

## Task Force 1: Pediatric Cardiology Fellowship Training in General Cardiology<sup>1</sup>

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Pediatric Training Statement: General Cardiology

# Task Force 1: Pediatric Cardiology Fellowship Training in General Cardiology<sup>1</sup>

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## 1. Introduction

### 1.1. Document Development Process

The Society of Pediatric Cardiology Training Program Directors (SPCTPD) board assembled a steering committee which nominated 2 chairs, 1 SPCTPD steering committee member, and 5 additional experts from a wide range of program sizes, geographic regions, and subspecialty focus. Representatives from the American College of Cardiology (ACC), American Academy of Pediatrics (AAP), and American Heart Association (AHA) participated. The steering committee member was added to provide perspective to each task force as a “non-expert” in that field. Relationships with industry and other entities were not deemed relevant to the creation of a general cardiology training statement; however, employment and affiliation information for authors and peer reviewers are provided in Appendices 1 and 2, respectively, along with disclosure reporting categories. Comprehensive disclosure information for all authors, including relationships with industry and other entities, is available as an online supplement to this document

[http://jaccjacc.acc.org/Clinical\\_Document/Ped\\_TS\\_TF1\\_Comprehensive\\_RWI\\_Supplement.pdf](http://jaccjacc.acc.org/Clinical_Document/Ped_TS_TF1_Comprehensive_RWI_Supplement.pdf).

The writing committee developed the document, approved it for review by individuals selected by the participating organizations (see Appendix 2), and addressed the comments. The final document was approved by the SPCTPD, AAP, and AHA in February 2015 and approved by the ACC in March 2015. This document is considered current until the SPCTPD revises or withdraws it.

<sup>1</sup> The American College of Cardiology requests that this document be cited as follows: Lewis AB, Martin GR, Bartz PJ, Fischbach PS, Fulton DR, Matherne, GP, Reinking B, Spicer R. Task force 1: pediatric cardiology fellowship training in general cardiology. J Am Coll Cardiol. 2015;●●:●●●●—●●●●.

## 1.2 Background and Scope

The goals of pediatric cardiology training include the acquisition of cognitive and procedural expertise needed to provide high-quality care to the fetus, infant, and child with congenital and acquired cardiovascular disease and the adult with congenital heart disease along with the acquisition of the academic skills to make meaningful scholarly contributions to the specialty and to develop the capacity for career-long self-education beyond the years of formal training (1). The 2005 guidelines statement emphasized the “time” (i.e., the number of months or procedures) devoted to a particular “topic”. Since then, competency-based training has become the general framework for medical education and is utilized in this report.

## 1.2. Background and Scope

The goals of pediatric cardiology training include the acquisition of cognitive and procedural expertise needed to provide high-quality care to the fetus, infant, and child with congenital and acquired cardiovascular disease and the adult with congenital heart disease along with the acquisition of the academic skills to make meaningful scholarly contributions to the specialty and to develop the capacity for career-long self-education beyond the years of formal training (1). The 2005 guidelines statement emphasized the “time” (i.e., the number of months or procedures) devoted to a particular “topic”. Since then, competency-based training has become the general framework for medical education and is utilized in this report.

Our revised training recommendations describe the program resources and environment that are required for training pediatric cardiology fellows, together with a competency-based system promulgated by the Accreditation Council of Graduate Medical Education (ACGME), to implement specific goals and objectives for training pediatric cardiology fellows. This system categorizes competencies into 6 core competency domains: Medical Knowledge, Patient Care and Procedural Skills, Systems-Based Practice, Practice-Based Learning and Improvement, Professionalism, and Interpersonal and Communication Skills, along with identification of suggested evaluation tools for each domain. Competencies unique to general pediatric cardiology training, along with suggested evaluation tools, are listed in Section 3 (see the Training Guidelines for Pediatric Cardiology Fellowship Programs Introduction for additional competencies and evaluation tools that apply to all Task Force reports).

The training of pediatric cardiology fellows builds on the clinical and academic skills acquired during residency training. Pediatric cardiology fellows should have a broad exposure to the spectrum of

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inpatient, outpatient, and consultative activities as outlined below, including cardiovascular manifestations of other organ system disorders and preventive cardiology.

