

## **ACGME Program Requirements for Graduate Medical Education in Pediatric Cardiology**

Effective: July 1, 2007

### Introduction

#### Int.A. Scope of Educational Experience

Int.A.1. Pediatric cardiology programs must provide fellows with an understanding of normal and abnormal cardiovascular conditions, with a focus on the pathophysiologic basis of cardiovascular disease, and prepare them to provide optimal care and consultation for pediatric patients with cardiovascular disease.

Int.A.2. The program must include progressive, properly-balanced, and well-organized responsibility for the care and study of patients on inpatient services, in intensive care units, and in ambulatory centers.

### VIII. Institutions

It is preferable that all facilities be within the primary site. Where a special facility is shared in the interest of cost and efficiency, the program director may arrange for a fellow to rotate to that facility.

### IX. Program Personnel and Resources

#### IX.A. Faculty

##### IX.A.1. Pediatric Cardiologists

There must be at least four pediatric cardiologists who provide sufficient time to the program to ensure its educational and research quality, and to provide adequate supervision of cardiology fellows.

#### IX.B. Other Program Personnel

IX.B.1. Appropriate board certified pediatric intensive care personnel must be available for the special and constant care needed by patients in the PICU. Fellows also must be provided access to scientists who are actively engaged in cardiovascular research.

IX.B.2. Staff from other disciplines, including cardiovascular radiology, cardiothoracic surgery, anesthesiology, pathology, genetics, and those with knowledge in the care of adults with congenital heart disease, should be readily available.

IX.B.3. Special staff expertise should be available in electrophysiology, exercise physiology, invasive and interventional cardiac catheterization procedures, preventive cardiology, and echocardiography, including transesophageal, Doppler, and fetal echocardiography. In addition, staff

with expertise in other non-invasive diagnostic modalities such as cardiac magnetic resonance imaging (MRI) and/or CT angiograms should be available.

IX.C. Resources

IX.C.1. Facilities should include space in an ambulatory setting for optimal evaluation and care of outpatients, and an inpatient area with a full array of pediatric and related services staffed by pediatric faculty and fellows.

IX.C.2. An active inpatient pediatric cardiology service is essential to the educational program. It should provide all the diagnostic and treatment services characteristic of a comprehensive children's facility.

IX.C.3. There must be an intensive care unit in each center in which patients with heart disease are cared for under the supervision of the training program staff. In these units there must be preoperative and postoperative patients with heart disease available to the fellows, as well as appropriate personnel and equipment to allow provision of the special and constant care needed by these patients.

IX.C.4. Clinical data, including data from inpatients, outpatients, and patients undergoing catheterization and/or surgery, should be cross-indexed to allow rapid evaluation and analysis of the assembled information, including age, diagnosis, and outcome morbidity and mortality.

IX.C.5. Support Facilities

The following facilities must be available:

IX.C.5.a) diagnostic imaging facilities that include cardiac MRI and/or CT scanning and nuclear cardiology;

IX.C.5.b) diagnostic and interventional cardiac catheterization laboratory facilities;

IX.C.5.c) an echocardiography laboratory with facilities for performing and interpreting standard transthoracic 2-D and Doppler echocardiograms, fetal echocardiograms, and transesophageal echocardiograms;

IX.C.5.d) a non-invasive electrophysiology laboratory with facilities for performing and interpreting standard electrocardiograms, ambulatory electrocardiograms, and exercise electrocardiograms;

IX.C.5.e) a clinical cardiac electrophysiologic laboratory for invasive intracardiac electrophysiologic studies and catheter ablation;

IX.C.5.f) laboratories to perform routine analyses of blood and urine, to determine blood gas values, to perform blood chemistry and coagulation profiles, and to type and cross-match blood;

IX.C.5.g) an operating room designed for pediatric patients who require cardiopulmonary extracorporeal circulation. The area must be equipped with appropriate monitoring devices, defibrillators, and cardiac pacing devices; and,

IX.C.5.h) a blood bank closely affiliated with the center that is equipped to meet the demands of cardiac surgery.

IX.C.6. Patient Population

IX.C.6.a) Patients available to the program must encompass age groups from the fetus and newborn through young adulthood, and must include exposure to adults with heart disease, particularly congenital heart disease. The fellow must be exposed to pathologic conditions ranging from mild to those requiring extensive or continued intensive care. There must be both pre- and post-surgical and medical experience with a broad spectrum of congenital and acquired heart disease, and in chronic, acute, and emergency situations.

IX.C.6.b) Patients admitted to the inpatient service should be under the direct or indirect supervision of the subspecialty program staff, and must be available to the fellows.

IX.C.6.c) An accredited program must have an annual patient population, including patients less than one year of age, that is sufficient in number to enable each fellow to become skilled in techniques fundamental to the practice of pediatric cardiology.

