Curriculum

DM Pediatric Critical Care (3 year course)

Department of Pediatrics

All India Institute of Medical Sciences, Nagpur

1. Introduction

Preamble

Training program for DM in Pediatric Critical Care Medicine (PCCM) 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 counselling 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.

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 and situation Analysis:

The body of basic and applied knowledge encompassed by the field of critical care medicine has grown remarkable in the last two decades. The need for separation of critically ill patients from others was recognized as early as 1854. The ICUs began with the need to provide ventilation to victims of poliomyelitis epidemic in 1958. The anesthetists usually cared for these patients and continuation of this had made anesthetists responsible for ICUs in many countries. Nevertheless, many medical specialties became involved in treating wide range of diseases making critical care medicine a multidisciplinary, multiprofessional endeavor. Intensive care in Pediatrics has made a significant difference to the mortality especially in conditions like sepsis with complications, pneumonia, meningitis, poisonings and several others.

Even though critical care medicine conditions are included in all medical schools, it has been shown that students (both undergraduate and postgraduate) lack the most basic critical care medicine skills and are poorly equipped to even make appropriate referral to the ICU.

Training in Critical Care medicine as a part of the training programme for M.D. (Pediatrics) exist in a few medical colleges, as most of them lack basic facilities to conduct such training. The deficiencies in the training programme gets further compounded by the non-availability of trained teachers.

In past decade Pediatric Critical Care has rapidly grown in India but still remains a developing branch as far as Indian scenario is concerned and there are not many places in India where satisfactory critical care is being delivered to the needy children. As an effort to promote this field of pediatric critical care in India, DM in Pediatric Critical Care was started in PGIMER, Chandigarh in 2009. Currently, DM program in Pediatric Critical Care is being offered at 3 places in country i.e., PGIMER Chandigarh, JIPMER, Puducherry and AIIMS Raipur and as Pediatric Pulmonology and Intensive Care in AIIMS Delhi and AIIMS Bhubaneshwar with primary mission to train the next generation of pediatricians, who will care for children with the most complex and critical conditions.

2. Programme Outcomes

Upon completion of the DM Pediatric Critical Care program, the trainee shall be able to acquire certain subject specific competencies in the acquired knowledge (cognitive), professionalism (affective domain) and skills (psychomotor domain)

1. Cognitive Domain	
S.No.	**Competencies**
1.1	Each student would have to develop a clear understanding of the physiology, patho- 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.
1.2	Each student during this period is expected to learn about utilizing the medical literature. This includes the ability to use electronic resourcessuch 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:**
1.2 (a)	Use the aspects of applied anatomy, physiology, biochemistry and pharmacology for daily practice in managing a sick child

