Curriculum & Syllabus

Postdoctoral Fellowship (PDF)

in

Paediatric Cardiac Anaesthesia

Justification for PDF program

There is an increase in the incidence of children born with heart disease in India due to various environmental, genetic mutations, familial and other multiple factors apart from high population growth. Many new born children are surviving immediately after birth with congenital heart disease due to early diagnosis and improved connectivity to hospitals, increased awareness among the people and improved treatment.

The increase in number of pediatric cardiac surgeries needs proportionate number of anaesthesiologists focused to paediatric cardiac anesthesia and intensive care. Many cardiologists and cardiac surgeons are dedicated to congenital cardiac patients care. Some centres are opening operation rooms (OR) specific for paediatric cardiac surgery. Various states and central Governments of India are introducing programmes for children suffering from heart diseases. Hence this fellowship will help in filling the shortage of trained, skilled and educated paediatric cardiac anaesthesiologists in our country.

There has been significant advances in the field of cardiothoracic and vascular anaesthesiology which has lead to the need for having specialized training in clinically and technically demanding fields. After 3 year DM training in cardiothoracic and vascular anaesthesiology, focused training in subspecialities like paediatric cardiac anaesthesia will make them more competent when they enter into cardiac anaesthesia practice. Though there has been significant advances in congenital heart disease treatment, we still find that the training for anaesthesia in paediatric congenital heart disease is unfulfilled. Few reasons are age of the patient groups and diverse disease conditions which are complex and difficult to manage without proper training and expertise. Also critical care management of small neonate patients in ICUs after surgery or catheterization lab interventions is challenging and

needs more manpower. Since, the outcome results of congenital heart surgery has dramatically improved over the last few years, we need more trained professionals for providing perioperative pediatric anaesthesia care.

On an national level, there is scracity of adequately trained pediatric cardiac anaesthesiologists and intensivists and there are limited number of centres having a fellowship program in paediatric cardiac anaesthesia. Through one year fellowship program, instititute will be able to give focused training in the field of paediatric cardiac anaesthesiology including perioperative echocardiography (Transesophageal, Epicardial and Transthoracic echocardiography), paediatric regional anaesthesia, and postoperative pediatric ICU care. Thus the twelve months Paediatric Cardiac Anaesthesia PDF program is designed as a comprehensive educational and clinical training program to provide graduates the clinical expertise, scholarly & research experience, team leadership skills, and supervisory proficiency expected of consultants and leaders in the field of paediatric cardiac anesthesiology.

CURRICULUM

Introduction

This curriculum is designed for training a DM graduate in cardiothoracic and vascular anaesthesia in providing anaesthesia care for the congenital heart disease patients undergoing cardiac surgeries, cardiac interventions and cardiac imaging. This one year fellowship programme incorporates an overall hands-on training in the perioperative anaesthetic management of congenital heart diseases, its complications as well as an exposure to perioperative transesophageal, epicardial and transthoracic echocardiography and regional anaesthesia techniques for the better management of paediatric patients with congenital heart disease.

Goals and objectives

- The fellow receives training for performing proper pre-anaesthetic workup, to recognize the complexity of cardiac disease and formulate the anaesthetic plan to overcome the difficulties in providing the anaesthesia for the congenital heart disease children.
- The fellow will get thoroughly trained in anesthetic management in the operating rooms which includes maintenance of hemodynamic & respiratory stability in neonates and children with variable cardiovascular pathophysiologies.
- They are also trained in providing anaesthesia at different locations (like cardiac catheterization lab, CT imaging room, MRI suite and ICUs), where the environment and procedures differs from the operation theatre.
- Fellow should also be able to manage cyanotic and acyanotic congenital heart diseases, its complications and the need for ICU care.
- They are trained to recognize the emergency conditions in paediatric patients and are prepared to perform endotracheal intubations, central venous cannulations and arterial cannulations.
- The fellow is trained in providing cardiopulmonary and cerebral resuscitation of congenital heart disease patients, handling new modalities of ventilation (like High frequency oscillatory ventilation (HFOV), high flow oxygen therapy, nitric oxide ventilators etc), paediatric fibreoptic bronchoscopy and ultrasound guided vascular access/regional blocks.
- Training in performance and interpretation of intraoperative transesophageal echocardiography findings and guides the surgical team in decision making. They also gets exposure in managing the patients on extracorporeal membrane oxygenation (ECMO).

- During the fellowship programme, they should also be able to plan and do 1 or 2 research projects in the field of paediatric cardiac anaesthesiology and perioperative echocardiography.
- They will acquire the attitude and communication skills to function as an efficient team leader and a member.
- Develop attitude and communication skills to deal with children and their relatives.

