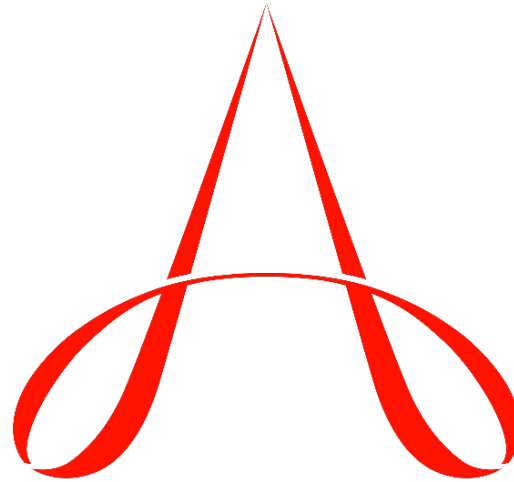




Supplemental Guide: Pediatric Cardiology



ACGME

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Milestones Supplemental Guide

This document provides additional guidance and examples for the Pediatric Cardiology Milestones. This is not designed to indicate any specific requirements for each level, but to provide insight into the thinking of the Milestone Work Group.

Included in this document is the intent of each Milestone and examples of what a Clinical Competency Committee (CCC) might expect to be observed/assessed at each level. Also included are suggested assessment models and tools for each subcompetency, references, and other useful information.

Review this guide with the CCC and faculty members. As the program develops a shared mental model of the Milestones, consider creating an individualized guide (Supplemental Guide Template available) with institution/program-specific examples, assessment tools used by the program, and curricular components.

Additional tools and references, including the Milestones Guidebook, Clinical Competency Committee Guidebook, and Milestones Guidebook for Residents and Fellows, are available at the end of this document as well as on the [Resources](#) page of the Milestones section of the ACGME website.

The following resources will be generally beneficial for all milestones and subcompetencies:

- American Board of Pediatrics. “Entrustable Professional Activities for Subspecialties: Cardiology.” <https://www.abp.org/content/entrustable-professional-activities-subspecialties>. Accessed 2021.
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- Dubin Anne M., Edward P. Walsh, Wayne Franklin, Ronald J. Kanter, J. Philip Saul, Mully J. Shah, George F. Van Hare, and Julie A Vincent. 2015. “Task Force 4: Pediatric Cardiology Fellowship Training in Electrophysiology.” *Circulation*. 132(6): e75-e80. [Published correction appears in *Circulation* 2016 Mar 29;133(13):e467]. doi:10.1161/CIR.000000000000195.
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- Frank, Lowell H., Peter R. Koenig, and Shubhika Srivastava. 2017. "Connecting Milestones to Observable Clinical Performance through Standardized Pediatric Cardiology Rotation Evaluations: Report and Reflections on a Novel Pilot Project." *Progress in Pediatric Cardiology* 44: 11-15. [doi:10.1016/j.ppedcard.2016.12.005](https://doi.org/10.1016/j.ppedcard.2016.12.005).
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- Mahle, William T., Anne M. Murphy, Jennifer S. Li, Yuk M. Law, Jane W. Newburger, Stephen R. Daniels, Daniel Bernstein, Bradley S. Marino, and Robert D. Ross. 2015. "Task Force 8: Pediatric Cardiology Fellowship Training in Research and Scholarly Activity." *Circulation*. 132(6): 107-113. [published correction appears in *Circulation* 2016 Mar 29;133(13):e470]. doi:10.1161/CIR.000000000000199.
- Ross, Robert D., Michael Brook, Peter Koenig, Jeffrey A. Feinstein, Peter Lang, Robert L. Spicer, Julie A. Vincent, et al. 2015. "SPCTPD/ACC/AAP/AHA Training Guidelines for Pediatric Cardiology Fellowship Programs (Revision of the 2005 Training Guidelines for Pediatric Cardiology Fellowship Programs)." *Journal of the American College of Cardiology* S0735-1097(15)00809-8. [published online ahead of print, 2015 Mar 13]. doi:10.1016/j.jacc.2015.03.004.
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- Srivastava, Shubhika, Beth F. Printz, Tal Geva, Girish S. Shirali, Paul M. Weinberg, Pierre C. Wong, and Peter Lang. 2015. "Task Force 2: Pediatric Cardiology Fellowship Training in Noninvasive Cardiac Imaging." *Circulation*. 132(6):e57-e67. [published correction appears in *Circulation* 2016 Mar 29;133(13):e466]. doi:10.1161/CIR.000000000000193.
- Stout, Karen, Anne Marie Valente, Peter J. Bartz, Stephen Cook, Michelle Gurvitz, Arwa Saidi, and Robert D. Ross. 2015. "Task Force 6: Pediatric Cardiology Fellowship Training in Adult Congenital Heart Disease". *Journal of the American College of Cardiology*. 66(6):723-731. [published correction appears in *Journal of the American College of Cardiology* 2015 Aug 11;66(6):762]. doi:10.1016/j.jacc.2015.03.011.
- Webber, Steven A., Daphne T. Hsu, D. Dunbar Ivy, Thomas J. Kulik, Elfriede Pahl, David N. Rosenthal, W. Robert Morrow, and Jeffrey A. Feinstein. 2015. "Task Force 7: Pediatric Cardiology Fellowship Training in Pulmonary Hypertension, Advanced Heart Failure, and Transplantation." *Journal of the American College of Cardiology*.66(6):732-739. [published correction appears in *Journal of the American College of Cardiology* 2015 Aug 11;66(6):763]. doi:10.1016/j.jacc.2015.03.013.