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

2. Affective Domain	
S.No.	**2.1 Comfort, Pain-Relief and Recovery**
2.1(a)	Understanding of the physical and psychosocial consequences of critical illness for patients and families and methods of prevention and management
2.1 (b)	Communication of the continuing care requirements of patients at PICU discharge to health care professionals, patients and guardians
	2.2 End of Life Care
2.2 (a)	Management of the process of withholding or withdrawing treatment with the multidisciplinary team
2.2 (b)	Discussion of the end of life care with patients and their families/surrogates
2.2 (c)	Discuss the possibility of Organ donation with the parents/caregivers
	2.3 Health Systems Management
2.3 (a)	• Leadership in daily multidisciplinary ward round
	2.4 Ethics, Attitudes and Professionalism
2.4 (a)	**Communication skills** ➢ Communication with patients/parents/guardians and relatives ➢ Communication with members of the health care team/infection control team
2.4 (b)	**Professional relationships with patients and relatives** ➢ Involvement with patients/guardian/caregiver in decision making ➢ Understanding of cultural and religious beliefs and awareness of their impact on decision making ➢ Understanding of privacy, dignity, confidentiality and legal constraints on the use of patient data
2.4 (c)	**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:	
S.No.	**Competencies**
	3.1 Respiratory system
3.1 (a)	Oxygen therapy - Fundamental principles and PICU specific issues
3.1 (b)	Fiber-optic laryngoscopy
3.1 (c)	Fiber-optic Bronchoscopy /BAL in intubated patients
3.1 (d)	Emergency airway management
3.1 (e)	Difficult and failed airway management, rapid sequence intubation
3.1 (f)	Endotracheal suction-open and closed
3.1 (g)	Percutaneous tracheostomy and mini- tracheostomy
3.1 (h)	Thoracocentesis via a chest drain
3.1 (i)	Pulmonary function test
3.1 (j)	Fundamentals of Mechanical ventilation
3.1 (k)	Chest Ultrasonography
	3.2 Cardiovascular system
3.2 (a)	Peripheral venous catheterization
3.2 (b)	Arterial catheterization, Invasive BP monitoring
3.2 (c)	Surgical isolation of vein/artery
3.2 (d)	Ultrasound techniques for vascular localization
3.2 (e)	Central venous catheterization: USG guided
3.2 (f)	Defibrillation and cardio version
3.2 (g)	Fundamentals of pericardiocentesis
3.2 (h)	Measurement of cardiac output and derived haemodynamic variable
3.2 (i)	ECHO based evaluation of IVC diameter/cardiac contractility

3.2 (j)	Fundamentals of Pediatric ECG & rhythm abnormalities
3.2 (k)	External cardiac pacing
	3.3 Central Nervous System
3.3 (a)	Lumbar puncture (intradural/spinal)
3.3 (b)	Fundamentals of ICP monitoring
3.3 (c)	Near Infra red spectroscopy (NIRS) monitoring
3.3 (d)	Sub-dural/intra-ventricular drainage
3.3 (e)	Assessment of Ventricular – peritoneal shunts
3.3 (f)	Fundamentals of EEG, NCV and EMG
	3.4 Gastrointestinal System
3.4 (a)	Gastric decontamination
3.4 (b)	Abdominal paracentesis
3.4 (c)	Fundamentals of upper GI endoscopy
3.4 (d)	Measurement and interpretation of intra-abdominal pressure
3.4 (e)	Focused assessment with sonography in Trauma (FAST)
3.4 (f)	Percutaneous/pigtail drainage
	3.5 Genitourinary System
3.5 (a)	Urinary bladder catheterization
3.5 (b)	Fundamentals of peritoneal Dialysis
3.5 (c)	Suprapubic aspiration
	3.6 Reno-vascular System
3.6 (a)	Principles of hemodialysis/ CRRT
3.6 (b)	Fundamentals of Reno -vascular Sonography
3.6 (c)	Percutaneous Biopsy

3. ELIGIBILTY CRITERIA

M.D/ D.N.B (Pediatrics)

4. SELECTION OF THE CANDIDATE

Through INI CET Super Speciality exam

5. DURATION OF THE COURSE

The training shall be of 3 years full time residency pattern. During these years, the candidate shall be a senior resident who will perform clinical, teaching and research activities as prescribed in the curriculum. The candidate shall be given additional administrative responsibilities duringthese years as per his/her competency.

6. SYLLABUS

System/Section	List of topics
• **Cardiovascular Physiology, Pathology, Pathophysiology, and Therapy**	• Shock(hypovolemic,neurogenic,septic,cardiogenic)and its complications • Cardiac rhythm Disturbances- identification and management • 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 • Perioperative management of patient undergoing cardiac surgery • Congenital heart disease and the physiologic alterations withsurgical repair • Recognition, evaluation, and management of hypertensive emergencies and urgencies • Hemodynamic monitoring (invasive and noninvasive) in critically ill child
• **Respiratory Physiology, Pathology, Pathophysiology, and Therapy**	• Acute respiratory failure ➢ Hypoxemic respiratory failure including acute respiratorydistress syndrome ➢ Hypercapnic respiratory failure

