



**ACGME International**

**Advanced Specialty Program Requirements for  
Graduate Medical Education in  
Pediatric Cardiology  
(Pediatrics)**

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**Int. Introduction**

*Background and Intent: Programs must achieve and maintain Foundational Accreditation according to the ACGME-I Foundational Requirements prior to receiving Advanced Specialty Accreditation. The Advanced Specialty Requirements noted below complement the ACGME-I Foundational Requirements. For each section, the Advanced Specialty Requirements should be considered together with the Foundational Requirements.*

**Int. I. Definition and Scope of the Specialty**

Pediatric cardiology is a subspecialty of pediatrics that comprises the provision of care to infants, children, adolescents, and young adults with cardiovascular disorders, including congenital heart disease. When providing care, pediatric cardiologists use an understanding of the pathophysiologic basis of cardiovascular disease, clinical diagnosis, and management and knowledge of the emotional aspects of caring for children and their families.

**Int. II. Duration of Education**

Int. II.A. The educational program in pediatric cardiology must be 36 or 48 months in length.

**I. Institution**

**I.A. Sponsoring Institution**

I.A.1. A fellowship in pediatric cardiology must function as an integral part of an ACGME-I-accredited residency in pediatrics.

I.A.1.a) The pediatric cardiology program should be geographically proximate to the affiliated pediatrics residency program.

I.A.2. The educational program in pediatric cardiology must not negatively affect the education of residents in the affiliated pediatrics residency program.

**I.B. Participating Sites**

See International Foundational Requirements, Section I.B.

**II. Program Personnel and Resources**

**II.A. Program Director**

II.A.1. The program director must demonstrate a record of ongoing involvement in scholarly activity.

- II.A.2. The program director must demonstrate a record of mentoring or guiding fellows in the acquisition of competence in the clinical, teaching, research, quality improvement, and advocacy skills pertinent to the discipline.
- II.A.3. The program director must ensure that each fellow:
- II.A.3.a) is provided with mentorship in development of the necessary clinical, educational, scholarship, and administrative skills; and,
  - II.A.3.b) documents experience in procedures.
- II.A.3.b).(1) The program director must ensure that such documentation is available for review.
- II.A.4. The program director must coordinate, with the program directors of the pediatric residency and other related subspecialty programs, the incorporation of the ACGME-I Competencies into fellowship education to foster consistent expectations for fellows' achievement and faculty members' evaluation processes.
- II.A.5. Meetings with the program directors of the pediatrics residency program and all pediatric subspecialty programs should take place at least semiannually.
- II.A.5.a) There must be documentation of these meetings.
  - II.A.5.b) These meetings should address a departmental approach to common educational issues and concerns that may include core curriculum, the ACGME-I Competencies, and evaluation.
- II.A.6. The fellowship program director must have the authority and responsibility to set and adjust the clinical responsibilities and ensure that fellows have appropriate clinical responsibilities and an appropriate patient load.

## **II.B. Faculty**

- II.B.1. To ensure the quality of the education and scholarly activity of the program, and to provide adequate supervision of fellows, there must be at least four faculty members, including the program director.
- II.B.2. Faculty members must encourage and support fellows in scholarly activities.
- II.B.2.a) This must include mentoring fellows in the application of scientific principles, epidemiology, biostatistics, and evidence-based medicine to the clinical care of patients.
  - II.B.2.b) Scholarly activities must be in basic science, clinical care, health services, health policy, quality improvement, or education with implications for the field of pediatric critical care medicine.

II.B.3. Qualified faculty members in the following pediatric subspecialties should be available for the education of fellows:

- II.B.3.a) neonatal-perinatal medicine;
- II.B.3.b) pediatric critical care medicine;
- II.B.3.c) pediatric gastroenterology;
- II.B.3.d) pediatric hematology-oncology;
- II.B.3.e) pediatric infectious disease;
- II.B.3.f) pediatric nephrology; and,
- II.B.3.g) pediatric pulmonology.

II.B.4. The faculty should also include the following specialists with substantial experience in treating pediatric problems:

- II.B.4.a) anesthesiologist(s);
- II.B.4.b) child and adolescent psychiatrist(s);
- II.B.4.c) child neurologist(s);
- II.B.4.d) congenital cardiothoracic surgery;
- II.B.4.e) medical geneticist(s);
- II.B.4.f) pathologist(s);
- II.B.4.g) pediatric surgeon(s);
- II.B.4.h) physiatrist(s); and,
- II.B.4.i) radiologist(s).