**1.3. Levels of Expertise – Core and Advanced**

In the SPCTPD/ACC/AAP/AHA Pediatric Cardiology Training Statement, both *core training* and *advanced training* are identified for fellows across each specialty area. *Core training* is the basic training required of all fellows to become competent consulting pediatric cardiologists and can be accomplished during the standard 3-year pediatric cardiology fellowship training. *Advanced training* guidelines are recommended for fellows who wish to become proficient in a particular field within pediatric cardiology and/or perform or interpret specific diagnostic tests and procedures or render specialized care for specific patients and conditions. Training in general pediatric cardiology represents the foundational training upon which all subspecialized, advanced, and procedure-oriented training is based. Accordingly, all training delineated in this report is core to fellowship training, required for all trainees, and intended to ensure that fellows acquire the knowledge and skills necessary to become a competent consulting pediatric cardiologist.

**2. Program Resources and Environment****2.1. General Environment**

The fundamental goal of clinical pediatric cardiology training is to allow trainees to acquire the diagnostic skills (competencies) necessary to provide optimal inpatient, outpatient, and consultative care to the fetus, infant, and child with cardiovascular disease and young adult with congenital heart disease. This requires the assimilation of data from multiple sources and high-level critical thinking and decision making that is derived from direct patient care. The fundamental skills of history-taking and physical examination form the basis for correctly initiating the diagnostic and management options appropriate for the individual patient. These skills must be stressed at all points of patient contact. Teaching faculty should observe fellows performing the key elements of history and physical examination in order to rate the fellow's progress in acquiring these skills. Similarly, fellows should have the opportunity to observe faculty in this activity. Outpatient clinics, inpatient units, and consultation services all provide excellent opportunities for such training and interaction.

Participation in an outpatient cardiology continuity clinic should occur throughout the entire period of training to develop an understanding of the progression of cardiac disease and its cumulative

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medical and social impact on patients and families. In addition to general pediatric cardiology, the outpatient experience should include patients with heart transplantation, pulmonary hypertension, rhythm disorders, and pacemakers. Fellows should receive at least 4 months of general inpatient cardiology training although 6 months experience is encouraged. Both inpatient and outpatient experiences should include exposure to the management of the young adult with congenital heart disease.

## **2.2. Core Curriculum**

During the course of inpatient and outpatient activities, the pediatric cardiology fellow will acquire understanding and familiarity with the content of the core knowledge base. The tabulation in this document, while comprehensive, should not be viewed as an encyclopedic summary of all that is required but rather it serves as an outline of the medical knowledge and skills needed to become entrusted with the care of pediatric cardiology patients. The fellowship program should offer courses, seminars, workshops, and/or laboratory experiences to provide appropriate background in basic and fundamental disciplines related to the heart and cardiovascular system. A lecture series encompassing a core curriculum in clinical and basic science topics should be provided and should include a multidisciplinary core curriculum in scholarly activities as mandated by the American Board of Pediatrics. Pediatric cardiology fellows should contribute formal presentations of selected topics in the core curriculum to strengthen their knowledge base and develop formal presentation skills. Fellows should have the opportunity to examine pathology specimens of normal and abnormal hearts under the supervision and guidance of a pediatric cardiologist or pathologist with specific background and training in congenital heart disease. Correlation of pathologic anatomy with imaging procedures such as echocardiography, cardiac angiography, and cardiac magnetic resonance imaging (MRI) should be incorporated into the pathology review.

Cardiovascular surgical, cardiac catheterization/intervention, electrophysiology, and echocardiography conferences should be regularly scheduled. Journal club is a necessary element for establishing an academic and scholarly environment and provides an excellent opportunity for the critical evaluation of study design and data analysis of publications, as well as enhancing a commitment to keeping up with advances in medical knowledge and evidence-based patient care. Quality assurance, patient safety, and morbidity/mortality conferences should be held at appropriate intervals. Multidisciplinary clinical and research conferences are strongly encouraged, and according to the resources of individual institutions may include cardiothoracic surgery, neonatology, adult cardiology, pulmonology, pathology, physiology, pharmacology, intensive care, cardiac anesthesiology, radiology, genetics, developmental biology, immunology, and stem cell biology. In all these conferences, pediatric

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cardiology fellows should be provided the opportunity of active participatory roles appropriate to their level of knowledge and training.