	➢ Acute on chronic respiratory failure
	• Pulmonary Mechanics and gas exchange
	• Oxygen therapy
	• Status asthmaticus
	• Pneumonia/Bronchiolitis
	• Pleural diseases: empyema, various effusions, and pneumothorax
	• Upper airway obstruction
	• Airway Maintenance
	  • Airway emergency management
	  • Endotracheal intubation/rapid sequence intubation
	  • Tracheostomy, open and percutaneous
	  • Long-term intubation vs. tracheostomy
	• Invasive and Noninvasive ventilation
	• Respiratory Monitoring
	• Chest trauma (e.g., flail chest, pulmonary contusion, rib fractures)

• **Renal Physiology, Pathology, Pathophysiology, and Therapy**	• Renal regulation of fluid balance and electrolytes • Renal failure: Prerenal, renal, and postrenal • Fluid and Electrolyte disturbances • Acid-base disorders and their management • Acute Renal failure and Principles of renal replacement therapy and associated methodologies (peritoneal dialysis, hemodialysis, peritoneal dialysis, CRRT, SLED, CAHF, CVVH) • Systemic diseases that involve the kidney
• **Central Nervous System Physiology, Pathology, Pathophysiology, and Therapy**	• Approach to a child presenting with Coma • Meningitis, Encephalitis (Infectious and noninfectious) • Pathophysiology and management of raised intracranial pressure with ICP monitoring • Neurocritical care monitoring • Management of Status epilepticus • Neuromuscular disease-causing respiratory failure e.g. (GBS, Myasthenic crisis, Critical illness neuromyopathy) • Traumatic and non-traumatic intracranial bleed • Brain death evaluation and certification

	• Hydrocephalus and shunt function and dysfunction • Perioperative management of patient undergoing neurologic surgery • Sedation & analgesia: principles and titration • Neuromuscular blockade: Use, monitoring, and complications
• **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 ➢ Disorders of antidiuretic hormone metabolism ➢ Diabetes mellitus, Diabetic Ketoacidosis ➢ Ketotic and nonketotic hyperosmolar coma ➢ Hypoglycemia/Hyperglycemia ➢ Disorders of calcium, magnesium, and phosphate balance ➢ Inborn errors of metabolism
• **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 ➢ Antimicrobial Resistance ➢ 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
• **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 • Acute hemolytic disorders including thrombotic microangiopathies • Sickle cell crisis and acute chest syndrome • ICU-acquired anemia • Oncologic emergencies • Acute syndromes associated with neoplastic disease andantineoplastic therapy
• **Physiology, Pathology, Pathophysiology, and Therapy ofAcute 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 gastro-surgical patients • Obstructive uropathy and its complications
• **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
• **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 diseases
• **Monitoring and Bioengineering**	• Prognostic indexes, severity, and therapeutic intervention scores • Principles of electrocardiographic monitoring, and transcutaneous measurements • Invasive and noninvasive hemodynamic monitoring ➢ Principles of arterial, and central venous catheterization and monitoring ➢ Echo based evaluation of cardiac function and derivedhemodynamic variables • Central nervous system brain monitoring (intracranial pressure, NIRS, EEG, transcranial Doppler) • Respiratory monitoring (pulse oximetry capnography, Ventilatory graphics) • Metabolic monitoring (oxygen consumption, carbon dioxide production, respiratory quotient, indirect calorimetry)

• **Simulation**	• Simulation in Pediatric Critical Care i) Clinical Skills training by simulation ii) Crisis Resource Management Principles iii) Communication and Interprofessional Collaboration iv) Error Recognition and management v) Team Debriefing and Reflection vi) Crisis Leadership Management vii)Quality Improvement and Patient safety
• **Biostatistics**	• Use of Biostatistics and various tests of significance (SPSS orother soft wares)
• **Ethics**	• Consent • Study enrollment • End-of- life decision making and care • Organ procurement • Outcome and futility • Quality of end of life
• **Administration**	• Team building, Patient safety • Organization of patient care • Physician, nurse, and ancillary staff staffing models • Documentation and compliance • Mass casualty or disaster
• **Genetic**	• Congenital diseases in critical care • Storage diseases • Fundamentals of Genetic testing • Genetic counseling
• **Pharmacology**	• Pharmacokinetics • Pharmacodynamics • Safe medication practice • Drug dosing adjustments in hepatic disease • Drug dosing adjustments in renal disease

