



Entrustable Professional Activities

EPA 6 for Pediatric Cardiology

EPA 6: Diagnosis and Management of Patients with Acute Congenital or Acquired Cardiac Problems Requiring Intensive Care

Supervision Scale for This EPA

1. Trusted to observe only
2. Trusted to diagnose and manage patients with direct supervision and coaching
3. Trusted to diagnose and manage with indirect supervision for most simple and some complex cases
4. Trusted to diagnose and manage with indirect supervision but may require discussion for a few complex cases
5. Trusted to execute without supervision

Description of the Activity

Upon completion of a general pediatric cardiology fellowship, the individual must have the knowledge base and ability to critically analyze information to formulate a care plan specific to the patient's cardiac needs for disease states common to an intensive care unit.

The specific functions which define this EPA include:

1. Evaluating and treating neonates, infants, and older pediatric patients with critical structural cardiac diseases
2. Evaluating and treating neonates, infants, and older pediatric patients with other forms of critical cardiac disease
3. Providing consultation to those caring for postoperative cardiac patients
4. Providing direct care or consultation to those responsible for primary care for cardiac patients with illnesses of noncardiac origin
5. Functioning as a member of a multidisciplinary team demonstrating professionalism and excellent communication skills
6. Participating in quality improvement and patient safety initiatives

Judicious Mapping to Domains of Competence

- Patient Care
- Medical Knowledge
- Practice-Based Learning and Improvement
- Interpersonal and Communication Skills
- Professionalism
- Systems-Based Practice
- Personal and Professional Development



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Competencies Within Each Domain Critical to Entrustment Decisions

PC 3:	Transferring care
PC 6:	Using optimal clinical judgment
MK 1:	Demonstrating knowledge
PBLI 4:	Analyzing practice
ICS 1:	Communicating with patients/families
ICS 3:	Communicating with health professionals
ICS 4:	Working as a member of a health care team
SBP 5:	Working in interprofessional teams

Context for the EPA

Knowledge, skills, and attitudes needed to execute the EPA safely (refer to Task Force Curriculum).

Rationale: Pediatric cardiologists must be able to care for patients with cardiac problems of all levels of severity, ranging from the relatively well patient in the outpatient clinic to those requiring intensive care. To achieve the best clinical outcomes, every pediatric cardiologist should have basic patient assessment and stabilization skills, command a clear understanding of complex cardiovascular anatomy and physiology, know the effects of pharmacological agents and surgical interventions on cardiac physiology, and function as an effective communicator within a multidisciplinary team.

Scope of Practice: This activity includes caring for patients of all ages, including neonates (some preterm), infants, older pediatric patients, and in certain circumstances, adults with congenital heart disease. There can be institutional variation in the intensive care environment and in age of patients cared for in that particular environment (e.g., whether there is a dedicated CICU vs PICU or NICU). However, the skills described here, such as establishing a diagnosis, counseling families, having knowledge of medical, interventional, and surgical therapies, and patient stabilization, apply to both the general pediatric cardiologist called to consult on a cyanotic newborn at a community hospital and to the frontline pediatric cardiologist in a cardiovascular intensive care setting. As such, the scope of practice includes functioning as a consultant to other services as well as receiving consultation from advanced pediatric cardiac subspecialists such as pediatric electrophysiologists, heart failure/transplant specialists, or noninvasive cardiac imagers. Institution-specific details would thus be dependent on the setup of each individual institution vis a vis cohorting of patients in a NICU, PICU, CICU, or adult unit.

The scope of care¹ includes evaluating and treating those patient groups who have critical structural cardiac disease and other forms of critical cardiac disease as detailed below; providing consultation to those providing primary care for cardiac patients with illnesses of a noncardiac origin; providing consultation to those caring for postoperative cardiac patients; functioning as a member of a multidisciplinary team demonstrating professionalism and excellent communication skills; and quality improvement and patient safety.