### **2.3. Teaching and Evaluation Skills**

Pediatric cardiology fellows should be afforded teaching opportunities in formal and informal settings. These include bedside teaching of medical students, pediatric interns and residents on the inpatient and outpatient services, as well as lectures and seminars to pediatric residents and other subspecialty groups. The pediatric cardiology fellow must be given adequate opportunities to practice clinical and administrative leadership and organizational skills appropriate for his/her level of knowledge, training, and experience. Observation and critique of these skills by faculty cardiologists are necessary components for growth and improvement in these areas.

## **3. Core Training: Goals and Methods**

The core clinical knowledge and experience for general inpatient and outpatient cardiology required for all pediatric cardiology trainees is summarized below. Each clinical area is subdivided according to ACGME competency domain. Suggested evaluation tools to assess competency in each domain are shown in Section 3.10. Please refer to Task Force 4: Pediatric Cardiology Fellowship Training in Electrophysiology for information on evaluating and managing pediatric patients with supraventricular tachycardia. Please refer to Task Force 6: Pediatric Cardiology Fellowship Training in Adult Congenital Heart Disease regarding transition from pediatric to adult congenital heart disease care.

### **3.1. Evaluation and Management of the Cyanotic Newborn**

#### **Medical Knowledge**

- Know the appropriate, prioritized differential diagnosis for a cyanotic newborn including noncardiac causes.
- Know the unique physiology and differences between complete transposition of great arteries and tetralogy of Fallot.
- Know the natural history of the disease process (with and without intervention).
- Know the physiology of cyanosis including the relationship between cyanosis, oxygen saturation,  $pO_2$ , and oxygen hemoglobin dissociation curve, as well as the effect hemoglobin concentration has on appearance of cyanosis.

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- Know the risks, benefits, and indications for intervention including neonatal palliative shunt, neonatal intracardiac repair, delayed intracardiac repair, or catheter-based intervention.

**Patient Care and Procedural Skills**

- Have the skills to obtain an appropriate history and physical examination and to recognize maternal, fetal, and familial risk factors that may predispose to cyanotic congenital heart disease (2).
- Have the skills to develop appropriate initial management plans based upon physiology, including recognizing ductal dependent lesions and utilizing PGE<sub>1</sub> appropriately; awareness of indications for neonatal atrial septostomy; utilizing appropriate pharmacologic agents to optimize pulmonary and systemic circulation (inotropic support, systemic and pulmonary vasodilators); and utilizing appropriate monitoring and diagnostic testing to direct medical management (e.g., cardiac monitoring, systemic monitoring, cerebral oxygen saturation monitors, lactate and mixed systemic venous oxygen saturation [SVO<sub>2</sub>]).

**Systems-Based Practice**

- Coordinate interdisciplinary outpatient management team including primary care physician, nursing, nutrition, and social services.
- Utilize appropriate and cost effective diagnostic testing including arterial blood gases, chest X-ray, electrocardiogram (ECG), echocardiogram, cardiac catheterization, computed tomography, or MRI and know their limitations and risks.

**Professionalism**

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

**Interpersonal and Communication Skills**

- Effectively communicate management plans with other specialty services including intensive care and surgical teams.
- Communicate with and counsel patients' families regarding immediate and long-term management.

**3.2. Evaluation and Management of Left-to-Right Shunts**

**Medical Knowledge**

- Know the anatomy of the atrial septum and correlations between pathologic specimen, clinical presentation, and diagnostic tests (echocardiography and angiography).
- Know the types of atrial septal defects based on location.



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- Know the anatomy of the ventricular septum and correlations between pathologic specimen, clinical presentation, and diagnostic tests (echocardiography and angiography).
- Know the types of ventricular septal defects (VSDs) based on location.
- Know the pathophysiology and natural history of left-to-right shunt lesions, including spontaneous closure of VSDs and the effect of changes in pulmonary and systemic vascular resistance on shunt flow.
- Know the mechanisms of action, risk/benefits and appropriate utilization of pharmacologic agents in the management of left to right shunts (e.g., diuretics, angiotensin converting enzyme inhibitors, and digoxin).
- Know the indications and timing of surgical or catheter intervention based on lesion.