• **Core Procedural Skills for Residents**	**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 • Cardioversion and defibrillation **c.** Additional Procedures • Thoracentesis • Paracentesis • Bronchoscopy • Peritoneal dialysis • Hemodialysis • Bedside Ultrasound for critical care
• **Training Courses**	**Each student would have to undergo the following courses:** • Pediatric Basic life support (BLS) • Pediatric Advanced Life Support (PALS) • Advanced Trauma Life Support (ATLS)

7. 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 below

Area of Posting	**Duration of Posting**
PICU	24 months
Pediatric emergency and Trauma	05
Anaesthesia	1.5 month
NICU	1.5 month
CTVS ICU*	1 month
Nephrology Unit (Hemodialysis and Transplant)	15 days
Pulmonology (Bronchoscopy)	15 days
Hematology/BMT Unit	15 days
Research Elective	15 days
Elective#	1 month
Total	**36 months**

* If any of the above departments do not cater to pediatric patients during candidate's tenure, the trainee may opt to choose any other hospital with functional PICU training programme to complete the duration of posting. Any expenditure incurred for this extra-institutional training will be borne by the trainee.

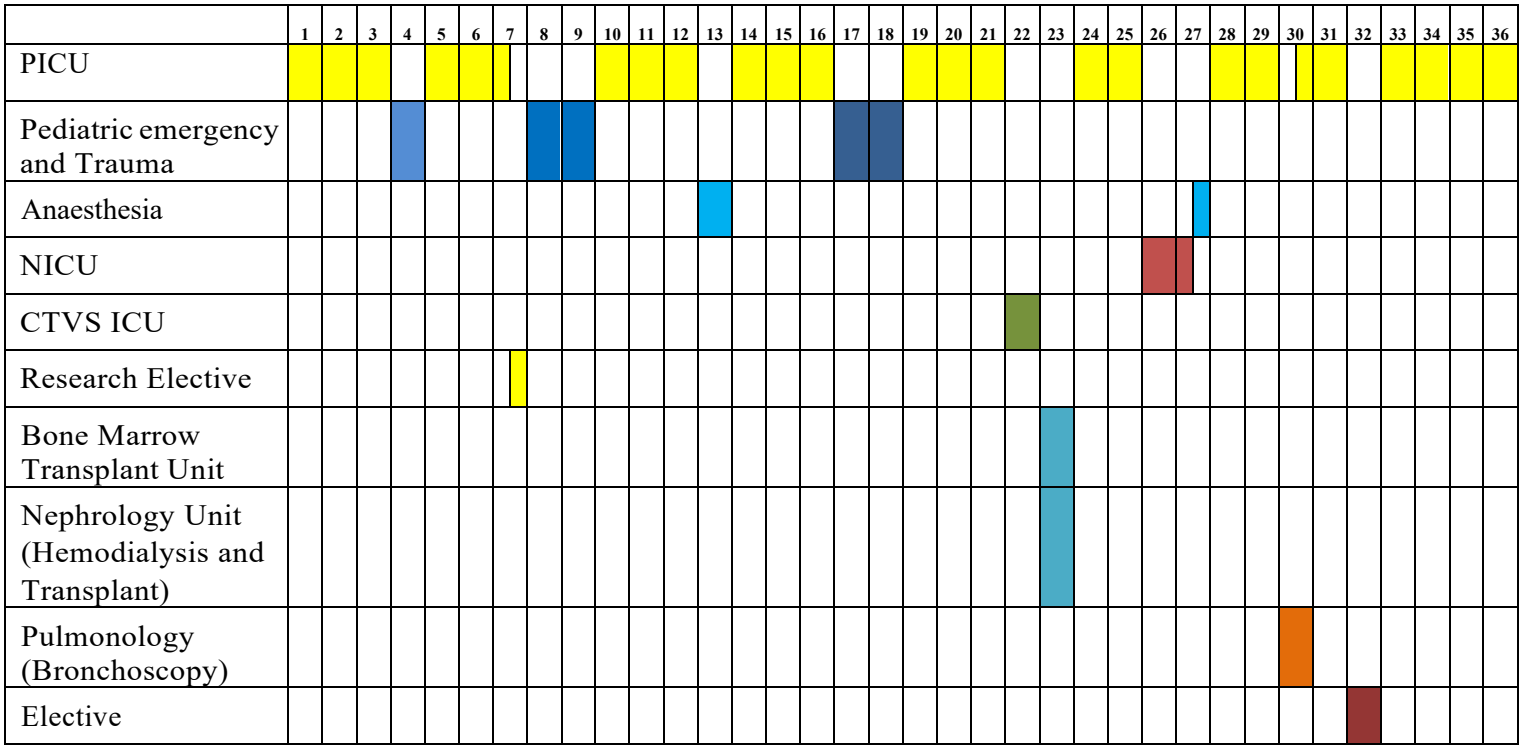
Elective#

- The trainee may choose elective posting at any hospital with functional PICU training programme in India or abroad.
- All expenses incurred for training and logistics will be borne by the trainee
- The objectives of elective posting are to gain more experience in specific skills desired by the trainee for which he/she has to submit a report about skills acquired.
- The trainee may also choose to utilize the given duration for training within the campus (AIIMS Nagpur) in any of the above postings

Elective in Research – The trainee may opt for this elective posting for acquiring new skill, training/ procedure, which will be essential for carrying out his research project.