Patient Care 1: Clinical Reasoning for Diagnosis	
Overall Intent: To integrate collected data (e.g., history including social determinants of health, physical, laboratory/diagnostic if available) to make an informed and appropriately broad differential diagnosis	
Milestones	Examples
Level 1 <i>Presents relevant clinical facts (e.g., history, exam, tests, consultations) in the order they were elicited</i>	<ul style="list-style-type: none"> • After evaluating a neonate with hypoxemia at birth, reports vital signs and physical exam findings without prioritization or recognition of pertinent positives and pertinent negatives; recites the patient’s history without excluding irrelevant information or emphasizing important information
Level 2 <i>Generates a differential diagnosis based on the clinical facts</i>	<ul style="list-style-type: none"> • For a well four-year-old child with a murmur, provides an overly broad differential of possible etiologies without recognizing which may be more or less likely • Lists the five most common causes of cyanotic heart disease but is unable to rank their likelihood based on the available clinical data • Recognizes that the immediate post-operative Fontan patient is in hypotensive shock without being able to discern a likely etiology
Level 3 <i>Organizes clinical facts to compare and contrast diagnoses being considered, resulting in a prioritized differential diagnosis</i>	<ul style="list-style-type: none"> • Having considered pertinent positive and negative findings, formulates a differential diagnosis of a neonate with hypoxemia in order of more likely to less likely • Considers common and less common causes of cyanotic heart disease and ranks their likelihood based on the available clinical data • Provides a focused differential for a post-operative Fontan patient in hypotensive shock in ranked order of likelihood based on the clinical findings and diagnostic testing
Level 4 <i>Integrates clinical facts into a unifying diagnosis(es); reappraises in real time to avoid diagnostic error</i>	<ul style="list-style-type: none"> • By considering new information, including test results and changing clinical status, revisits and adjusts the differential diagnosis for a hypoxic neonate in real time • Consistently compares and contrasts several diagnoses and uses supporting evidence to determine which is the most likely in a post-operative Fontan patient in hypotensive shock
Level 5 <i>Models diagnostic reasoning for junior learners</i>	<ul style="list-style-type: none"> • Articulates clinical reasoning in a way that allows insight into an expert’s clinical decision making • Develops a curriculum that aids junior learners in developing and advancing their clinical reasoning skills as assessed in pre- and post-test evaluation
Assessment Models or Tools	<ul style="list-style-type: none"> • Case-based discussion • Direct observation • Medical record (chart) review • Multisource feedback • Simulation
Curriculum Mapping	