**Patient Care and Procedural Skills**

- Have the skills to obtain a detailed history regarding symptoms suggestive of heart failure including respiratory status, feeding intolerance, diaphoresis with feeding, and growth.
- Have the skills to identify signs associated with various shunt lesions including vital signs, respiratory status, precordial impulse, thrill, pulmonic component of second heart sound, systolic/diastolic/continuous murmurs (frequency/pitch, duration, quality, location, and radiation), rales, hepatomegaly, femoral pulses, and perfusion.
- Have the skills to interpret ECG with recognition of QRS axis, atrial enlargement, RVH, and LVH.
- Have the skills to consider need for chest X-rays based on age of patient, findings on exam, and suspicion for a pulmonic process.
- Have the skills to perform and interpret echocardiograms for presence of ASD (location, size), VSD (location, size, LV-RV gradient), PDA (size, Ao-PA gradient), LV size and function, RV size, and pulmonary hypertension. Know when sedation is required and when an alternate imaging modality is necessary.

**Systems-Based Practice**

- Order appropriate diagnostic testing and design management plans in a cost effective manner.
- Set appropriate intervals for follow-up assessment.

**Interpersonal Communication and Skills**

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



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- Explain clinical status to family, reasons for additional testing, and the need for pharmacologic agents or hospital admission based on clinical status.

### **3.3. Evaluation and Management of Right and Left Heart Obstructive Lesions**

#### **Medical Knowledge**

- Know the pathophysiology and natural history of valvar, subvalvar and supra-valvar aortic and pulmonic stenosis, coarctation of aorta, and bicuspid aortic valve.
- Know the indications for surgical or catheter intervention based on lesion.

#### **Patient Care and Procedural Skills**

- Have the skills to obtain detailed age-appropriate history regarding symptoms including respiratory status, feeding intolerance, diaphoresis with feeding, growth, exercise intolerance, and chest pain.
- Have the skills to identify physical examination signs associated with various obstructive lesions including upper and lower extremity blood pressure differences, respiratory status, precordial impulse, thrill, ejection clicks, murmurs (frequency/pitch, duration, quality, location, and radiation), femoral pulses, and perfusion.
- Have the skills to interpret ECG with recognition of QRS axis, RVH, LVH, ST and T wave abnormalities.
- Have the skills to perform and interpret echocardiogram for presence of valvar (subvalvar and supra-valvar) aortic or pulmonic stenosis, bicuspid aortic valve, and coarctation of aorta.
- Have the skills to recognize ductal-dependent critical right or left heart obstruction in the neonate and initiate treatment with PGE<sub>1</sub> and recognize when PGE<sub>1</sub> therapy may be detrimental (e.g., pulmonary venous obstruction).

#### **Systems-Based Practice**

- Order appropriate diagnostic testing and design management plans in a cost effective manner.
- Coordinate care with surgical or interventional team and primary care provider.
- Set appropriate intervals for follow-up assessment.

#### **Interpersonal Communication and Skills**

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

### 3.4. Evaluation and Management of Cardiomyopathies

#### Medical Knowledge

- Know the natural history of dilated, hypertrophic, and restrictive cardiomyopathy including the risk for sudden cardiac death (3).
- Know the importance of obtaining a thorough family history and how to utilize genetic testing where appropriate (4) and cost effective.
- Know the indications, benefits, and risks of pharmacologic agents in the management of
  - Dilated cardiomyopathy (DCM): diuretics, angiotensin converting enzyme inhibitors (ACEI), beta-adrenergic antagonists, spironolactone, and digoxin.
  - Hypertrophic cardiomyopathy: beta blockers, non-dihydropyridine calcium channel blockers (e.g., verapamil), and disopyramide.
- Know the indications for septal myotomy/myectomy in hypertrophic cardiomyopathy and implantable cardioverter defibrillator.
- Know the appropriate limitations and restrictions to physical activities and sports participation.

