

Pediatric Cardiology Content Outline

In-Training, Certification, and
Maintenance of Certification Exams

Effective for all examinations administered October 1, 2022, and after

Overview

This content outline was developed to serve as the blueprint for pediatric cardiology in-training, initial certification, and maintenance of certification examinations administered by the American Board of Pediatrics (ABP). This outline identifies for all important stakeholders (eg, prospective candidates, diplomates, the public, training programs, professional associations) the knowledge areas being measured by these exams.

This outline takes effect on November 1, 2022. All pediatric cardiology exams administered after this date will adhere to the specifications within this outline.

DEVELOPMENT OF THE PEDIATRIC CARDIOLOGY CONTENT OUTLINE

The initial draft of this content outline was developed by a diverse, representative panel of practicing pediatric cardiology subspecialists. The panel identified the knowledge required of pediatric cardiologists in clinical practice and categorized that knowledge into content domains and subdomains. All board-certified pediatric cardiologists (N = 2000) were then invited to provide feedback via an online survey. A total of 625 pediatric cardiologists (31%) rated the frequency, criticality, and relevance of the content areas within each content domain. The survey also collected open-ended comments from respondents in order to identify any important content areas that were not included in the initial draft.

The survey results were used to make final revisions to the outline and to establish the exam weights (ie, the percentage of exam questions associated with each content domain). The content domains that were rated as highly critical, highly relevant, and frequently required in practice have been weighted more heavily than the domains rated as less critical, less relevant, and/or less frequently required. Establishing the exam weights in this manner helps to ensure that ABP's pediatric cardiology exams are measuring the full breadth of knowledge required for clinical practice, while also placing appropriate emphasis on the content domains that were identified by practicing pediatric cardiology subspecialists as being critically important.

CONTENT DOMAINS

The knowledge for safe and effective practice as a pediatric cardiology subspecialist has been categorized into 21 content domains, presented in the table below. A more detailed breakdown of the knowledge within

each domain is reflected in the detailed content outline, beginning on page 4. Each exam question included on a pediatric cardiology exam (in-training, initial certification, and maintenance of certification) is classified according to the content domain to which it is most closely aligned. If an exam question does not align with one of the content domains, it is removed from the question pool and is not included on an exam.

Pediatric Cardiology Content Domains	
1.	Normal Cardiovascular Structure and Function
2.	Basic Pharmacology
3.	Arrhythmias
4.	Left-to-Right Shunts
5.	Right-to-Left Shunts
6.	Single-Ventricle Lesions
7.	Congenital Heart Disease in the Adolescent and Adult
8.	Duct-Dependent Neonatal Heart Disease
9.	Valve and Outflow Tract Lesions
10.	Abnormalities of the Great Arteries
11.	Disorders of the Myocardium and Pericardium
12.	Systemic and Pulmonary Venous and Situs Abnormalities
13.	Pathophysiologic Vascular States
14.	Conditions Affecting Cardiac Function in the Fetus and Newborn
15.	Inflammatory and Infectious Acquired Heart Disease
16.	Genetic Disorders and Syndromes of the Cardiovascular System
17.	Coronary Artery Abnormalities
18.	Preventative Cardiology and Inherited Cardiovascular Diseases
19.	Intensive Care Management
20.	Systems-Based Practice and Population Health
21.	Core Knowledge in Scholarly Activities

UNIVERSAL TASKS

To help ensure the clinical relevance of the pediatric cardiology exams, the panel of pediatric cardiology subspecialists also identified a set of four universal tasks that reflect the primary ways in which pediatric cardiology knowledge can be applied in clinical practice. By classifying exam questions to a universal task category, an appropriate number of questions from each category can be included on all pediatric cardiology exams. Each exam question that falls within content domains 3 through 17 (all of which address

congenital and acquired pediatric cardiac conditions) is classified according to the universal task to which it is most closely aligned. If an exam question within those domains does not align with one of the universal tasks, it is removed from the question pool and is not included on an exam. The four universal task categories are:

1. **Pathophysiology:** Understanding the molecular, cellular, and physiological processes associated with pediatric cardiovascular conditions
2. **Epidemiology and Risk Assessment:** Recognizing patterns of pediatric cardiac conditions and understanding the variables that influence those patterns, including risk factors, risk stratification, natural history, and conditions that affect outcomes
3. **Diagnosis:** Evaluating patient histories, family histories, existing records, and physical presentation; selecting and interpreting results from diagnostic testing; and referring patients for advanced cardiac imaging (transesophageal echocardiography, cardiac computed tomography scan, magnetic resonance imaging, etc) to formulate differential diagnoses
4. **Management and Treatment:** Formulating a comprehensive management and/or treatment plan, including planning and managing appropriate pharmacological therapy; applying standards of care and available evidence to initiate and manage inpatient and outpatient targeted treatment; and referring patients in a timely manner for subspecialty care, advanced treatment, or intensive care unit management

