

**IAPA PAEDIATRIC ANAESTHESIOLOGY FELLOWSHIP**  
**PROGRAMME CURRICULUM, PATIENT CARE, INTERPERSONAL**  
**SKILLS and MEDICAL KNOWLEDGE GOALS**

*The goals of training candidates selected for the Pediatric Fellowship Programme is to facilitate the development of knowledge, attitude s and skills necessary to provide advanced peri-operative care for paediatric patients. This should include general anaesthesia, sedation for routine and critically ill paediatric patients requiring surgery or painful procedures*

**A) PAEDIATRIC ANAESTHESIOLOGY MEDICAL KNOWLEDGE GOALS**

1. To correlate current knowledge of
  - a. The physiology and pathophysiology of various systems and management of congenital and acquired paediatric diseases
  - b. Metabolic and endocrine effects of surgery and critical illness
  - c. Infectious diseases pathophysiology and management
  - d. Coagulation disorders and management
  - e. Congenital abnormalities and developmental delay
2. Difference in anatomy, physiology and pharmacology of the foetus, premature neonate and term neonate and infant
3. Relevant differences in pharmacology of common anesthetic agents and other medications related to the paediatric patient
4. Correlate current knowledge of common medical and surgical problems in children e.g.,
  - a. Local anesthetic agent toxicity
  - b. Common airway problems in children
  - c. Management of pain all ages groups of paediatric patients
  - d. Trauma and burns management in children
  - e. Transport of critically ill children
  - f. Post anesthetic care and critical care management of children
  - g. Ethical and legal issues
2. Discuss the concerns of anesthetic agents and the developing brain
3. Monitoring principals and anesthetic management in simple and complex paediatric patients undergoing anesthesia and sedation

4. Provide and understand concepts and algorithms of Pediatric Advanced Life Support

## **B. DETAILED SYLLABUS**

### **1) Basic embryology and development including:**

- i) Transition from intrauterine to extrauterine life
- ii) Neonatal physiology including transition from neonatal period to infancy
- iii) Physical and emotional developmental milestones

### **2) Anatomical and physiological differences between small children and adults**

- a. Airway and respiratory system
- b. Cardiovascular system
- c. Water, electrolyte balance and renal function
- d. Liver and gastrointestinal tract
- e. Central nervous system
- f. Haematology
- g. Immune system
- h. Endocrine system
- i. Metabolism and temperature control

### **3) Pharmacological differences in drug kinetics and dynamics of:**

- a. inhalational agents, intravenous induction and maintenance agents
- b. Opioids and non-opioid analgesics
- c. Local anaesthetic agents
- d. Muscle relaxants
- e. Adjuncts (anti-emetics and antimuscarinics)

### **4) Preoperative assessment and preparation**

- a. History taking and clinical examination - interaction with children
- b. Criteria for preoperative investigations
- c. Preoperative management of
  - i. URTI
  - ii. Heart murmurs
  - iii. Bronchial asthma
  - iv. Diabetes
- d. Selection for day care and discharge criteria

- e. Fasting guidelines
- f. ASA physical status grading
- g. Communication with child and family
- h. Age related behaviour and anxiety
- i. Management of uncooperative children
- j. Nonpharmacological interventions
- k. Anxiolytic premedication
- l. Consent

## **5) Equipment, techniques and monitoring**

- a. Equipment
  - i)** Oral, nasopharyngeal airways
  - ii)** Laryngeal masks and other supraglottic devices
  - iii)** Endotracheal and tracheostomy tubes (plain, cuffed, preformed, armoured, Cole, laser)
  - iv)** Laryngoscopes (curved and straight blades, video laryngoscopes, fiberoptic bronchoscopes)
- b. Breathing circuits
  - i. Jackson Rees modification of Ayre's t-piece
  - ii.** Circle absorption breathing system
- c. Anaesthesia machine
- d. Ventilators

