

**1) Title of the course:** Fellowship in Pediatric Intensive Care

**2) Course contents/ syllabus/ curriculum:**

- 1) Basic training in Pediatric emergencies and intensive care
- 2) Clinical skills in procedures, understanding equipments, monitoring and resuscitation
- 3) Mechanical Ventilation
- 4) Allied posting in Pediatric surgery and anesthesia- 1 month (Optional)
- 5) research programs, teaching skills
- 6) Designing a PICU: replica creation

**1. Basic training in Pediatric emergencies and intensive care:**

- Emergency and critical Pediatrics: Scope and need
- Pediatric emergency resuscitation and Pediatric advanced life support, and life saving procedures.
- Common Pediatric emergencies
- Shock
- Sepsis and Hospital acquired infections
- Convulsion and Status epilepticus
- Respiratory distress
- Cardiac emergencies including arrhythmias, CCF
- Neurological emergencies including ICP and coning
- Approach in a case of suspected brain death
- Taking care of a PICU child: basic nursing
- Taking care of a PICU child: anesthesia and analgesia
- Trauma, head injury and other surgical emergencies
- Transporting a sick child
- Safety and Bio waste managements
- Investigations in PICU: including radiology
- PRISM - PIM Score
- Record keeping in PICU

## **2. Clinical skills in procedures, understanding equipment's, monitoring and resuscitation**

- A sepsis and anesthesia and decision making in PICU emergency procedures
- Procedures in emergency medicine: tracheostomy, bronchoscopy, Needle drainage, Rapid IV access
- Rapid sequence intubation
- Vascular / Central line access : Jugular, subclavian, femoral and cut down access
- Arterial catheterization
- Intraosseus line
- Ventricular tap and VP shunt
- Pleuro-and peritoneocentesis
- Peritoneal dialysis
- Difficult intubations
- Monitoring: Needs, modalities and action
- Resuscitation:
  - Pediatric advanced life support: CPR, intubation and medicines
  - Monitoring a resuscitated child
- **Equipments: -**
  - Invasive and noninvasive equipments
  - Multichanel Monitors, defibrillators
  - Nebulizer, suction, O2 delivery systems
  - Ventilators
  - Machines: ECG, Doppler, Echo
  - EEG
  - Maintenance and record keeping
- **PICU Pharmacology**

## **3. Mechanical Ventilation**

- Basic physiology of respiratory system in a child
- Need for artificial ventilation
- Modalities and machines: know your ventilators
- ABG analysis; ABG actions

- Ventilation modes and needs, Airway ventilations
- Ventilation graphics, HFO, Trouble shootings
- Controlled ventilations, Assist ventilations
- Care of a ventilated child; Weaning from ventilators
- CPAP, Tracheostomy, VAP
- ARDS and its management

#### **4.Allied posting in Pediatric surgery and anesthesia (Optional):**

- Curriculum as per the respective departments, aimed at anesthesia, analgesia and perioperative issues related to fluid and airway dynamics and drugs.

#### **5.Research programs, teaching skills**

- Clinical Core competency skills: development and assessment
- Research dissertation completion
- Organizing a CME
- Representation in conferences
- Writing a paper and basics of statistics
- Staying in touch and staying updated: Virtual PICU

#### **6. Designing a PICU: replica creation**

- Understanding a need for PICU at periphery
- Point of Care PICU
- PICU designing: budget, management and maintenance
- Implementing a PICU protocol and a teaching program

### **Curriculum topics--**

#### **Respiratory system**

*Applied anatomy and physiology*

Anatomy of the respiratory tract in children including developmental aspects

Respiratory physiology and mechanics of breathing

Pathophysiology of acute respiratory failure

Type 1 failure Type 2 failure Diffusion of defects V/Q mismatch Shunts

*Clinical recognition of respiratory distress*

Respiratory failure Assessment of oxygenation status  $PaO_2/FiO_2$  ratios  $P(A-a)O_2$   
 $Q_s/Q_t$

*Causes of acute respiratory failure*

Upper airway problems LTB Epiglottitis Laryngeal edema Retropharyngeal abscess  
LTM Congenital anomalies Acquired damage following intubation