DEVELOPMENT AND CLASSIFICATION OF EXAM QUESTIONS

Although the field of pediatric cardiology is continually evolving, the content domains and subdomains within this outline should be viewed as broad categories of knowledge that are likely to remain relatively stable over time. The detailed knowledge within the content domains and subdomains, however, is likely to change as the field continues to advance. Because exam questions may assess a pediatric cardiology subspecialist's knowledge of a specific element within a content domain/subdomain, it is important to note that it is the responsibility of the test taker to ensure that their knowledge within each area is up to date.

To ensure the currency of all pediatric cardiology exam questions, the ABP follows a rigorous item development and approval process. Each exam question is written by a board-certified subspecialist. Each question is classified according to the content domain/subdomain

to which it is most closely aligned, and any question classified within domains 3 through 17 is also classified to the universal task to which it is most closely aligned.

Once a question has been written, it is then discussed and revised, if necessary, by the pediatric cardiology subboard, a diverse panel of practicing pediatric cardiology subspecialists. During the revision process, each question is also reviewed multiple times by a medical editor to ensure accuracy and by ABP staff editors who standardize question style, format, and terminology; correct grammar; and eliminate ambiguity and technical flaws, such as cues to the answer.

Once the subboard has approved a question, it is included in the question pool and is made available for future exams. All approved questions in the pool are reviewed periodically for accuracy, currency, and relevance.

SAMPLE QUESTION

To illustrate how exam questions are classified, consider the following sample question:

A full-term newborn develops respiratory distress with an oxygen saturation of 70%. Physical examination reveals a single second heart sound and a to-and-fro murmur. His arterial blood gas shows a PCO₂ of 70 mm Hg.

Which of the following is the most likely diagnosis?

A. Pulmonary atresia and large patent ductus arteriosus (PDA)

B. Pulmonary atresia and major aortopulmonary collateral arteries

C. Pulmonary stenosis and restrictive PDA

D. Tetralogy of Fallot and absent pulmonary valve

Correct answer = D. Tetralogy of Fallot and absent pulmonary valve

The question above would most likely be classified as shown in the table below.

Item Classification	
Content Domain/ Subdomain*	5. Right-to-Left Shunts A. Tetralogy of Fallot
Universal Task	3. Diagnosis

*Note: Content domain/subdomain 5.A can be found on page 4 of this document (within the detailed content outline section).

Exam Weights

The tables below indicate the exam weights (ie, the percentage of exam questions associated with each content domain for the ABP's pediatric cardiology exams). The content domain/subdomain weights are the same for the in-training, initial certification, and maintenance of certification exams. Please note that the weights reflect the content of a typical exam and are approximate; actual content may vary.

Content Domain	Exam Weights
1. Normal Cardiovascular Structure and Function	7%
2. Basic Pharmacology	2%
3. Arrhythmias	6%
4. Left-to-Right Shunts	6%
5. Right-to-Left Shunts	6%
6. Single-Ventricle Lesions	6%
7. Congenital Heart Disease in the Adolescent and Adult	6%
8. Duct-Dependent Neonatal Heart Disease	5%
9. Valve and Outflow Tract Lesions	5%
10. Abnormalities of the Great Arteries	5%
11. Disorders of the Myocardium and Pericardium	5%
12. Systemic and Pulmonary Venous and Situs Abnormalities	4%
13. Pathophysiologic Vascular States	4%
14. Conditions Affecting Cardiac Function in the Fetus and Newborn	4%
15. Inflammatory and Infectious Acquired Heart Disease	4%
16. Genetic Disorders and Symptoms of the Cardiovascular System	4%
17. Coronary Artery Abnormalities	3%
18. Preventative Cardiology and Inherited Cardiovascular Diseases	6%
19. Intensive Care Management	5%
20. Systems-Based Practice and Population Health	3%
21. Core Knowledge in Scholarly Activities	4%
	100%

Detailed Content Outline

Domain 1: Normal Cardiovascular Structure and Function

- A. Physiology
- B. Anatomy
- C. Conduction system, including anatomy, ion channel function, and mechanisms of arrhythmias
- D. Age-related changes
- E. Cardiopulmonary interactions
- F. Neurohumoral regulation
- G. Cardiac development
- H. Myocardial and vascular cell biology

