

Postdoctoral fellowship in paediatric cardiology

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Part I

Introduction:

Post-doctoral fellowship (PDF) in paediatric cardiology is a one-year program accepting 1 fellow each year. The training consists of clinical rotations and research experience. The program engages new fellows with hands-on training and skill development. A core group of committed teaching staff oversee the program, with collaboration of multidisciplinary programs. Research opportunities are diverse. Fellows are expected to participate in ongoing projects, or to design and implement their own project.

Goals:

The goal of the program is to train excellent academic congenital heart disease specialists to enable them to become competent in all diagnostic and therapeutic areas of clinical pediatric cardiology so that he/she is capable of acting as a consultant.

It is a comprehensive program which provides training in the essential diagnostic, therapeutic and consultative skills required of a clinical cardiologist, as well as pursuit of research and academic endeavours. The Department works closely with the paediatric cardiac Surgery Program and the imaging department to deliver integrated medical, interventional, and surgical care to a diverse and challenging patient population. The surgical program includes complex neonatal repairs, staged palliations, operations for adults with congenital heart disease. There is a huge variety from fetal to adult life and everything in between. Variety not just in ages and cases but also in physiology. Commitment of a high order is expected.

Training is imparted with input from adult cardiac and electrophysiology divisions also.

Part II

Training:

Fellows are the primary caregivers and first line consultants, and are given increasing levels of autonomy and independence within a structured environment of education and supervision. The training is practical and procedure-based. Emphasis is on team-based working and close working relationship with surgeons.

Fellows are required to make diagnostic and therapeutic decisions based on patient information, current scientific evidence and clinical judgment. They should be able to provide effective counseling with regard to medical issues such as pregnancy and contraception. Fellows should be aware of the unique psychosocial needs that must be met for these patients in transitioning from pediatric to adult care.

Rotations: They complete rotations in the following areas: Cardiac Intensive Care, Bedside hemodynamic monitoring, Inpatient Care, Electrophysiology and pacing, Consultation, Outpatient

Care, Exercise Physiology, Catheterization, angiography, echocardiography, MRI/CT and Adult Congenital Heart Disease, pulmonary hypertension, Heart Failure.

The **Cardiac Intensive Unit** rotation is designed for the fellow to develop expertise in the acute and chronic medical management of infants and children diagnosed with congenital and acquired heart disease.

fellows become familiar with all aspects of **care for critically ill cardiac patients** including:

vascular access,

indications for, and limitations and risks of, invasive tests and procedures in critically ill patients

principles of pharmacology and relationship with cardiovascular physiology

Airway management and mechanical ventilation

Preoperative stabilization

Cardiopulmonary bypass and its sequelae

Technical aspects of cardiac surgery and postoperative management

Mechanical support including ECMO

experience in managing these types of patients:

ductal-dependent lesions,

acute heart failure,

Neonates with complex physiology (e.g., hypoplastic left heart syndrome, critical aortic stenosis), severe Ebstein's anomaly, and pulmonary atresia with ventricular septal defect and major aortopulmonary collateral vessels

d-transposition of the great arteries

total anomalous pulmonary venous connection with obstruction

anomalous origin of a coronary artery from the pulmonary artery

Single-ventricle patients

symptomatic arrhythmias

infectious endocarditis/sepsis

pericardial effusion and tamponade

hypercyanotic episode

Cardiology fellows work closely with critical care, cardiac anesthesia and cardiac surgery fellows in the management of all patients in the CICU, including pre- and post-operative care and participation in invasive procedures.

During the **echocardiography** laboratory rotation, fellows learn the segmental approach to cardiac diagnosis and the morphologic method of cardiac description and become acquainted with a wide variety of congenital heart defects.

fellows acquire the knowledge and skills necessary to correctly perform and interpret transthoracic (TTE), transesophageal (TEE) and fetal echocardiograms.

TTE: Independently perform and interpret TTEs in patients of all ages and diagnostic complexity.

Independently utilize echocardiographic data to guide clinical decisions in children and young adults with congenital and acquired heart disease.

Know quantitative methods of systolic and diastolic ventricular function assessment.

Know how to interpret and report regional ventricular function.

Observe and be familiar with applications and limitations of 3-dimensional imaging.

Be proficient in advanced quantitative and hemodynamic assessment using 2- and 3-dimensional and myocardial deformation imaging

Be familiar with echocardiographic imaging implications and uses of telemedicine.

examinations should include repaired, palliated, and unrepaired CHD, as well as pediatric forms of acquired heart disease.

supervise sonographers and junior fellows and help them acquire core skills.

Develop and/or participate in non-invasive imaging related research, with a goal of project completion as evidenced by presentation at a national meeting and manuscript publication.