#### Patient Care and Procedural Skills

- Have the skills to obtain an appropriate history and physical examination.

#### Systems-Based Practice

- Coordinate patient care management plan with heart transplant and electrophysiology teams.
- Order appropriate noninvasive and invasive diagnostic modalities in an efficient and cost-effective manner and know how to interpret correctly: ECG, echocardiogram, Holter monitor, treadmill stress testing, MRI, cardiac catheterization, and endomyocardial biopsy (5).

#### Interpersonal and Communication Skills

- Communicate diagnosis, management plans, prognosis, and familial implications with patient, family, and primary care physician and counsels child and family about physical activity and sports participation.

### 3.5. Evaluation and Management of Chest Pain in Children and Adolescents

#### Medical Knowledge

- Know the cardiac and noncardiac causes of chest pain in children and adolescents (6).
- Know the potential contributions and limitations of specific tests to address clinical possibilities suggested by the differential diagnosis.

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- Know the costs and benefits relative to the likelihood of detecting abnormalities of obtaining an ECG, chest X-ray, echocardiogram, Holter/event monitoring, and exercise testing.

**Patient Care and Procedural Skills**

- Have the skills to elicit pertinent history regarding the characteristics of symptoms (e.g., exertional versus nonexertional pain).
- Have the skills to identify contributing family history of sudden death, aborted sudden death, hyperlipidemia, or pulmonary hypertension.
- Have the skills to perform physical examination with emphasis on cardiac aspects of examination.
- Have the skills to formulate a differential diagnosis, including possible cardiac and noncardiac etiologies.

**Systems-Based Practice**

- Obtain subspecialty evaluation (e.g., gastroenterology and pulmonary), when indicated.

**Interpersonal Communication and Skills**

- Summarize the findings with the patient and family with explanation for symptoms and reasons for any proposed testing.
- Review results of tests with patient and family. In the case of a cardiac etiology, discuss implications, plan for further work-up, and treatment/intervention as needed.
- Appropriately reassure patient/family about benign, noncardiac chest pain.

**3.6. Evaluation and Management of Syncope (7)**

**Medical Knowledge**

- Know the pathophysiology of neural-mediated or vasovagal syncope.
- Know the non-pharmacologic management including fluid/salt supplementation and injury avoidance.
- Know evidence-based indications/limitations for pharmacologic management (e.g., midodrine, beta-adrenergic antagonists, and fludrocortisone), including mechanism of action, dosage, frequency, untoward effects.

**Patient Care and Procedural Skills**

- Have the skills to obtain a detailed history regarding the nature of episodes, triggers, postural change, frequency, duration, recovery, pre-syncopal events and fluid intake.
- Have the skills to inquire about pertinent family history.

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- Have the skills to detect abnormalities on physical examination, including measuring vital signs during orthostatic maneuvers.
- Have the skills to interpret ECG with emphasis on findings supporting a cardiac etiology including a long QT interval or conduction abnormalities (8).
- Have the skills to assemble a differential diagnosis based on history and physical examination to consider cardiac, neurologic, or neural-mediated etiology.
- Have the skills to order further cardiac testing as appropriate including Holter/event monitoring, exercise testing, echocardiography, tilt table testing, and MRI.
- Have the skills to recognize the need for neurologic or psychiatric consultation based on history.

**Systems-Based Practice**

- Refer for electrophysiologic evaluation when indicated from history, ECG, and/or Holter/event monitoring.

**Interpersonal Communication and Skills**

- Discuss potential causes with patient/family, including mechanisms leading to syncope that is neural-mediated versus cardiac in origin, and explain indications for further testing if indicated.

**3.7. Evaluation and Management of Hypercholesterolemia and Other Dyslipidemias**

**Medical Knowledge**

- Know the pediatric origins of coronary heart disease in the adult.
- Know the role of diet and lifestyle in prevention of coronary heart disease.
- Know the genetic basis of familial hypercholesterolemia.
- Know the indications, mechanisms of action, benefits, and risks of pharmacologic agents for treatment of dyslipidemia in children with familial hypercholesterolemia, metabolic syndrome, or diabetes mellitus, including bile acid sequestrants, statins, ezetimibe, niacin, fibrates, and omega-3 fatty acids.