Domain 2: Basic Pharmacology

- A. Antiarrhythmic drugs
- B. Heart failure and transplant therapies
- C. Anticoagulation/antiplatelet therapy
- D. Antihypertensives and lipid-lowering drugs

Domain 3: Arrhythmias

- A. Supraventricular and junctional arrhythmias
- B. Accessory atrioventricular connection and pre-excitation syndrome
- C. Ventricular arrhythmias
- D. High-risk syncope
- E. Atrioventricular block
- F. Implantable devices
- G. Sinus node dysfunction

Domain 4: Left-to-Right Shunts

- A. Ventricular septal defects
- B. Atrioventricular septal defects
- C. Patent ductus arteriosus
- D. Atrial septal defects
- E. Aortopulmonary window
- F. Partial anomalous pulmonary venous return
- G. Total anomalous pulmonary venous return (with and without obstruction)
- H. Arteriovenous malformations

Domain 5: Right-to-Left Shunts

- A. Tetralogy of Fallot
- B. Double-outlet right ventricle
- C. Pulmonary atresia with ventricular septal defect
- D. Pulmonary atresia with intact septum
- E. Pulmonary arteriovenous malformations

Domain 6: Single-Ventricle Lesions

- A. Single-ventricle palliation and interstage status
- B. Hypoplastic left heart syndrome
- C. Tricuspid atresia
- D. Fontan circulation
- E. Other forms of single (univentricular) heart

Domain 7: Congenital Heart Disease in the Adolescent and Adult

- A. Long-term effects of native and surgically altered congenital heart disease
- B. Psychosocial issues related to congenital heart disease
- C. Recurrence risk in progeny
- D. Cardiac effects of long-standing systemic disease
- E. Pregnancy and contraception in congenital heart disease

Domain 8: Duct-Dependent Neonatal Heart Disease

- A. Critical coarctation and interrupted aortic arch
- B. Critical aortic stenosis
- C. Critical pulmonary stenosis

Domain 9: Valve and Outflow Tract Lesions

- A. Tricuspid valve lesions (eg, Ebstein anomaly)
- B. Mitral valve lesions, mitral stenosis, mitral regurgitation, mitral valve prolapse
- C. Obstructive lesions of the left ventricular outflow tract (subaortic, valvar, and supra-valvar aortic stenosis)
- D. Bicuspid aortic valve
- E. Obstructive lesions of the right ventricular outflow tract (double-chambered right ventricle), pulmonary valve stenosis
- F. Aortic regurgitation
- G. Pulmonary regurgitation
- H. Valve replacement therapy

Domain 10: Abnormalities of the Great Arteries

- A. Truncus arteriosus
- B. Transposition of the great arteries
- C. Congenitally corrected transposition of the great arteries
- D. Aortic root and arch abnormalities
- E. Coarctation of the aorta
- F. Left pulmonary artery sling
- G. Branch pulmonary artery and peripheral pulmonary artery stenosis
- H. Vascular rings

Domain 11: Disorders of the Myocardium and Pericardium

- A. Isolated cardiomyopathies, including dilated, restrictive, arrhythmogenic, metabolic, mitochondrial, storage diseases, and hypertrophic cardiomyopathy
- B. Secondary cardiomyopathies, including arrhythmia-induced, chemotherapy-induced, and hemochromatosis
- C. Pericardial diseases
- D. Cardiac tumors
- E. Myocardial ischemia, including genetic and environmental risk factors for coronary artery disease
- F. Heart transplant

Domain 12: Systemic and Pulmonary Venous and Situs Abnormalities

- A. Situs abnormalities and heterotaxic syndromes
- B. Abnormalities of the pulmonary venous system
- C. Pulmonary vein stenosis
- D. Systemic venous abnormalities
- E. Cor triatriatum dexter and sinister

Domain 13: Pathophysiologic Vascular States

- A. Pulmonary hypertension
- B. Systemic hypertension
- C. Eisenmenger syndrome

Domain 14: Conditions Affecting Cardiac Function in the Fetus and Newborn

- A. Fetal and congenital heart disease
- B. Transitional physiology
- C. Fetal arrhythmias
- D. Hydrops fetalis
- E. Maternal disease on the fetal heart
- F. Systemic disease on the fetal heart
- G. Twin-to-twin transfusion syndrome