Notes or Resources

- Bowen, Judith L. 2006. "Educational Strategies to Promote Clinical Diagnostic Reasoning." *NEJM* 355: 2217-2225.
<https://www.nejm.org/doi/full/10.1056/NEJMra054782>.
- Feltes, Timothy F., Stephen J. Roth, Melvin C. Almodovar, Dean B. Andropoulos, Desmond J. Bohn, John M. Costello, Robert J. Gajarski, Antonio R Mott, and Peter Koenig. 2015. "Task Force 5: Pediatric Cardiology Fellowship Training in Critical Care Cardiology." *Circulation*. 132(6): e81-e90. doi:10.1161/CIR.000000000000196.
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- Society to Improve Diagnosis in Medicine. "Tools and Toolkits."
<https://www.improvediagnosis.org/toolkits/>. Accessed 2020.
- Srivastava, Shubhika, Elizabeth Braunlin, David Brown, Antonio G. Cabrera, Lowell Frank, Julie S. Glickstein, Troy Johnston, et al. 2017. "Curricula Components for Entrustable Professional Activities for the Subspecialty of Pediatric Cardiology." *Progress in Pediatric Cardiology*. 44: 17-32.
<https://doi.org/10.1016/j.ppedcard.2017.01.004>.

Patient Care 2: Patient Management	
Overall Intent: To create a management plan and select the appropriate testing as dictated by the clinical situation	
Milestones	Examples
Level 1 Lists management options for common clinical presentations	<ul style="list-style-type: none"> ● For a patient with a ventricular septal defect (VSD), lists broad treatment options such as medication, surgery, or catheter-based intervention
Level 2 Identifies advantages and drawbacks of standard management options	<ul style="list-style-type: none"> ● Understands risks and benefits of a cardiac catheterization procedure for a patient with pulmonary hypertension ● Discusses risks and benefits of surgical repair versus medical management of a four-month-old with congestive heart failure with a large perimembranous VSD
Level 3 Develops and adapts a patient-specific management plan for patients with common and typical presentation	<ul style="list-style-type: none"> ● Determines that a three-week-old with poor weight gain with a perimembranous VSD should be started on diuresis and increased fortification of feeds in the setting of congestive heart failure symptoms, rather than immediately proceed with surgical repair ● In a hypoxemic three-month-old patient status post Norwood, recommends a cardiac catheterization to determine etiology of cyanosis before performing an early Glenn repair
Level 4 Develops and adapts a patient-specific management plan for patients with complicated and atypical presentation	<ul style="list-style-type: none"> ● In a hypoxemic 18-month-old patient with pulmonary vein stenosis status post Glenn, develops a staged treatment plan including cardiac catheterization for potential intervention and dilation of veins, medications, and/or surgery
Level 5 Models the development and adaptation of management plans	<ul style="list-style-type: none"> ● Consistently articulates evidence-based management plans ● In a two-year-old patient with progressive pulmonary vein stenosis status post Glenn, leads a patient’s family and multidisciplinary team discussion on palliative care options
Assessment Models or Tools	<ul style="list-style-type: none"> ● Case-based discussion ● Direct observation ● Medical record (chart) review ● Multisource feedback
Curriculum Mapping	<ul style="list-style-type: none"> ●
Notes or Resources	<ul style="list-style-type: none"> ● Feltes, Timothy F., Stephen J. Roth, Melvin C. Almodovar, Dean B. Andropoulos, Desmond J. Bohn, John M. Costello, Robert J. Gajarski, Antonio R Mott, and Peter Koenig. 2015. “Task Force 5: Pediatric Cardiology Fellowship Training in Critical Care Cardiology.” <i>Circulation</i>. 132(6): e81-e90. doi:10.1161/CIR.000000000000196. ● Lewis, Alan B., Gerard R. Martin, Peter J. Bartz, Peter S. Fischbach, David R. Fulton, G. Paul Matherne, Benjamin Reinking, and Robert L. Spicer. 2015. “Task Force 1: Pediatric Cardiology Fellowship Training in General Cardiology.” <i>Circulation</i>. 132(6): 48-56. doi:10.1161/CIR.000000000000192. ● Sachdeva, Ritu, Anne Marie Valente, Aimee K. Armstrong, Stephen C. Cook, B. Kelly Han, Leo Lopez, George K. Lui, et al. 2020.

“ACC/AHA/ASE/HRS/ISACHD/SCAI/SCCT/SCMR/SOPE 2020 Appropriate Use Criteria for Multimodality Imaging During the Follow-Up Care of Patients with Congenital Heart Disease: A Report of the American College of Cardiology Solution Set Oversight Committee and Appropriate Use Criteria Task Force, American Heart Association, American Society of Echocardiography, Heart Rhythm Society, International Society for Adult Congenital Heart Disease, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, and Society of Pediatric Echocardiography.” *Journal of the American College of Cardiology* 75(6): 657–703. doi: 10.1016/j.jacc.2019.10.002.