**Patient Care and Procedural Skills**

- Have the skills to obtain a detailed family history and recommend screening of appropriate family members and recognize other systemic etiologies of hyperlipidemia (e.g., hypothyroidism and renal failure).
- Have the skills to assess the increased risk of coronary heart disease in patients with familial hypercholesterolemia, metabolic syndrome, and diabetes mellitus.

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- Have the skills to formulate an individualized management plan based upon current cholesterol screening guidelines and recommendations for dietary and lifestyle modification and pharmacologic treatment (9).
- Obtain subspecialty evaluation (e.g., endocrinology, gastroenterology, when indicated).

**Systems-Based Practice**

- Work with family and insurers to minimize costs due to the financial implication of long-term use of pharmacologic agents.

**Interpersonal Communication and Skills**

- Counsel and refer patients for management of overweight and obesity.
- Counsel family about the individual and familial implications of hyperlipidemia and the need for family-wide lifestyle and dietary modifications.

**3.8. Evaluation and Management of Kawasaki Disease**

**Medical Knowledge**

- Know the differential diagnosis for an acute febrile illness mimicking Kawasaki disease.
- Know the symptoms, clinical findings and course of Kawasaki disease including atypical presentation.
- Know the tests to support the clinical diagnosis of Kawasaki disease including ECG, echocardiogram, CBC with differential, platelets, ESR, CRP, Na, and albumin.
- Know the indications, risks, and benefits of pharmacologic agents during all phases of illness including IVIG, aspirin, corticosteroids, heparin, and warfarin.
- Know the incidence and natural history of coronary artery aneurysms, including giant aneurysm development in untreated and treated patients.
- Know the indications for retreatment with IVIG and alternative therapies in the setting of IVIG resistance.
- Know of tailored therapy for patients with residual coronary artery lesions.

**Patient Care and Procedural Skills**

- Have the skills to obtain detailed history of the acute illness with respect to the symptoms and signs of classical Kawasaki disease.
- Have the skills to identify pertinent findings on physical examination necessary to arrive at clinical diagnosis.

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- Have the skills to interpret echocardiograms with emphasis on recognition of normal coronary artery anatomy and potential changes involving coronaries, LV function, mitral regurgitation, and pericardial effusion and to know when alternate imaging modalities should be obtained.
- Have the skills to synthesize clinical information to arrive at a likely diagnosis of Kawasaki disease, including incomplete or atypical Kawasaki disease.
- Have the skills to identify and develop treatment plans for patients with atypical Kawasaki disease or persistent fever despite treatment with intravenous immune globulin.
- Have the skills to monitor patients for development and/or regression of coronary artery aneurysms.

**Systems-Based Practice**

- Establish long-term follow-up plans for patients and coordinate care with other disciplines as necessary (general pediatrics, infectious disease, and rheumatology).

**Practice-Based Learning and Improvement**

- Appropriately utilize current guidelines for the diagnosis and management of Kawasaki disease.
- Apply standard clinical criteria to establish the diagnosis of Kawasaki disease (10).

**Interpersonal Communication and Skills**

- Communicate clearly with the family regarding the nature of the illness, clinical course, short- and long-term outcomes, and timing for follow-up and testing.

**3.9. Evaluation and Management of Cardiac Manifestations of Genetic Syndromes**

**Medical Knowledge**

- Know the cardiac and cardiovascular manifestations of the common genetic syndromes (e.g., Marfan, Loeys-Dietz, Turner, Noonan, Williams and DiGeorge syndromes, and Trisomies 21, 13, 18).
- Know the genetic basis for congenital heart defects (11).
- Know the indications, limitations, and costs for prenatal and postnatal genetic testing (amniocentesis, chorionic villus sampling, karyotyping, FISH, chromosomal microarray and whole exome sequencing) and noninvasive imaging.
- Know the current studies and approaches to pharmacologic prevention and treatment of cardiovascular sequelae of Marfan and Loeys-Dietz syndrome including consideration of beta-adrenergic blockade, angiotensin receptor blockade (e.g., losartan).
- Know the indications for interventional catheter and/or surgical procedures for aortic aneurysm, coarctation, valvar, supra-valvar, and branch pulmonary artery stenosis.