## **6) Techniques**

- a. Anaesthesia in the neonatal period
- b. IV access skill
- c. Inhalational induction
- d. Maintenance of anaesthesia
- e. Management of laryngospasm
- f. Rapid sequence induction(RSI) and modified RSI
- g. Maintenance of normothermia
- h. Management of common problems during recovery (including criteria for discharge).  
Understand the postoperative anaesthetic complications for paediatric patients *e.g.*, stridor, croup, nausea/vomiting, pruritic, respiratory depression, emergence delirium, bleeding and their management

## **7) Monitoring**

- a. Cardiovascular, respiratory, CNS, neuromuscular, temperature
- b. Indications for invasive monitoring

## **8) Management of the airway**

- a. Assessment of the paediatric airway
- b. Identification of the child with a difficult airway or with congenital syndromes
- c. Airway obstruction, congenital and acquired
- d. Equipment required for management of the paediatric airway
- e. Basic and advanced paediatric airway skills
- f. Techniques for management of difficult airway
- g. Recognise, diagnose and manage complications with the difficult paediatric airway:
  - a. Management of the unanticipated difficult airway

## **2) Venous access**

- a. Routine sites, appropriate cannula sizes and fixation of peripheral cannulae
- b. Central venous lines: indications, devices, techniques and complication
- c. Ultrasound guidance for vascular access
- d. Intraosseous access
- e. Long term care of central venous lines

## **3) Resuscitation**

- a. Provide and understand concepts and algorithms of Basic Life Support, Pediatric Advanced Life Support and life support algorithms
- b. Causes of paediatric arrest
- c. Structured approach to assessing critically ill or injured children (airway, breathing, circulation, disability ABCD)
- d. Neonatal Resuscitation
- e. Choking Child
- f. Structured approach to initiating treatment in the seriously ill child
  - i) Breathing difficulties: airway emergencies, respiratory failure
  - ii) Child in shock: dehydration, acute blood loss
  - iii) Sepsis

- iv) Anaphylaxis
- v) Cardiac failure and abnormal cardiac rhythm
- vi) Altered sensorium, raised intracranial pressure, meningitis, convulsions, metabolic coma

#### **4) Structured approach to treating the seriously injured child**

- a. Initial assessment of ABCD
- b. Trauma and burns management in children
- c. Airway and C-spine stabilisation
- d. Specific do's and don'ts in the M=management of the child with chest, abdominal and head and spine injuries
- e. Principles of safe transfer and transport of the critically ill and injured child
- f. When to stop resuscitation
- g. How to deliver bad news to parents
- h. Do Not Resuscitate orders

#### **5) Major Crisis Management**

Ability to independently identify and manage paediatric clinical crises and demonstrate leadership of the crisis response team

Ability to supervise other members in the paediatric anesthesia team (residents, technicians, nurses, interns). Including management of malignant hyperthermia, anaphylaxis, major haemorrhage

#### **6) Pain management including regional techniques**

- a. Pain neurophysiology, nociception and the response to injury
- b. Analgesic pharmacology: paracetamol, NSAIDs, opioids
- c. Multimodal analgesia: range of drugs, routes of administration and techniques available for acute postoperative pain
- d. Oral/PR, continuous infusions, Patient/Nurse controlled analgesia
- e. Spinal/epidural, caudal, blocks e.g., of upper limb, lower limb, ilio-inguinal block, penile block
  - i) Use of adjuncts: ketamine, clonidine, fentanyl
  - ii) ultrasound guidance in regional blocks

- f. Non-pharmacological approaches of pain management
- g. Management of common complications of pain management
- h. How to set up Paediatric Pain Control Services
  - i) Protocols and Guidelines
  - ii) Ensure safety

14) **Anaesthetic implications of congenital inherited conditions and syndromes:** Down, Pierre Robin, Goldenhar, Treacher Collins, Mucopolysaccharidoses, Apert's, Charge association, VATER, Osteogenesis Imperfecta

### 15) Anesthetic implications for surgical procedures

#### a. General surgery

- i. Common problems of neonatal and small infant anaesthesia
- ii. Acute Abdomen and RSI
- iii. Laparoscopic surgery techniques and implications
- iv. Urology and renal transplantation