TEE: Indications and use of TEE in the operating room, interventional (cardiac catheterization) laboratory, intensive care unit, and outpatient settings.

Strengths and limitations of TEE.

Contraindications and complications of TEE.

Familiarity with the TEE views

Advanced imaging modalities include 3D and deformation imaging. Performing, recording and interpreting echocardiogram, reporting of echo, presentation and correlation with clinical findings are dealt with.

Fetal echocardiography:

Indications for, and limitations of, fetal echocardiography.

Gestational age at which to refer for a fetal echocardiogram.

Normal physiology of fetal and transitional circulation.

Alterations in fetal circulation associated with CHD that impact outcome.

Fetal arrhythmia evaluation, management, outcomes, and utility of fetal echocardiographic monitoring.

Extracardiac anomalies in the fetus that impact prenatal and perinatal outcome.

Existing innovations in perinatal management

counseling of families and plan of delivery

MRI and CT: Fellow will learn to compare and contrast different types of MRIs (e.g. spin echo, cine, magnetic tagging) and be able to list the advantages and limitations of cardiac magnetic resonance as a diagnostic modality. Also, be able to correctly identify cardiac anatomy, interpret cardiac physiology and correctly synthesize diagnoses obtained from magnetic resonance studies. The fellow will be able to concisely and accurately convey pertinent data obtained from MRI at surgical conference.

Interpret at least 25 cardiac MRI examinations, including assessment of cardiac anatomy, function, and physiology;

Develop an understanding of MRI physics, instrumentation, nomenclature, and MRI safety.

cardiac MRI techniques, including image acquisition and interpretation.

Fellow acquires the required knowledge, skills and attitudes to effectively evaluate and initiate management of infants, children and adolescents with cardiomyopathy and heart failure.

OPD: fellows is assigned to outpatient clinic where he can see a wide range of patient referrals.

Exposure to noninvasive and invasive diagnostic procedures, including:

Transthoracic, Transesophageal and Fetal Echocardiography and Doppler studies

Diagnostic and interventional cardiac catheterization and angiography

Electrocardiography

Cardiopulmonary exercise testing

Invasive Electrophysiologic studies

Cardiac Magnetic Resonance Imaging

CT

Cath lab:

Medical Knowledge

Know the risks and benefits of catheterization and specific interventions.

Know the indications and contraindications for catheterization and specific interventions.

Know procedural techniques for catheterization and specific interventions.

Know the principles of radiation safety.

Patient Care and Procedural Skills

Have the skills to interpret waveforms, determination of pressures, and gradients.

Have the skills to apply thermodilution and the Fick principle for flows and resistances.

Have the skills to recognize normal and abnormal hemodynamics.

Have the skills to interpret angiographic information.

Have the skills to assess interventional outcomes, both successful and unsuccessful.

Have the skills to assess the limitations of a procedure and to recognize and manage complications.

Minimum Number of Procedures in cath lab

Cardiac catheterization (including interventions) 100

Interventional procedures (including those listed below) 150

Interventional procedures in neonate 25

Device closures (ASD, VSD, PDA, PFO, and others using closure devices and plugs) 30

Angioplasty procedures 30

Stent insertion 20

Transseptal punctures 5

Procedures to open the atrial septum 5

Expected skills after fellowship:

Diagnosis and treatment of congenital heart disease

Diagnosis and treatment of acquired heart disease in children

Diagnosis and treatment of arrhythmia

Management of heart failure

Valvular Heart Disease

Adult congenital heart disease

Preventive cardiology including obesity, lipidology and atherosclerosis

Recommendations for minimal numbers of procedures:

perform and interpret a minimum of 500 echocardiograms.

cardiac catheterization laboratory: perform at least 250 diagnostic and/or interventional catheterizations.

Responsibilities include:

Participation in morning and evening rounds with the CICU team

Coordination of all appropriate pre- and post-operative testing

Fellows participate in daily pre-catheterization conferences, present and discuss data in post-catheterization conferences.

follow patients with acquired and congenital heart disease throughout their course of treatment-from inpatient unit, emergency department or primary caregiver referral to diagnosis and subsequent medical and/or surgical intervention and post-operative care.

professionally counsel patients and families with cultural competence, awareness and sensitivity, and use information technology competently and efficiently to optimize patient care.

GUCH:

Know the unique aspects of caring for cyanotic adults, including Eisenmenger syndrome and pulmonary vascular disease.

Know the electrophysiological abnormalities specific to ACHD patients.

Know the mental health and cognitive outcomes in ACHD patients.

Know the complex relationship between cardiovascular disease, erectile dysfunction, and endothelial dysfunction.