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**Patient Care and Procedural Skills**

- Have the skills to formulate appropriate long-term follow-up and management plans including transition to adult congenital heart disease programs.

**Systems-Based Practice**

- Obtain appropriate imaging studies in a cost effective manner.

**Practice-Based Learning and Improvement**

- Adhere to clinical practice guidelines for genetic syndromes (12-14).

**Professionalism**

- Collaborate with multidisciplinary team to coordinate care of these patients.
- Protect privacy of genetic information.

**Interpersonal Communication and Skills**

- Counsel family about cardiac conditions and implications for other medical problems.

**3.10. Evaluation Tools**

Duration of training and achievement of procedural volume requirements have played a foundational role in assessing competence of fellows to date. With the profession's movement toward a competency-based outcomes structure, it has become particularly important to identify evaluation tools that can demonstrate achievement of competencies. Table 1 provides suggestions of evaluation tools, by competency domain, that can be used to assess whether fellows have obtained the competencies identified above.

**Table 1. Suggested Evaluation Tools for Competency Domains**

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**Medical Knowledge**

*Evaluation Tools: direct observation, conference participation and presentation, in-training examination*

**Patient Care and Procedural Skills**

*Evaluation Tools: conference participation, direct observation, procedure logs*

**Systems-Based Practice**

*Evaluation Tools: conference participation and presentation, direct observation, faculty evaluations, 360 evaluations*

**Practice-Based Learning and Improvement**

*Evaluation Tools: meeting with mentors, review by Clinical Competency Committee (CCC), reflection and self-assessment*

**Professionalism**

*Evaluation Tools: conference participation and presentation, direct observation, faculty evaluations, 360 evaluations, reflection and self-assessment*



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### **Interpersonal and Communication Skills**

*Evaluation Tools: direct observation, faculty evaluations, 360 evaluations*

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## **4. Evaluation and Documentation of Competence**

All training programs should include written goals and objectives for each pediatric cardiology rotation with performance goals set according to the fellow's level of training. These will serve as the basis for formative feedback. A copy of these goals and objectives should be supplied and explained to the trainee at the onset of fellowship training and reviewed at the beginning of each rotation. Evaluation of fellows should be performed midway through, and at the completion of, each rotation; evaluations should be directed towards whether or not the fellow met those pre-specified aims. The fellow evaluation should be performed by the pediatric cardiology training program director and/or the supervising physician for that rotation. The fellow evaluation should assess the fellow's performance in each of the 6 areas of core competencies, as appropriate for the level of training, and should be based on direct observation of the fellow. Evaluation of competency in preparation, performance, and interpretation of the results of a procedure should be given more consideration than a focus on the number of procedures performed. Evaluation of competency should be done in person with the trainee and documented in their fellowship record. If the trainee is not progressing as expected, remedial actions should be arranged and documented in accordance with institutional procedures. All fellows should maintain a log (preferably electronic) of all procedures performed.

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<b>Committee Member</b>	<b>Employment</b>	<b>Consultant</b>	<b>Speakers Bureau</b>	<b>Ownership/ Partnership/ Principal</b>	<b>Personal Research</b>	<b>Institutional/ Organizational or Other Financial Benefit</b>	<b>Expert Witness</b>
Alan B. Lewis ( <i>Co-Chair</i> )	Children's Hospital of Los Angeles—Director, Cardiology Fellowship Program; University of Southern California—Professor of Pediatrics	None	None	None	None	None	None
Gerard R. Martin ( <i>Co-Chair</i> )	Children's National Health System—Senior Vice President; Center for Heart, Lung and Kidney Disease—C. Richard Beyda Distinguished Professor of Cardiology and Medical Director, Global Services	None	None	None	None	None	None
Peter J. Bartz	Children's Hospital of Wisconsin, Medical College of Wisconsin—Associate Professor of Pediatrics – Cardiology & Medicine – Cardiovascular Diseases	None	None	None	None	None	None
Peter S. Fischbach	Emory University—Associate Professor; Children's Healthcare of Atlanta	None	None	None	None	None	None
David R. Fulton	Boston Children's Hospital—Associate Cardiologist-in-Chief for Administration; Chief, Cardiology Outpatient Services, Department of Cardiology; and Associate Professor of Pediatrics	None	None	None	None	None	None
G. Paul Matherne	University of Virginia Children's Hospital—Vice Chair for Clinical Affairs and Associate Chief Medical Officer	None	None	None	None	None	None
Benjamin Reinking	University of Iowa Children's Hospital, Stead Family Department of Pediatrics, Division of Pediatric Cardiology—Director, Clinical Cardiology and Director, Pediatric Cardiology Fellowship Program	None	None	None	None	None	None