X. Educational Program

X.A. Patient Care

X.A.1. Training in history-taking and physical examination must be the cornerstone of the training program. This must include family history that is a critical aspect of the evaluation of pediatric patients with suspected cardiovascular disease. Programs must include training in the following fundamental skills:

X.A.2. Noninvasive Techniques

X.A.2.a) The program must provide education in clinical diagnosis, with special emphasis on radiology, electrocardiography, echocardiography, exercise testing, ambulatory electrocardiography, and magnetic resonance imaging. Each fellow must perform and interpret a minimum of 300 pediatric echocardiography studies.

X.A.2.b) The program also must provide sufficient experience for fellows to acquire skill in the interpretation of electrocardiograms,

ambulatory ECG monitoring studies, and exercise stress testing with ECG monitoring.

X.A.3. Invasive Techniques

Experience and instruction must be provided in the techniques and understanding of the indications for and limitations of diagnostic cardiac catheterization, selective angiocardiology, electrophysiologic testing, therapeutic catheterizations, and pacemaker implantation. During the three years of training, each fellow should participate in a minimum of 100 catheterizations and 10 pediatric intracardiac electrophysiologic studies.

X.A.4. Resuscitation Techniques

Experience and instruction in the techniques, indications, contraindications, complications, and interpretation of pericardiocentesis, cardiopulmonary resuscitation, mechanical ventilation, cardioversion, and temporary pacing are required.

X.A.5. Technical and Other Skills

The fellows must learn the use of relevant electronic equipment, recording devices, and other equipment necessary to perform cardiac catheterization, echocardiography, ambulatory ECG monitoring, and electrophysiologic studies. The fellows should be exposed to the basics of implantable pacemaker and cardioverter defibrillator function, and the interrogation and programming of these devices. In addition, the program must instruct the fellows in the fundamentals of radiation safety.

X.A.6. Preoperative and Postoperative Care

X.A.6.a) Fellows must participate in the care of preoperative and postoperative care of patients having both closed and open cardiac surgery, in close cooperation with the cardiothoracic surgical staff. Fellows must participate in cardiac catheterization conferences to develop the knowledge required in decision making and planning for corrective cardiac surgery. Fellows must have sufficient exposure to and instruction in current surgical techniques, mechanical ventilation, methods of cardiopulmonary bypass, and hypothermia to develop an adequate understanding of these surgical techniques. The fellow should receive instruction in the management of postoperative patients and postoperative complications, both immediate and delayed. Opportunity for long-term follow-up observations of both preoperative and postoperative patients must be provided.

X.A.6.b) Fellows should participate in consultations or conferences in which the medical and surgical staff evaluate the results of surgery and the patient's cardiac status before discharge from the hospital.

X.A.7. Pediatric Cardiology Clinic

Fellows must attend a regularly-scheduled pediatric cardiology clinic that is supervised by one or more members of the cardiology staff. Time and space in this clinic must be available for fellows to provide continuity and follow-up care for patients under their care.

X.A.8. Other Clinical Experiences

Fellows must have instruction and clinical experience with collagen vascular diseases, infective endocarditis, cardiomyopathy, Kawasaki disease, and other infectious, vasculitic, and metabolic conditions. Instruction should also include clinical experience in assessing the genetic basis of heart disease. Fellows should have instruction in the etiologic and risk factors in hypertensive and atherosclerotic heart disease, including hyperlipidemic states, and should gain experience in the prevention, diagnosis, and management of patients with these cardiovascular problems. Fellows should understand the indications for cardiac transplantation and the basics of immunosuppression, natural history and complications of transplantation.

X.B. Medical Knowledge

X.B.1. Fellows must have instruction in embryology and anatomy of the normal heart and vascular system, clinical morphologic correlations, and potential deviations from normal. The program should teach Normal and abnormal cardiovascular and cardiopulmonary physiology and metabolism, as well as fundamentals of cardiovascular pharmacology, including mechanisms of drug action, therapeutic indications, and side effects.

X.B.2. The fellows must receive instruction in cardiovascular pathology that includes structured educational experiences to examine various types of congenital cardiovascular anomalies. Conferences involving current pathological material must be held regularly, and must be closely correlated with clinical experience.

X.B.3. The program must engage fellows in courses, seminars, workshops, and/or laboratory experience that provide an appropriate background in basic cardiac physiology, cardiac pharmacology, and other fundamental disciplines related to the heart and cardiovascular system.

X.B.4. Multidisciplinary conferences should include physiology, pharmacology, neonatology, anesthesiology, critical care, cardiothoracic surgery, cardiac radiology (such as MRI), and adult cardiology.

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