Definitions

A trainer of the fellow is the program director or faculty appointed by program director who has adequate skills, knowledge and experience in the sub-speciality of paediatric cardiac anaesthesia and perioperative echocardiography. A paediatric cardiac anaesthesiology specialist is a cardiac anaesthetist who has a fellowship training in paediatric cardiac anaesthesia (for a minimum of 1 year) and/or for whom paediatric cardiac anaesthesia comprises more than 50% of his/her clinical and research activities.

SYLLABUS

I. Basic sciences of congenital heart diseases

A. Anatomy:

- Basic and correlative cardiac, thoracic and vascular anatomy
- Embryological development of normal heart, great vessels and thoracic structures
- Embryology of congenital cardiac lesions

B. Pathophysiology:

- Cyanotic and acyanotic cardiac diseases

- Congenital vascular diseases
- Clinical laboratory tests

C. Pharmacology:

- Basic and correlative pharmacology of drugs acting on heart, lung, vasculature and other vital organs.
- Pharmacological principles of anaesthetic drugs
- Indications and the rational use of anaesthetic drugs in cyanotic and acyanotic patients.

D. Microbiology:

- Infections following paediatric cardiac surgeries
- Nosocomial infections in ICU and VAP infections
- Paediatric Sepsis management protocols
- Guidelines and recommendations to prevent infections

E. Cardiovascular Engineering:

- Material in cardiovascular application and biocompatibility
- Principles and Mechanics of Paediatric cardiopulmonary bypass circuit
- Paediatric ECMO circuit

F. Perioperative Monitoring:

- Hemodynamic monitoring
- Respiratory monitoring
- Neurological monitoring (BIS, NIRS)
- Coagulation monitoring (Activated clotting time, Thromboelastography)
- Transesophageal & Trans thoracic echocardiography,

G. Ventilatory Therapy

- Newer modes of ventilation (invasive & non-invasive HFOV, SIMV-HFOV, high flow oxygen therapy, nitric oxide ventilation)
- Principles of ventilator therapy in neonates
- Difficult weaning from ventilator
- Tracheostomy management

II. Clinical sciences

- Clinical features, diagnostic aspects, therapeutic strategies, principles of perioperative care, anaesthesia management and surgical principles in congenital heart disease patients subjected to corrective or palliative surgery.
- Postoperative intensive care of paediatric patients following cardiothoracic and vascular surgery: vital organ care, homeostasis, management of surgical bleeding, ventilatory therapy, invasive and non-invasive monitoring, nutrition, management of postoperative infections, management of medical emergencies, transportation of critically ill patients, physiotherapy and nursing care.
- Anaesthetic management of paediatric patients subjected to cardiac investigations and therapeutic procedures in cardiac catheter laboratories and radiology suites

III. Training in Echocardiography

- Principles of ultrasound and knobology
- Understanding the echocardiographic anatomy of congenital cardiac lesion
- Evaluation of complex congenital heart diseases by transesophageal echocardiography
- Perioperative TEE or Epicardial echo guided surgical decision making

- Postoperative cardiac evaluation by transthoracic echocardiography in guiding inotropes and fluid therapy

IV. Regional Analgesia Techniques

Training for performing regional block for perioperative analgesia (ultrasound and landmark based)

- Caudal block
- Bilateral paravertebral block
- Regional nerve blocks (parasternal, erectar spinae, PECS)

V. Ultrasound Scanning

- Perioperative vascular access
- Diagnosing lung pathologies in ICUs
- Diagnosing diaphragmatic palsy in postop cases
- Transcranial doppler to evaluate middle cerebral artery flow in ICUs

VI. Fibreoptic Bronchoscopy & Video Laryngoscopy

Training to perform paediatric fibreoptic bronchoscopy / video laryngoscopy

- in difficult intubation
- bronchial suction for airway clearance

VII. Cardiac Imaging and Cardiac Intervention

- Interpretation of cardiac CT, CT angiogram and CT perfusion
- Interpretation of MRI and MR angiogram
- Conventional angiogram techniques
- Interpretation of cardiac catheterization reports

VIII. Research

Short term prospective study to be conducted during the course period with an aim to publish it in an indexed journal of repute in the field of paediatric cardiac anaesthesia/present findings in national/international conferences.

IX. Recommendations of Textbooks and journals

A. Textbooks: A trainee is expected to gain the academic knowledge through standard textbooks related to the specialties like Pediatric Anesthesia, Pediatric Cardiac anesthesia, Congenital echocardiography, Critical care, Pediatric Cardiothoracic & vascular surgery, Pediatric cardiac imaging and Pediatric Cardiology.

B. Journals: A trainee is expected to upgrade his/ her academic knowledge through published article of various journals related to the Pediatric Anesthesia, Pediatric Cardiac anesthesia, Congenital echocardiography, Critical care, Pediatric Cardiothoracic & vascular surgery, Pediatric cardiac imaging and Pediatric Cardiology.