II.B.5. Consultants with expertise in adult congenital cardiac disease should be available for transition care of young adults.

II.B.6. Consultants should be available in obstetrics and gynecology and maternal-fetal medicine.

## **II.C. Other Program Personnel**

II.C.1. To ensure multidisciplinary and interprofessional practice in pediatric cardiology, the following personnel with pediatric focus and experience should be available:

- II.C.1.a) child life therapist(s);

- II.C.1.b) dietitian(s);
- II.C.1.c) mental health professional(s);
- II.C.1.d) nurse(s);
- II.C.1.e) pharmacist(s);
- II.C.1.f) physical and occupational therapist(s);
- II.C.1.g) respiratory therapist(s);
- II.C.1.h) school and special education liaison(s);
- II.C.1.i) social worker(s); and,
- II.C.1.j) speech and language therapist(s).

**II.D. Resources**

- II.D.1. There must be an intensive care unit in which patients with heart disease are cared for by a multidisciplinary team that includes faculty members with pediatric critical care medicine and pediatric cardiology education and training and experience.
- II.D.1.a) There must be patients with congenital heart disease who require pre- and post-operative care.
- II.D.2. Facilities and services, including comprehensive laboratory, pathology, and imaging services, must be available. These must include:
  - II.D.2.a) a cardiac electrophysiologic laboratory for invasive intracardiac electrophysiologic studies and catheter ablation;
  - II.D.2.b) a diagnostic and interventional cardiac catheterization laboratory;
  - II.D.2.c) diagnostic imaging facilities, including advanced cardiac imaging;
  - II.D.2.d) an echocardiography laboratory with facilities for performing and interpreting standard transthoracic 2-D and Doppler echocardiograms, fetal echocardiograms, and transesophageal echocardiograms; and,
  - II.D.2.e) a non-invasive electrophysiology laboratory with facilities for performing and interpreting standard electrocardiograms, ambulatory electrocardiograms, exercise electrocardiograms, and ambulatory electrocardiographic monitoring.

- II.D.3. An adequate number and variety of cardiology patients ranging in age from newborn through young adulthood must be available to provide a broad experience for fellows.
- II.D.4. A sufficient number of patients must be available in inpatient and outpatient settings to meet the educational needs of the program.
- II.D.5. Clinical data, such as age, diagnosis, morbidity and mortality from inpatients, outpatients, cardiac catheterization, and/or surgery should be available in a single database to allow immediate access.

### **III. Fellow Appointment**

#### **III.A. Eligibility Criteria**

- III.A.1. Prior to appointment in the program, fellows should have completed an ACGME-I-accredited residency program in pediatrics, or a pediatric residency program acceptable to the Sponsoring Institution's Graduate Medical Education Committee.

#### **III.B. Number of Fellows**

See International Foundational Requirements, Section III.B.

### **IV. Specialty-Specific Educational Program**

#### **IV.A. ACGME-I Competencies**

- IV.A.1. The program must integrate the following ACGME-I Competencies into the curriculum.
  - IV.A.1.a) Professionalism
    - IV.A.1.a).(1) Fellows must demonstrate a commitment to professionalism and an adherence to ethical principles, including:
      - IV.A.1.a).(1).(a) trustworthiness that makes colleagues feel secure when a fellow is responsible for the care of patients;
      - IV.A.1.a).(1).(b) leadership skills that enhance team function, the learning environment, and/or the health care delivery system/environment to improve patient care;
      - IV.A.1.a).(1).(c) the capacity to recognize that ambiguity is part of clinical medicine and to respond by utilizing appropriate resources in dealing with uncertainty; and,

