. Organize peri-operative care
g. Offer support for care in transfer of critically ill patients
h. Organize Clinical Measurement
i. Plan and execute Research in related fields
j. Organize infection control in PICU
k. Discuss safety for patients & staff in PICU
l. Exhibit good understanding of critical incidents, adverse events, and complications related to PICU care
m. Organize multi-disciplinary case conference and counseling sessions with family
n. Discuss and explain critical appraisal and application of guidelines, protocols and care bundles
o. Demonstrate understanding of scoring systems for assessment of severity of illness
p. Demonstrate good understanding of the managerial & administrative responsibilities as a pediatric critical care specialist
q. Exhibit ability for intra/inter departmental coordination for care of sick child

2. **Affective Domain**

a. **Comfort, Pain-Relief and Recovery**

- Understanding of the physical and psychosocial consequences of critical illness for patients and families and methods of prevention and management

- Communication of the continuing care requirements of patients at PICU discharge to health care professionals, patients and guardians

b. **End of Life Care**

- Management of the process of withholding or withdrawing treatment with the multidisciplinary team

- Discussion of the end of life care with patients and their families/surrogates

- Discuss the possibility of Organ donation with the parents/caregivers

c. **Health Systems Management**

- Leadership in daily multidisciplinary ward round

d. **Ethics, Attitudes and Professionalism**

- **Communication skills**
  - Communication with patients/parents/guardians and relatives
  - Communication with members of the health care team/infection control team

- **Professional relationships with patients and relatives**
  - Involvement with patients/guardian/caregiver in decision making
  - Understanding of cultural and religious beliefs and an awareness of their impact on decision making
  - Understanding of privacy, dignity, confidentiality and legal constraints on the use of patient data

- **Professional relationships with members of the health care team**
  - Collaboration, consultation, team work
  - Supervision and delegation of duties and responsibilities to juniors and others

3. **Psychomotor Domain**

At the end of the course, the student should have acquired skills in the following:

a. **Respiratory system**

- Oxygen therapy - Fundamental principles and PICU specific issues
- Fiber-optic laryngoscopy
- Fiber-optic Bronchoscopy /BAL in intubated patients
- Emergency airway management

- Difficult and failed airway management, rapid sequence intubation
- Endotracheal suction-open and closed
- Percutaneous tracheostomy and mini- tracheostomy
- Thoracocentesis via a chest drain
- Pulmonary function test
- Fundamentals of Mechanical ventilation
- Chest Ultrasonography

b. Cardiovascular system

- Peripheral venous catheterization
- Arterial catheterization, Invasive BP monitoring
- Surgical isolation of vein/artery
- Ultrasound techniques for vascular localization
- Central venous catheterization: USG guided
- Defibrillation and cardio version
- Fundamentals of pericardiocentesis
- Measurement of cardiac output and derived haemodynamic variable
- ECHO based evaluation of IVC diameter/cardiac contractility
- Fundamentals of Pediatric ECG & rhythm abnormalities
- External cardiac pacing

c. Central Nervous System

- Lumbar puncture (intradural/spinal)
- Fundamentals of ICP monitoring
- Near Infra red spectroscopy (NIRS) monitoring
- Sub-dural/intra-ventricular drainage
- Assessment of Ventricular – peritoneal shunts
- Fundamentals of EEG, NCV and EMG

d. Gastrointestinal System

- Gastric decontamination
- Abdominal paracentesis
- Fundamentals of upper GI endoscopy
- Measurement and interpretation of intra-abdominal pressure
- Focused assessment with sonography in Trauma (FAST)
- Percutaneous/pigtail drainage

e. Genitourinary System

- Urinary bladder catheterization
- Fundamentals of peritoneal Dialysis
- Suprapubic aspiration

f. Reno-vascular System

- Principles of hemodialysis/ CRRT
- Fundamentals of Reno -vascular Sonography
- Percutaneous Biopsy

VI. LOG BOOK

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

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

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

1. Personal profile of the candidate
2. Educational qualification/Professional data
3. Record of case histories
4. Procedures learnt
5. Record of case Demonstration/Presentations
6. Every candidate, at the time of practical examination, will be required to produce performance record (log book) containing details of the work done by him/her during the entire period of training as per requirements of the log book. It should be duly certified by the supervisor as work done by the candidate and countersigned by the administrative Head of the Institution.
7. In the absence of production of log book, the result will not be declared

VII. RECOMMENDED TEXT BOOKS AND JOURNALS

1. TEXT BOOKS

- Rogers textbook of Pediatric Intensive Care (latest edition)
- Pediatric Critical care - Bradley P. Fuhrman, Jerry J. Zimmerman – (latest edition)
- Pediatric critical care medicine. Basic science and clinical evidence – Derek.S.Wheeler
- Mechanical Ventilation- Neil R. MacIntyre Richard D. Branson
- Principles and Practice of Mechanical ventilation – Tobin (McGraw –Hill Education)
- Clinical Application of Mechanical Ventilation by David W Chang (Delmar CENGAGE Learning)
- Respiratory Physiology: The essential – John B West
- Pulmonary Pathophysiology: The essentials-– John B West
- Clinical Blood gases: Assessment and management – William Murray
- Drug Doses- Frank Shann
- PICU Hand Book- Frank Shann
- Applied Cardiovascular Physiology – Michael Pinsky

2. JOURNALS

- Pediatric Critical Care medicine
- Critical Care Medicine
- Intensive Care Medicine
- American Journal of Respiratory and Critical Care Medicine
- Chest
- Critical Care
- Journal of Critical Care
- Indian Pediatrics, Indian Journal of pediatrics (IJP)
- Journal of Pediatric Critical Care Medicine
- Journal of Tropical Pediatrics