Eg- POCUS training, EEG training (interpretation of EEG) in Neurophysiology lab, Spirometry/Impulse Oscillometry training in Pulmonology Lab/Physiology lab, CRRT training in Dialysis unit, New Equipment – Use of Indirect Calorimeter/NIRS, or any other similar skill enhancement programme.

GANTT CHART


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
PICU
Pediatric emergency and Trauma
Anaesthesia
NICU
CTVS ICU
Research Elective
Bone Marrow Transplant Unit
Nephrology Unit (Hemodialysis and Transplant)
Pulmonology (Bronchoscopy)
Elective

8. Competencies to be achieved in Psychomotor Domain/Practical Skill during rotation postings

A. PICU

At the end of the course upon successful completion of training the student is will be able to:

1. Perform resuscitation and management of the acutely ill pediatric patients
2. Plan and organize therapeutic interventions/organ system support in single or multiple organfailure in conditions associated with trauma, burns, infections, metabolic derangements etc.
3. Perform essential procedures (eg central line insertion etc.) essential for management of critically ill child
4. Organize peri-operative care of surgical / trauma patients
5. Plan and execute infection control procedures, system management and standard operativeprocedures in the Pediatric Critical Care Units
6. Operate the various monitoring equipment's and to detect and manage effectively alterations in their functioning
7. Plan end of life care and withdrawal of life support
8. Communicate effectively and empathetically to patients and attendants, about the critical nature of illnesses and breaking bad news in contingencies
9. Be a Team Leader and also a member of the team involved in critical care
10. Analyze the quality and implications of ever-expanding medical literature and guidelines andapply new knowledge in the delivery of health care of critically ill children
11. Identify and participate in research activities and also have knowledge of newer statistical tools and data management

B. Pediatric Emergency

At the end of the course upon successful completion of training the student is will be able to:

1. Recognises, assesses and manages the full range of paediatric emergency conditions
    - Child with respiratory failure
    - Child with shock
    - Child with altered consciousness
    - Child with trauma
    - Child with Abuse
    - Child with poisoning
2. Performs high-level clinical and technical skills and procedures in the paediatric emergency setting.
    - Airway management
        - Maintenance of an airway
        - Ventilation by bag- mask
        - Tracheal intubation
        - Management of Air leaks
    - Circulation
        - Arterial puncture and cannulation
        - Insertion of central venous catheters
        - Pericardiocentesis in acute tamponade
        - Cardioversion and defibrillation
    - Additional Procedures
        - Thoracentesis
        - Paracentesis
        - Bedside Ultrasound for emergency care
3. Assumes the role of paediatric emergency team leader and takes responsibility for this domain of service
4. Effectively manages and coordinates patient flow, staffing, safety and quality in a PED
5. Demonstrates the ability to make pragmatic and rapid decisions across a broad range of paediatric emergencies.

C. **CTVS ICU**

At the end of the course upon successful completion of training the trainee will be able to manage critical care aspects in the perioperative period of heart disease children

D. NICU

1. Recognises, assesses and manages neonatal emergency conditions
2. Neonatal Resuscitation and Neonatal Ventilation

Management of critically ill neonates Manage neonatal emergencies in labour room and postnatal wards

E. Anaesthesia

1. Pediatric Airway Management including Difficulty airway, learn about the use of adjuncts like supraglottic airways and bronchoscopy
2. Anaesthesia for children and neonates
3. Principles of Procedural sedation
4. Perioperative care of children of different disciplines (ped surgery, neurosurgery, cardio surgery, ENT etc)
5. Pain Management: Learn various techniques for effective pain management in pediatric patients. This includes understanding the use of opioids, regional anesthesia, and multimodal approaches. Stay informed about the latest advances in pediatric pain management, such as nerve blocks and non-pharmacological interventions
6. Ethical and Legal Considerations: Familiarize yourself with the ethical and legal aspects of pediatric intensive care and anesthesia

F. Bone Marrow Transplant Unit

1. Understand hematological conditions, solid tumors commonly treated with bone marrow transplants.
2. Have a comprehensive understanding of the principles and processes involved in Bone Marrow transplantation, including autologous and allogeneic transplant techniques

3. Apply specific infection control practices specific to BMT units, as immunocompromised patients are at high risk for infections.
4. Knowledge of guidelines for prophylaxis, surveillance, and management of infections in post BMT patients
5. Recognition, prevention, and management of GVHD, which can occur after transplantation. Understand the different clinical manifestations, grading systems, and treatment options for acute and chronic GVHD

G. Dialysis Unit and Kidney Transplant Unit

1. Develop a thorough understanding of renal physiology, including glomerular filtration, tubular function, and electrolyte balance.
2. Gain knowledge of different dialysis modalities used in pediatric patients, including hemodialysis (HD) and peritoneal dialysis (PD). Understand the principles, techniques, and equipment involved in each modality, as well as their indications, advantages, and potential complications
3. To write prescription for dialysis treatment, including determining dialysis duration, frequency, and dialysate composition
4. Recognize and manage complications and emergencies that can arise during dialysis, such as hypotension, arrhythmias, bleeding, dialysis disequilibrium syndrome, and electrolyte disturbances.
5. Gain knowledge of medications commonly used in pediatric dialysis patients, including appropriate dosing adjustments, drug interactions, and potential side effects. Understand the pharmacokinetics and pharmacodynamics of medications in the context of renal dysfunction.
6. Knowledge of pre and post-transplant care in children

H. Pulmonology (Bronchoscopy)

1) To know principles and techniques of diagnostic and therapeutic bronchoscopy in pediatric and adult patients. Learn about indications for bronchoscopy, airway anatomy, procedural sedation, specimen collection, and therapeutic interventions, such as biopsy and airway interventions.
2) Knowledge about Spirometry equipment, its types and interpretation

I. Elective in Research – The trainee may opt for this elective posting for acquiring new skill, training/procedure, which will be essential for carrying out his research project

Eg- POCUS training, EEG training (interpretation of EEG) in Neurophysiology lab, Spirometry/Impulse Oscillometry training in Pulmonology Lab/Physiology lab, CRRT training in Dialysis unit, New Equipment – Use of Indirect Calorimeter/NIRS, or any other similar skill enhancement programme.