IV.A.1.a).(1).(d)	a willingness to accept questions of clarification and feedback in a non-defensive, collaborative, and welcoming manner.
IV.A.1.b)	Patient Care and Procedural Skills
IV.A.1.b).(1)	Fellows must provide patient care that is compassionate, appropriate, and effective for the treatment of health problems and the promotion of health.
IV.A.1.b).(1).(a)	Fellows must demonstrate competence in the clinical skills necessary in pediatric cardiology, including:
IV.A.1.b).(1).(a).(i)	providing consultation, performing a history and physical examination, making informed diagnostic and therapeutic decisions that result in optimal clinical judgement, and developing and carrying out management plans;
IV.A.1.b).(1).(a).(ii)	providing transfer of care that ensures seamless transitions, counseling patients and families, using information technology to optimize patient care, and providing appropriate role modeling and supervision;
IV.A.1.b).(1).(a).(iii)	providing for or coordinating care for patients with complex and chronic diseases with the appropriate physician and/or agency;
IV.A.1.b).(1).(a).(iv)	diagnosing and managing a broad range of congenital and acquired cardiac problems, to include:
IV.A.1.b).(1).(a).(iv).(a)	acquired heart disease in children;
IV.A.1.b).(1).(a).(iv).(b)	cardiac manifestation of genetic syndromes;
IV.A.1.b).(1).(a).(iv).(c)	cyanotic congenital heart disease in the newborn;
IV.A.1.b).(1).(a).(iv).(d)	left to right shunt lesions; and,
IV.A.1.b).(1).(a).(iv).(e)	outflow obstruction lesions.
IV.A.1.b).(1).(a).(v)	diagnosing and managing patients with arrhythmias and conduction abnormalities;

- IV.A.1.b).(1).(a).(vi) diagnosing, managing, and referring children with advanced or end-stage heart failure and pulmonary hypertension for medical therapy, extracorporeal membrane oxygenation, ventricular assist devices, and/or cardiac transplantation;
- IV.A.1.b).(1).(a).(vii) diagnosing and managing patients with risk factors for hypertension, atherosclerotic heart disease, and hyperlipidemic states, and preventing heart disease in this population; and,
- IV.A.1.b).(1).(a).(viii) interpreting transesophageal echocardiography, cardiac magnetic resonance imaging, and other relevant cardiac imaging.
- IV.A.1.b).(1).(b) Fellows must be able to competently perform all medical, diagnostic, and surgical procedures considered essential for the practice of pediatric cardiology. Fellows must:
- IV.A.1.b).(1).(b).(i) competently use and interpret the results of laboratory tests and imaging;
- IV.A.1.b).(1).(b).(ii) perform and interpret cardiac catheterization data and care for patients who require catheter-based interventions;
- IV.A.1.b).(1).(b).(iii) perform and interpret echocardiograms; and,
- IV.A.1.b).(1).(b).(iv) demonstrate competence in the techniques, indications, contraindications, complications, and interpretation of pericardiocentesis, cardiopulmonary resuscitation, cardioversion, and temporary pacing.
- IV.A.1.c) Medical Knowledge
- IV.A.1.c).(1) Fellows must demonstrate knowledge of established and evolving biomedical, clinical, epidemiological, and social-behavioral sciences, as well as the application of this knowledge to patient care. Fellows must demonstrate knowledge of:



- IV.A.1.c).(1).(a) biostatistics, bioethics, clinical and laboratory research methodology, study design, preparation of applications for funding and/or approval of clinical research protocols, critical literature review, principles of evidence-based medicine, ethical principles involving clinical research, and teaching methods;
- IV.A.1.c).(1).(b) embryology and anatomy of the normal heart and vascular system, clinical morphologic correlations, and potential deviations from normal;
- IV.A.1.c).(1).(c) normal and abnormal cardiovascular and cardiopulmonary physiology and metabolism, and fundamentals of cardiovascular pharmacology, including mechanisms of drug action, therapeutic indications, and side effects; and,
- IV.A.1.c).(1).(d) cardiovascular pathology.
- IV.A.1.c).(1).(d).(i) Fellows must have structured educational experiences to examine various types of congenital cardiovascular anomalies.
- IV.A.1.d) Practice-based Learning and Improvement
- IV.A.1.d).(1) Fellows must demonstrate the ability to investigate and evaluate their care of patients, to appraise and assimilate scientific evidence, and to continuously improve patient care based on constant self-evaluation and lifelong learning.
- IV.A.1.e) Interpersonal and Communication Skills
- IV.A.1.e).(1) Fellows must demonstrate interpersonal and communication skills that result in the effective exchange of information and collaboration with patients, their families, and health professionals. Fellows must demonstrate skill in:
- IV.A.1.e).(1).(a) teaching both individuals and groups of learners in clinical settings, classrooms, lectures, and seminars, as well as by electronic and print modalities; and,
- IV.A.1.e).(1).(b) providing feedback to learners and assessing educational outcomes.
- IV.A.1.f) Systems-based Practice

IV.A.1.f).(1) Fellows must demonstrate an awareness of and responsiveness to the larger context and system of health care, including the social determinates of health, as well as the ability to call effectively on other resources in the system to produce optimal care.