Following components need to be instilled:

Multidisciplinary Teams Involved in ACHD Care

Transition From Adolescence to Adulthood

Recognition of Concomitant Adult Medical Conditions

Knowledge of Electrophysiology in ACHD Care

Cyanotic Adults With Eisenmenger Syndrome and Pulmonary Vascular Disease

Advanced Heart Failure and Determination of Transplant Candidacy

Importance of Palliative Care

Mental Health and Cognitive Outcomes

Safety of Participation in Sports and Exercise

Sexual Function

Contraception and Pregnancy

Employment and Advocacy

Academic Environment

The Fellowship Program provides a stimulating learning environment with a full spectrum of didactic and clinically-oriented teaching conferences. These include didactic lectures on specific areas of cardiology, Patient Management Rounds, Management Discussion Conference; Mortality; Echo Conference; Journal Club; Cath, Angiography and Imaging Conference; Surgical Conference; and a periodic Meeting with the Program Director. The aim is to create innovators and leaders in academic medicine within the field of pediatric cardiology

Part III

A week in the life of fellow:

all days:

08:00 am: Cath conference (morning Meeting)

Fellows participate in daily morning rounds with residents, reviewing physical findings, laboratory results and management plans for each patient. The fellow supervises the management of inpatients and teaches basic cardiology topics to the residents.

5:00 pm: ward round/review post-catheter patients

9-30 AM:

Monday: Journal club after Cath conference

Following that, echocardiography lab

Tuesday: paediatric forum (didactic discussion) after Cath conference

Following that, echo and cath lab alternate weeks

Wednesday: adult cardiac intervention forum after Cath conference

Following that cath lab, 3 PM: joint cardiac meeting

Thursday: seminar after Cath conference

Following that cath lab

Friday: electrophysiology forum after Cath conference

Following that OPD

Saturday: Seminar, 9-30 AM: joint cardiac meeting; 11 AM: long seminar, 2 PM: joint cardiac meeting with radiology team

Journal reviews, topic reviews are part of their presentation

Mortality meet one day every month

PDF is on first call on every aspect of patient care. They will report directly to the consultant on call.

Part IV

Research Opportunities

Research is an important component of the Pediatric Cardiology Fellowship Program. The Training for this includes interpretation and critical review of scientific literature, knowledge and skill in study design and statistics, and development of the skills necessary for grant writing, abstract submission and presentation, and manuscript preparation and submission.

Fellows participate in a hypothesis driven project, ideally related to their specific area of interest and their long term goals. Each fellow is provided with two faculty who meet regularly with the fellow to assist with progress of the project. Fellows are expected to present their research at multiple forums.

Fellows think prospectively about their research work early in the fellowship. They work with their clinical faculty mentor. They identify a project, and discuss with the ethics committee to ensure project feasibility, timeliness and efforts toward completion. The research project involves data collection, analysis and writing a paper / abstract presentation.

They present research to division faculty and peers. Fellows are encouraged to submit posters and abstracts to major cardiology conferences. A thesis is submitted at the end of fellowship.

Know the methods of conducting a comprehensive and systematic search of the literature on a clinical problem.

Following are the steps in the achievement of the goals:

Know the basic statistical methods used in clinical research studies.

Have the skills to determine the resources needed and to implement a clinical research plan.

Have the skills to obtain informed consent and assent for enrollment.

Have the skills to recognize and report adverse events.

Know regulatory requirements in the study design.

Have the ability to identify ethical challenges and potential conflicts of interest in clinical research.

Have the skills to write a grant for intramural or extramural funding.

Have the skills to prepare an abstract for submission to a national meeting.

Have the skills to prepare a manuscript for publication.

Have the skills to present an abstract at a national conference.

Part V

Other skills:

Fellows are expected to demonstrate professionalism by practicing within the scope of expertise.

For Interpersonal and Communication Skills, fellows are expected to function as an effective communicator within a multidisciplinary team and engage in shared decision making with patients and their families, including options for diagnosis and treatment.

Explain clinical status to family including reasons for additional testing and intervention.

Explain surgical and/or catheter intervention to family including benefits/risks, anticipated course, and post-intervention follow-up.

Respond appropriately in emergency situations by recognizing limitations and seeking assistance when needed.

Advise patient and family on appropriate levels of sports and competitive athletic participation.

Fellows are expected to assume a degree of responsibility, taking on teaching junior fellows and residents that are commensurate with their experience, as determined and supervised by attending faculty.

Participate in end-of-life patient care plans.

In this manner, fellows learn effective time management from balancing patient care responsibilities with other aspects of their academic and clinical workload.

Part VI**Assessment****Log book:**

Completion of procedure logs, and faculty evaluations is expected in a timely manner. It consists of clinical work, Echo, Cath, presentations, etc

Degree:

The fellowship program is accredited by the Institute.