J. Electives

To further acquire skills in pediatric critical care as practised in other institutes. To develop skills in special techniques as per the candidate's choice

9 ACADEMIC ACTIVITY:

Academic Activity	Frequency
Journal Club	once in 2 weeks.
Seminar	once a week
Clinical Meet	once in two weeks
Case presentation	daily
Combined Round/Grand Round	Once a week
Joint inter-departmental academic meets with pediatric surgery, nephrology, radiology, etc.	Once a month
Audit presentation (Sepsis data, Critical Incident data)	Once a month
Mortality Meet	Once a month
Institutional level CME	As per the institute's schedule
Research Project Progress Report	Once in 6 months

Note:

A. 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.

B. Trainee shall be required to participate in the teaching and training programme of Undergraduate students and interns.

10 LOG BOOK

The DM Pediatric Critical Care student shall maintain a log book of the work carried out by them and the training program undergone during the period of training including details of procedures assisted or done independently by the trainees. The log book shall be checked and assessed periodically by the faculty members imparting the training. Maintenance of performance record in log book is mandatory. Certified and assessed copy should be made available at the time of practical examination for review by examiners.

11 DISSERTATION:

11.1 Every student registered for DM shall carry out research project under a guide allotted, the result of which shall be written up and submitted in the form of a dissertation.

11.2 Work for writing the dissertation is aimed at contributing to the development of a spirit of enquiry, besides exposing the student to the techniques of research, critical analysis, acquaintance with the latest advance in medical science and the manner of identifying and consulting available literature.

11.3 Dissertation will be done in accordance with institutional protocol

11.4 Thesis should be sent for publication before the final exam

11.5 Apart from the dissertation, it is desirable for each candidate to take short term research project/ QI project which may be sent for publication.

11.6 **Process to be completed within six months of admission to DM Pediatric Critical Care programme:**

Activity	**January admission**	**July admission**
Selection of topic in consultation with PG Guide	March / April	September / October
Approval by Department PG Committee		
Institute Scientific		

Committee approval	May / June	November / December
Institute Ethics Committee approval		
Final approval letter by Academics Section	30th June	31st December
Final submission to academic section	30th June (Third Year)	31st December (Third Year)

12. ASSESSMENT

A. INTERNAL ASSESSMENT (FORMATIVE ASSESSMENT)

During the training includes:

1. Evaluation of clinical skills, academic performance and personal attributes will be an ongoing process. Periodic formative assessment will be done every 6 months and feedback will be given to trainee.
2. The academic presentations shall be graded at the time of presentation by the faculty in-charge/HOD.
3. Systematic theory and practical assessment will be done at the end of each year.

A 1. Six monthly Progress Report

The progress of the trainee will be monitored with the help of a six monthly structured report. The report will contain details pertaining to attendance, teaching-learning activities, clinical duties, teaching assignments, practical work, marks obtained at intermediate examinations, papers / posters presented, research publications and progress of dissertation work. The performance of the student will be graded by the PG Guide and the Head of the Department.

A 2. Formative Assessment (600 Theory + 600 Practical = Total 1200 Marks)

Theory (600 Marks)

S.N.	Schedule	Marks	Pattern and Marks Distribution
1.	At end of First year	100 (1 Paper)	10 Short Questions x 10 Marks each (Total Duration 3 hrs.)
2.	At end of Second year	100 (1 Paper)	10 Short Questions x 10 Marks each (Total Duration 3 hrs.)