Domain 15: Inflammatory and Infectious Acquired Heart Disease

- A. Myocarditis
- B. Endocarditis
- C. Pericarditis
- D. Kawasaki disease and multisystem inflammatory syndrome in children (MIS-C)
- E. Rheumatic heart disease and other inflammatory heart conditions caused by systemic disease
- F. Cardiac trauma

Domain 16: Genetic Disorders and Syndromes of the Cardiovascular System

- A. Common syndromes associated with congenital heart disease
- B. Familial and inherited abnormalities of the cardiovascular system
- C. Syndromic and familial cardiomyopathies
- D. Connective tissue disorders
- E. Channelopathies
- F. Tuberous sclerosis and neurofibromatosis
- G. Metabolic disorders

Domain 17: Coronary Artery Abnormalities

- A. Abnormalities with anomalous origin
- B. Coronary fistulae
- C. Coronary disease

Domain 18: Preventative Cardiology and Inherited Cardiovascular Diseases

- A. Cardiovascular symptoms
 - 1. Murmur
 - 2. Syncope
 - 3. Palpitations
 - 4. Chest pain
 - 5. Cyanosis
 - 6. Shortness of breath
 - 7. Exercise intolerance
 - 8. Growth failure
 - 9. Obesity
 - 10. Stridor or difficulty swallowing
 - 11. Orthostatism and postural tachycardia syndrome
- B. Familial conditions
 - 1. Congenital heart disease
 - 2. History of sudden cardiac risks
 - 3. Aortic disease and bicuspid aortic valve
 - 4. Cardiomyopathies
 - 5. Marfan disease and connective tissue disorders
 - 6. Conduction tissue disorders
 - 7. Familial or genetic channelopathies
 - 8. Hypercholesterolemia/early coronary disease
 - 9. Autoimmune disease
- C. Lifestyle and behavioral activity recommendations and restrictions
 - 1. Exercise recommendations for patients with known heart disease
 - 2. Preparticipation screening
 - 3. Activity and lifestyle recommendations
 - 4. Nutritional counseling
- D. Abnormal test results
 - 1. Abnormal electrocardiogram
 - 2. Abnormal findings on previous imaging, monitoring, and sleep studies
 - 3. Hypertension/hyperlipidemia and coronary risk management
 - 4. Lipid abnormalities

Domain 19: Intensive Care Management

- A. Low cardiac output state
- B. Postsurgical management
- C. Stabilization of a critically ill child
- D. Acute management of pulmonary hypertension
- E. Temporary pacing systems and arrhythmia management
- F. Airway support, mechanical ventilation, and effects on congenital heart disease
- G. Multiorgan system management
- H. Mechanical circulatory support

Domain 20: Systems-Based Practice and Population Health

- A. Communication and care coordination
 - 1. Patient and family communication
 - 2. Clinical documentation
 - 3. Cultural sensitivity and awareness
 - 4. Feeding goals, barriers, and nutrition
 - 5. Transition of care and transfer processes, principles, and communication
 - 6. Mental health risks and needs of children with congenital heart disease
 - 7. Neurodevelopmental assessment and referral
 - 8. Health information privacy regulations
 - 9. Programs and services available for patients with mental and behavioral health needs
 - 10. Pediatric palliative care
- B. Fiscal responsibility and management
 - 1. Testing and utilization of resources
 - 2. Financial implications and risks for patients and families
 - 3. Payer reimbursement models
- C. Population health
 - 1. Epidemiology of cardiac conditions
 - 2. Social determinants of health
 - 3. Care delivery and access to underserved populations
 - 4. Resource utilization and capacity
 - 5. Principles of health systems and population research
 - 6. Economic analysis and implications for research and new technology
 - 7. Disaster preparedness

Domain 21: Core Knowledge in Scholarly Activities

- A. Principles of biostatistics in research
 - 1. Types of variables
 - 2. Distribution of data
 - 3. Hypothesis testing
 - 4. Common statistical tests
 - 5. Measurement of association and effect
 - 6. Regression
 - 7. Diagnostic tests
 - 8. Systematic review and meta-analysis
 - 9. Qualitative research methods and analysis
- B. Principles of epidemiology and clinical research design
 - 1. Study design, performance, and analysis

2. Generalizability
 3. Bias and confounding
 4. Causation
 5. Incidence and prevalence
 6. Screening
 7. Cost benefit, cost effectiveness, and outcomes
 8. Measurement
- C. Ethics in research
1. Professionalism and misconduct in research
 2. Principles of research involving human subjects
 3. Principles of consent and assent
- D. Quality improvement
1. Project design
 2. Data and measurement