Caring for patients with cardiac disease requiring intensive care necessitates application of specific knowledge and skills, including cardiopulmonary physiology, the relationship between cardiac structure, function, and hemodynamic state, multi-organ system management, pharmacology as it relates to cardiovascular physiology, diagnosis and management of arrhythmias, as well as airway management and cardiopulmonary support, including resuscitation and mechanical circulatory support. The specific knowledge/skills listed above are reflected particularly in the first



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three functions described below. Practicing in a cardiac ICU requires a general facility with all aspects of cardiac care as well as knowledge of when to consult with advanced cardiac subspecialists.

Setting: Diagnosis and management in the following settings: inpatient, outpatient, consultation, routine, and acute/emergent or intensive care environment.

Patient Population: Neonate, infant, child, adolescent, and adult.

Curricular Components That Support the Functions of the EPA

1. Evaluating and treating neonates, infants, and older pediatric patients with critical structural cardiac diseases
 - Establishes an accurate anatomic diagnosis and ascertains the relevant cardiopulmonary physiology compared to normal physiology across all pediatric ages, including interpretation of diagnostic studies, such as echocardiograms and catheterizations with an understanding of the limitations of those and other studies
 - Knows how to triage patients and which patients require ICU observation for potential risk of decompensation or to meet immediate medical needs
 - Provides appropriate medical therapy to stabilize the patient with confirmed or suspected critical cardiac disease (providing for adequate oxygen delivery and organ perfusion), including determining the need for the initiation of prostaglandin E1, intubation, inotropic support, and central line placement
 - Knows the indications for and limitations and risks of invasive testing and procedures, including issues related to sedation, anesthesia, and intrahospital transport of the critically ill patient with cardiac disease
 - Knows what medical and surgical treatments are appropriate for the cardiac condition and the short- and long-term outcomes of these therapies
 - Recognizes patients who are deviating from the usual postoperative course after commonly performed cardiac operations, specifically those patients who have a residual cardiac lesion, either due to an imperfect operation or incomplete preoperative diagnosis. Plans appropriate anatomic investigation and determines the need to recommend surgical or transcatheter intervention weighing the risks and benefits of the intervention
 - Manages the patient with many forms of congenital heart disease at many ages, with a focus on:
 - Neonates and young infants with ductal-dependent right heart obstructive lesions
 - Neonates and young infants with ductal-dependent left heart obstructive lesions
 - Neonates and young infants with severe Ebstein's anomaly
 - Neonates and young infants with pulmonary atresia with ventricular septal defect and multiple aortopulmonary collateral vessels
 - Neonates with d-transposition of the great arteries
 - Neonates with total anomalous pulmonary venous connection with obstruction
 - Infants with anomalous origin of a coronary artery from the pulmonary artery
 - Single-ventricle patients with staged palliation
 - Mixing lesions
 - Pulmonary and systemic ventricles stressed by abnormal preload or afterload
2. Evaluating and treating neonates, infants, and older pediatric patients with other forms of critical cardiac disease