3.	Pre-professional	400 (4 Papers of 100 marks each)	As per Final Professional Examination
	Total	600 Marks	

Practical(600Marks)

	Schedule	**Marks**	**Pattern and Marks Distribution**
1.	At end of First year	100	1 Case -50 Marks Average Marks from evaluation of Academic Activity of first year – Out of Max Marks 50 (Annexure I,II,III,IV) Total Marks -100
2.	At end of Second year	100	1 Case -50 Marks Average Marks from evaluation of Academic Activity of first year – Out of Max Marks 50 (Annexure I,II,III,IV) Total Marks -100
3.	Pre-professional	400	As per Final Professional Examination
	Total	**600 marks**	

Eligibility for Professional/Summative assessment:

1. Candidate should secure a minimum of 50% marks in Theory and Practical separately in formative assessments, in order to be eligible to appear for Professional Examination
2. At least four out of six-monthly progress report should be satisfactory
3. Minimum 80% attendance in each year of training.
4. Acceptance of Dissertation is mandatory
5. Successful completion of Research Methodology program at induction
6. Minimum one scientific paper OR poster presentation at an international/national/state/zonal/regional conference / scientific society meetings.

7. Minimum one scientific research paper – for publication/ accepted for publication / sent for publication in a peer-reviewed indexed scientific journal. The quality of paper should be peer reviewed and approved by unit incharge /departmental head.

B. SUMMATIVE ASSESSMENT/FINAL PROFESSIONAL ASSESSMENT

At the end of the training will be as follows:

1	**Theory**	**4 Papers each of 100 marks = 400 marks**
2	**Practical**	**Clinical Case + Viva = 400 marks**

The DM Pediatric Critical Care examination shall be in two parts:

B.1 Theory:

There shall be 4 papers; each of 3 hours duration carrying 100 marks each.

Each paper shall consist of ten short questions for 10 marks each

Paper	Title	Marks
Paper I	Basic sciences and applied sciences related to Pediatric Critical Care, research methods	100
Paper II	Principals and practice of Pediatric Critical Care	100
Paper III	Principals and Practice of Pediatric Emergency Care	100
Paper IV	Recent Advances and allied disciplines	100
	Total	**400**

B.2 Practical: The practical examination should consist of the following

1. Long Case I (PICU) - **100 Marks**
2. Long Case II (PICU) **100 Marks**
3. Case (Pediatric Emergency) – **50 Marks**
4. Structured Viva Voce (two parts) **(150 marks)**
    a. Patient management problems **– 40 marks**
    b. Journal Scan /Research Methodology/Dissertation Defense – **20 Marks**
    c. General viva (including radio- imaging Investigations i.e., ultrasound/CT/MRI records, interpretation of ABGs', neurophysiological records such as BERA, NCV, EMG, EEG, thesis - **40 marks**
    d. Simulation Station – **20 Marks**
    e. Counselling Station – **20 Marks**
    f. Pedagogy -**10 Marks**

Note:

(A) Minimum 40% marks in each paper and aggregate of 50% marks in order to be declared pass in theory exam

(B) Minimum 50% marks required in Theory & Practical separately, in order to be declared successful in summative exam

RECOMMENDED READING /LEARNING RESOURCES: Trainee should make the use of learning resources in both offline and online mode including but not limited to the list given below

Recommended 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 BWest
- Clinical Blood gases: Assessment and management – William Murray
- Drug Doses- Frank Shann
- PICU Hand Book- Frank Shann
- Applied Cardiovascular Physiology – Michael Pinsky

Recommended Journals

International Journals

- Intensive Care Medicine
- Critical Care Medicine
- Critical Care
- Journal of Pediatric Critical Care Medicine
- Journal of Tropical Pediatrics
- American Journal of Respiratory and Critical Care Medicine
- Chest

National Journals

- Indian Journal of Critical Care Medicine
- Journal of Pediatric Critical Care
- Indian Pediatrics
- Indian Journal of Pediatrics (IJP)
    - Society Guidelines
    - Online Learning Materials (Websites and Programme)