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Committee Member	Employment	Consultant	Speakers Bureau	Ownership/ Partnership/ Principal	Personal Research	Institutional/ Organizational or Other Financial Benefit	Expert Witness
Robert Spicer	Children's Hospital and Medical Center, Division of Pediatric Cardiology— Clinical Service Chief, Cardiology	None	None	None	None	None	None

For the purpose of developing a general cardiology training statement, the ACC determined that no relationships with industry or other entities were relevant. This table reflects author's employment and reporting categories. To ensure complete transparency, authors' comprehensive healthcare-related disclosure information—including RWI not pertinent to this document—is available in an online data supplement ([http://jaccjacc.acc.org/Clinical\\_Document/Ped\\_TS\\_TF1\\_Comprehensive\\_RWI\\_Supplement.pdf](http://jaccjacc.acc.org/Clinical_Document/Ped_TS_TF1_Comprehensive_RWI_Supplement.pdf)). Please refer to <http://www.acc.org/guidelines/about-guidelines-and-clinical-documents/relationships-with-industry-policy> for definitions of disclosure categories, relevance, or additional information about the ACC Disclosure Policy for Writing Committees.

**APPENDIX 2. PEER REVIEWER RELATIONSHIPS WITH INDUSTRY AND OTHER ENTITIES (RELEVANT)—TASK FORCE 1: PEDIATRIC CARDIOLOGY FELLOWSHIP TRAINING IN GENERAL CARDIOLOGY**

Name	Employment	Representation	Consultant	SpeakersB ureau	Ownership/ Partnership/ Principal	Personal Research	Institutional/ Organizational or Other Financial Benefit	Expert Witness
Antonio Cabrera	Texas Children's Hospital— Pediatric Cardiology	AAP	None	None	None	None	None	None
Timothy Feltes	Nationwide Children's Hospital—Chief, Pediatric Cardiology and Co-Director of the Heart Center	ACC ACPC Council	None	None	None	None	None	None
Regina Lantin-Hermoso	Texas Children's Hospital	ACC ACPC Council	None	None	None	None	None	None
Sara Pasquali	University of Michigan Health System—Associate Professor of Pediatrics	AHA	None	None	None	None	None	None

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Swee Chye Quek	National University of Singapore, Department of Pediatrics	ACC ACPC Council	None	None	None	None	None	None
Carole Warnes	Mayo Clinic—Professor, Medicine	ACC BOT	None	None	None	None	None	None
Eric Williams	Indiana University School of Medicine—Professor (Cardiology) and Associate Dean; Indiana University Health, Cardiology Service Line Leader	ACC CMC Lead Reviewer	None	None	None	None	None	None

For the purpose of developing a general cardiology training statement, the ACC determined that no relationships with industry or other entities were relevant. This table reflects peer reviewers' employment, representation in the review process, as well as reporting categories. Names are listed in alphabetical order within each category of review. Please refer to <http://www.acc.org/guidelines/about-guidelines-and-clinical-documents/relationships-with-industry-policy> for definitions of disclosure categories, relevance, or additional information about the ACC Disclosure Policy for Writing Committees.

AAP indicates American Academy of Pediatrics; ACC, American College of Cardiology; ACPC, Adult Congenital and Pediatric Cardiology; AHA, American Heart Association; BOT, Board of Trustees; and CMC, Competency Management Committee.

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