Lower airway problems Asthma Bronchiolitis Parenchymal diseases

Pneumonias Aspiration ARDS Pulmonary edema Atelectasis

Pneumothorax and airleak Empyema Common respiratory pathogens

Chemical pneumonias-Kerosene Chronic problems

BPD Chronic lung injury Cystic fibrosis

*O<sub>2</sub> therapy*

Indication Devices Monitoring Toxicity

*Bag and Mask ventilation*

*Endotracheal intubation*

Plain Cuffed

*Suction*

*Nebulisation*

*Advanced airway*

LMA Cricothyrotomy Tracheostomy

*Ventilation*

Ventilators PCV VC Modes Humidification Trigger

HME Alarms Intrinsic PEEP Graphics

*Disease specific ventilation*

ARDS network trial Ventilating ARDS Ventilating Asthma RDS

Meconium aspiration PPHN Pulmonary airleak Pulmonary hemorrhage

*Lung protective strategies*

*Advanced strategies*

High frequency ventilation ECMO NO Surfactant

*Monitoring*

Pulse oximetry Capnography Blood gases

*Special procedures*

Fibreoptic bronchoscopy BAL

*Iatrogenic issues*

Barotrauma Ventilator associated pneumonia

## **Circulatory system**

SHOCK

Hypovolemic cardiogenic distributive obstructive

*Clinical signs*

Decompensated compensated

Pathophysiology

*Therapy*

Fluid therapy Crystalloids Colloids

Inotropes Dopamine Dobutamine Epinephrine Norepinephrine Vasopressin

Amrinone Milrinone Role of steroids

### **Septic shock**

Pathophysiology Management Other therapies

*Vascular access*

Intraosseous CVA CVP monitoring Arterial pressure monitoring

*Monitoring*

SVO<sub>2</sub> monitoring Goal directed therapy Lactate

## **Hematology**

DIC Intravascular hemolysis Febrile neutropenia

Tumor lysis Superior vena cava obstruction Hemophilia

## **Liver**

Fulminant Hepatic failure Portal hypertension with bleeding varices Budd Chiari

Wilson's disease Hepatitis Reye's syndrome Metabolic disorders with significant liver involvement Transplantation

## **Renal**

ARF HUS /TTP RPGN

Hypertensive encephalopathy

Renal vein thrombosis Life threatening dyselectrolytemia

Tubular disorders presenting as critical illness Nephrotoxic drugs Dose adjustments

PD HD Plasmapheresis Hemoperfusion CVVH

## **Metabolic**

Acid base disturbances Urea cycle disorders Organic acidemias

Hypoglycemia DKA Neurometabolic disorders Metabolic liver diseases Approach to suspected IEM

## **Nervous system**

GBS Polio Tetanus Botulinism Diphtheria Encephalitis JB, Herpes Pyogenic meningitis

TB meningitis Raised ICP Coma Status epilepticus

## **Trauma Poisoning**

TBI Multiple trauma Drowning Burns

Poisonings

General Organophosphorous Kerosene Corrosives Barbiturates TCA

Iron Salicylates Digoxin Paracetamol

Snake bites Scorpion stings Bee sting

## **Infectious diseases**

HIV Dengue H1N1 Leptospirosis Malaria Typhoid TB Staphylococcal infections

Pseudomonas Fungal Nosocomial

Antimicrobials in ICU

Classes of drugs Bacterial resistance

MRSA VRE VISA GISA ESBL

Antivirals Antifungals Pharmacokinetics.pharmacodynamics

## **Nutrition**

Enteral / TPN

## **Ethics**

Brain death DNR Dying child Organ donation Dealing with parents and caretakers

## **Interpretation of investigations**

Lab Radiology Xray,CT,MRI ECG ABG Capnography CVP waveforms

Arterial pressure waveforms

## **Medical statistics**

Research methodologies

Guidelines

## **Procedural skills**

Bag and Mask ventilation  
CPR  
Endotracheal intubation (cuffed and uncuffed tubes)  
ET suction  
Care of tracheostomy  
ICD insertion  
Intraosseous line insertion  
Central venous line insertion  
Arterial cannulation  
Pericardiocentesis  
PD  
Synchronised cardioversion  
Defibrillation  
Administration of Adenosine

## **3) Proposed teaching/ learning methods**

**i) Lectures:** These will be held once a week and will be delivered either by a faculty member or by a specialist in the field of critical care.

**ii) Seminars and journal clubs:** Candidates are required to present 1 seminar and 1 journal club every alternate month.

**iii) Case presentations:** This will be held every alternate week. Experts from other specialties may be called for these discussions. Each student is expected to maintain a journal.

**iv) Administrative responsibilities:** The candidate is expected to actively participate in purchase and maintenance of ICU equipment/s.

**v) Patient care, teaching and research:** The candidate is expected to attend indoor calls for referrals made to the ICU from wards and emergency medical services. It is expected that the fellowship candidates will contribute to patient care in the Pediatric ward, Pediatric critical care unit and emergency Pediatric service, develop SOPs or protocols for diagnosis and management, make ethics committee submissions, interact/liaison with ethics committees and any agency involved in research projects undertaken in the ICU as and when needed, fill case record forms, and participate in audits and inspections. They are also required to give lectures on selected topics to the IIIrd year undergraduate medical students and postgraduate Pediatric students.

**vi) Project work and paper publication:** Each fellowship candidate will be required to undertake a project on a topic decided after consultation with the guide. This topic is required to be approved by the institutional ethics committee. The project work will be submitted in the form of a thesis at the end of the fellowship.

**vii) Attending conferences:** The candidate will attend any one of the following Annual conferences: Indian Academy of Pediatrics – Intensive Care Chapter or Indian Society of Critical Care Medicine or State/ City chapters of IAP Intensive Care Chapter.

**Teaching scheme: -**

- Daily teaching clinical rounds & case discussions,
- Bedside clinics and discussions
- Monthly critical care audit meets, Success cases discussions
- Discussions on mortality data
- Monthly statistics of the unit
- Equipment maintenance
- Classroom lecture series
- Lectures on advances in Pediatric critical care
- Guest lectures: Bimonthly multidisciplinary international & national faculty
- Seminars
- Antimicrobial and infection control policies
- Journal reading and advances in therapeutics
- Case presentations: twice a week
- Hands on supervision of procedures