**IV.B. Regularly Scheduled Educational Activities**

IV.B.1. Fellows must have a formally-structured educational program in the clinical and basic sciences related to pediatric cardiology.

IV.B.1.a) The program must utilize didactic experiences such as lectures, seminars, case discussions, journal clubs, and clinical experience.

IV.B.1.b) Pediatric cardiology conferences must occur regularly and must involve active participation by the fellows in planning and implementation.

IV.B.1.c) Fellow education must include instruction in:

IV.B.1.c).(1) basic and fundamental disciplines, as appropriate to pediatric cardiology, such as anatomy, physiology, biochemistry, embryology, pathology, microbiology, pharmacology, immunology, genetics, and nutrition/metabolism;

IV.B.1.c).(2) pathophysiology of disease, reviews of recent advances in clinical medicine and biomedical research, and conferences dealing with bioethics, complications, end-of-life care, palliation and death, and the scientific, ethical, and legal implications of confidentiality and informed consent; and,

IV.B.1.c).(2).(a) This should include attention to physician-patient, physician-family, physician-physician/allied health professional, and physician-society relationships.

IV.B.1.c).(3) the economics of health care and current health care management issues, such as cost-effective patient care, practice management, preventive care, population health, quality improvement, resource allocation, and clinical outcomes.

IV.B.2. Conferences must be held to review pathologic specimens with clinical correlation.

IV.B.3. Multidisciplinary conferences should include anesthesiology, cardiac radiology, congenital cardiothoracic surgery, critical care, and neonatology.

- IV.B.4. Fellows must participate in cardiac catheterization conferences to develop the knowledge required for decision-making and planning for corrective cardiac surgery.
- IV.B.5. Fellow education must include courses, seminars, workshops, and/or laboratory experience to provide background in basic cardiac physiology, cardiac pharmacology, and other fundamental disciplines related to the heart and cardiovascular system.

#### **IV.C. Clinical Experiences**

- IV.C.1. Fellows must have responsibility for providing longitudinal care to a panel of patients throughout their educational program that is supervised by one or more members of the pediatric cardiology faculty.
- IV.C.1.a) This must include longitudinal care for outpatients.
- IV.C.1.b) The panel of patients must be representative of the types of cardiac disorders fellows are likely to encounter once they complete the educational program.
- IV.C.2. Fellows must have 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.
- IV.C.3. Fellows must have sufficient experience and instruction in current surgical techniques, mechanical ventilation, methods of cardiopulmonary bypass, and therapeutic hypothermia to develop an adequate understanding of these surgical techniques.
- IV.C.3.a) Fellows should receive instruction in the management of immediate and delayed complications in patients following cardiac surgery.
- IV.C.4. Long-term follow-up observations of both pre- and post-operative patients must be provided.
- IV.C.4.a) Fellows should participate in consultations or conferences in which medical and surgical staff members evaluate the results of surgery and the patient's cardiac status prior to hospital discharge.

#### **IV.D. Scholarly Activity**

- IV.D.1. Fellows' Scholarly Activity
- IV.D.1.a) The program must have a core curriculum in research and scholarship.
- IV.D.1.a).(1) Where appropriate, the curriculum should be a collaborative effort involving all pediatric subspecialty programs at the institution.

- IV.D.1.b) The program must provide a Scholarship Oversight Committee for each fellow to oversee and evaluate the fellow's progress as related to scholarly activity.
- IV.D.1.b).(1) Where applicable, a fellow's Scholarship Oversight Committee should be a collaborative effort involving other pediatric subspecialty programs or other experts.
- IV.D.1.c) Each fellow must design and conduct a scholarly project in pediatric cardiology with guidance from the fellowship director and a designated mentor. The designated mentor must:
- IV.D.1.c).(1) be approved by the Scholarship Oversight Committee; and,
- IV.D.1.c).(2) have expertise in the fellow's area of scholarly interest, either as a faculty member in pediatric cardiology or through collaboration with other departments or divisions.
- IV.D.1.d) Fellows' scholarly experience must begin in the first year of and continue for the entire length of the educational program.
- IV.D.1.d).(1) The experience must be structured to allow development of requisite skills in research and scholarship, and provide sufficient time for project completion, and presentation of results to the Scholarship Oversight Committee.

IV.D.2. Faculty Scholarly Activity

See International Foundational Requirements, Section IV.D.2.

**V. Evaluation**

See International Foundational Requirements, Section V.

**VI. The Learning and Working Environment**

See International Foundational Requirements, Section VI.