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- Establishes an accurate diagnosis and ascertains the relevant cardiopulmonary physiology compared to normal physiology across all pediatric ages
 - Knows how to triage patients and which patients require ICU observation for potential risk of decompensation or to meet immediate medical needs
 - Provides appropriate medical therapy to stabilize the patient (provides for adequate oxygen delivery and organ perfusion)
 - Knows the indications for and limitations and risks of invasive testing and procedures, including issues related to sedation, anesthesia, and intrahospital transport of the critically ill patient with cardiac disease
 - Knows what medical and surgical treatments are appropriate for the cardiac condition and the short- and long-term outcomes of these therapies
 - Manages the patient with other forms of critical cardiac diseases, including those with:
 - Primary myocardial dysfunction
 - Acutely compromised cardiopulmonary status due to viral myocarditis or decompensated, end-stage cardiomyopathy
 - Acutely symptomatic arrhythmias
 - Acutely compromised cardiopulmonary status that is due to infectious endocarditis/sepsis and inflammatory (noninfectious) endocarditis
 - Pericardial effusion and tamponade, including supervised pericardiocentesis as indicated
 - Elevated pulmonary vascular resistance, with or without a structural abnormality of the heart
3. Providing consultation to those caring for postoperative cardiac patients
- Provides interpretation of diagnostic studies such as echocardiograms and heart catheterizations, including a clear delineation of the limitations of such studies
 - Diagnoses and treats acutely symptomatic arrhythmias
 - Provides consultation regarding therapies to maximize oxygen delivery and cardiac output
 - Provides consultation regarding pharmacologic and other therapies for patients with single-ventricle physiology
 - Provides consultation regarding therapies for patients with high pulmonary vascular resistance and pulmonary hypertension
 - Knows the factors that predispose to common postoperative complications and the appropriate diagnostic techniques and therapies to address them
4. Providing direct care or consultation to those responsible for primary care for cardiac patients with illnesses of noncardiac origin
- Knows the risks posed to the cardiac patient undergoing noncardiac surgery
 - Recognizes when a different treatment approach is needed compared to a patient with a normal heart
 - Communicates the cardiovascular physiological concerns for the patient to other care providers and collaborates in developing an appropriate care plan
5. Functioning as a member of a multidisciplinary team demonstrating professionalism and excellent communication skills



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- Provides nonbiased information to the patient/family regarding known causes of congenital heart disease, the genetic and developmental implications, and treatment options
- Conducts oneself in a respectful and collegial manner in CICU, exhibiting the utmost professionalism in interactions with nurses, social workers, nutritionists, case managers, respiratory therapy, support staff, and other physicians
- Communicates the entire clinical picture for the family and the care team in an ongoing fashion, providing patients, their families, other clinical team members, and referring physicians with realistic expectations, keeping them engaged as appropriate
- Applies the general principles for providing effective and compassionate end-of-life and palliative care
- Interacts effectively with subspecialty teams (e.g., heart failure, transplant, interventional cardiology, electrophysiology, cardiac surgeons)

6. Participating in quality improvement and patient safety initiatives

- Demonstrates (via participation) the understanding of and rationale for quality improvement and patient safety initiatives in the intensive care unit setting; knows the impact (or potential impact) of these on day-to-day care and patient outcomes, including frequent assessment of the need for invasive monitoring/access, procedures to reduce iatrogenic infections, and techniques to reduce medication errors
- Applies the principles behind a quality improvement process and recognizes and abides by the principles of safe care delivery in the hospital
- Knows and applies the elements of an effective handover of care between services
- Knows the common complications that occur in cardiac patients in the ICU and how they may be prevented and treated

Additionally, there are problems that **generally** require consultation where the role of the general cardiologist is to recognize, provide preliminary evaluation, and obtain consultation. This list depends greatly on context in which one practices. Those cardiologists practicing in areas/centers where access to cardiac subspecialists is difficult will likely provide more of this care and may do so with remote advice from a trusted consultant as needed.

- Interpretation of intra-operative or bedside transesophageal echocardiographic data and the implications for management
- Initiation of second-line or atypical pharmacologic therapies for difficult arrhythmias
- Initiation and management of transesophageal pacing, complex temporary pacing (including poor thresholds and sensitivities), or complex permanent pacemakers and/or defibrillators
- Management of immunosuppression in patients after heart transplantation
- Initiation and management of advanced ventilation strategies
- Initiation and management of renal replacement therapies
- Management of patients not responding to first-line agents for sedation, analgesia, and neuromuscular blockade
- Use of strategies to manage elevated intracranial pressure due to intracranial hemorrhage

Reference

1. Task Force 5: Pediatric cardiology fellowship training in critical care cardiology. Feltes TF, Roth, SJ, Almodovar MC, Andropoulos DB, Bohn DJ, Costello JM, Gajarski RJ, Mott AR, Koenig P. *J Am Coll Cardiol.* 2015; 66:712-722.



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