#### b. Ear, nose and throat surgery

- i) Associated anomalies and airway pathology e.g., choanal atresia
- ii) General anaesthetic considerations for laryngeal papilloma, bronchoscopy, the shared airway
- iii) Laser surgery
- iv) Post anaesthetic care
- v) Obstructive sleep apnoea following adenotonsillectomy

c. **Ophthalmic surgery:** retinopathy of prematurity, glaucoma, corneal transplant, vitreoretinal surgery, squint

#### d. Dental, maxillofacial and plastic surgery

- i) Temporomandibular joint ankylosis
- ii) Cleft lip and palate
- iii) Craniofacial surgery
- iv) Reconstructive surgery

### **e. Orthopaedic surgery**

- i) Use of tourniquets
- ii) Cerebral palsy\
- iii) Scoliosis surgery
- iv) Trauma

### **f. Neurosurgery**

- i) Hydrocephalus
- ii) Meningomylocele
- v) Space occupying lesion
- vi) Head injury
- vii) Trans-sphenoidal surgery

### **g. Cardiac and thoracic surgery**

- i) Management of the child with cardiac disease undergoing non-cardiac surgery
- ii) Endocarditis prophylaxis
- iii) Pathophysiology of common cardiac shunts like VSD/ASD/AVSD/PDA, cyanotic heart disease *e.g.*, Tetralogy of Fallot (including management of a 'spell'), transposition of the great arteries, coarctation of the aorta, valve stenosis, single ventricle
- iv) Preoperative assessment and investigations including the implications of cyanotic heart disease, re-do surgery, pulmonary hypertension
- v) Blood gas analysis
  - vi) Principles of cardiopulmonary bypass and cardioplegia
  - vii) Pharmacology of inotropes – types, uses & doses, antifibrinolytics, heparin, haemostasis and blood product use
  - viii) Thoracic surgery – one lung ventilation, VATS, thoracotomy

## **16) Anaesthesia/sedation in remote location**

- a.** CT, MRI
- b.** Interventional radiology – DSA

- c. Cardiac catheterization
- d. Chair side dental sedation
- e. Radiotherapy
- f. GE endoscopy

## **INTERPERSONAL AND COMMUNICATION SKILLS**

1. Demonstrate effective exchange of information and collaboration with children and their families of difference socioeconomic and religious backgrounds, colleagues and other health professionals.
2. Maintain comprehensive and clear medical documentation in a timely manner
3. Recognize and identify patient and family conflicts and get assistance when appropriate and required
4. Communicate effectively in situations of crisis or difficult interpersonal conflicts in the operative team thereby ensuring safe patient care
5. Ability to work effectively with other team members as a consultant caring for paediatric medical and surgical patients
6. Ability to facilitate team based discussions or conferences related to paediatric patient care which includes updating knowledge prior to managing a complex case and active discussion on patient rounds
7. Effectively communicate when handing over patients to another team.
8. Consider cost of medications, devices and procedures when making a clinical decision
9. Have the ability to analyse a medical error or a critical incident

## **SUGGESTED ACADEMIC PROGRAMME FOR FELLOWSHIP IN PAEDIATRIC ANAESTHESIOLOGY PROGRAMME**

- **Didactic lectures**, suggested programme may include:

- i) *Orientation Lectures*: To cover key topics in paediatric anaesthesiology, paediatric developmental stages, PALS, how the institution operating room, recovery room and preoperative system functions.
  - ii) *Fellow lectures*: On preselected topics
  - iii) *Journal Club*: Quarterly review of current paediatric anaesthesiology of select articles selected by the Fellow
  - iv) *Case Conference / Discussions*: Presentation of a recent challenging case presented by the Fellow
  - v) Conduct a prospective study during this period and present it at a conference.
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- **Perioperative teaching by paediatric anaesthesiology faculty**: active involvement in mentoring clinical management which includes:
    - i) Review of preoperative assessment of each patient by the anaesthesiology fellow prior to general /regional anaesthesia or sedation
    - ii) Discuss anticipated anaesthetic management prior to and during general / regional anaesthesia or sedation
    - iii) Informal discussion of topics related to the individual case