- Schumacher, Daniel J., Robert Englander, Patricia J. Hicks, Carol Carraccio, and Susan Guralnick. 2014. “Domain of Competence: Patient Care.” *Academic Pediatrics* 14(2) Supp: S13-S35. <https://pubmed.ncbi.nlm.nih.gov/24602619/>.

Patient Care 3: Organization and Prioritization of Patient Care Overall Intent: To organize and appropriately prioritize patient needs to optimize patient outcomes	
Milestones	Examples
Level 1 Organizes patient care for an individual patient when prompted	<ul style="list-style-type: none"> • Sees a patient admitted for heart failure and orders a chest radiograph, electrocardiogram, and echocardiogram, when asked by a senior fellow
Level 2 Organizes patient care responsibilities by focusing on individual (rather than multiple) patients	<ul style="list-style-type: none"> • While admitting a stable teenager for heart failure, fails to shift priority to an urgent evaluation for a neonate with possible obstructed total anomalous pulmonary venous connection (TAPVC)
Level 3 Organizes and prioritizes the simultaneous care of patients with efficiency; anticipates and triages urgent and emergent issues	<ul style="list-style-type: none"> • While admitting a stable teenager for heart failure, shifts priority to rapidly evaluate a neonate with suspected obstructed TAPVC and initiates an urgent diagnostic plan prior to returning to the patient with heart failure
Level 4 Organizes, prioritizes, and delegates patient care responsibilities, even when patient volume approaches the capacity of the individual or facility	<ul style="list-style-type: none"> • While admitting an unstable teenager for heart failure, receives multiple pages for neonatal consults in several babies with profound hypoxemia; after assessing the stability of the heart failure patient, appropriately delegates the admission of the heart failure patient and appropriately triages and manages the hypoxemic neonates, and communicates events to the attending
Level 5 Coaches junior learners in organizing patient care responsibilities	<ul style="list-style-type: none"> • After initial stabilization of all patients, reviews care as well as teaching points with the residents, and meets with the nurses and patients' family members to address further questions • Organizes a debriefing with the team after a clinically busy day with multiple urgent, unstable patients to review the prioritization followed to ensure improvement in the future
Assessment Models or Tools	<ul style="list-style-type: none"> • Direct observation • Guided reflection • Multisource feedback • Self-assessment
Curriculum Mapping	<ul style="list-style-type: none"> •
Notes or Resources	<ul style="list-style-type: none"> • Covey, Stephen. 1989. <i>The Seven Habits of Highly Effective People</i>. New York, NY: Simon & Schuster. • Di Rocco, Jennifer R., Chieko Kimata, Masihullah Barat, and Samantha Kodama. 2022. "Paediatric Resident Workflow Observations in a Community-Based Hospital." <i>British Medical Journal Open Quality</i> 11(1):e001607. doi:10.1136/bmjopen-2021-001607. • Kuch, Bradley A., Matthew Bochkoris, and Richard A. Orr. 2020. "Triage and Transport of Infants and Children with Cardiac Disease." In <i>Critical Care of Children with Heart Disease</i>. Springer Cham. doi:10.1007/978-3-030-21870-6_2. Accessed 2022.

- Ledrick, David, Susan Fisher, Justin Thompson, and Mark Sniadanko. 2009. "An Assessment of Emergency Medicine Residents' Ability to Perform in a Multitasking Environment." *Academic Medicine* 84(9): 1289-1294. doi: 10.1097/ACM.0b013e3181b18e1c.

Patient Care 4: Transthoracic Echocardiography (TTE)	
Overall Intent: To independently perform and interpret transthoracic echocardiography	
Milestones	Examples
Level 1 Lists the elements of a complete transthoracic echocardiogram	<ul style="list-style-type: none"> • Lists the different modalities, views, and utility of echocardiography (2D, M-mode, Doppler)
Level 2 Obtains and identifies standard views for transthoracic echocardiogram <i>Distinguishes normal from abnormal findings</i>	<ul style="list-style-type: none"> • Performs basic views of a transthoracic echocardiogram following an institutional protocol • Names visualized anatomic structures while acquiring standard parasternal long and short axis imaging as part of an institutional protocol • Identifies a VSD • Identifies severely reduced ventricular function
Level 3 Performs a complete transthoracic echocardiogram for normal and simple heart disease <i>Interprets anatomic, hemodynamic, and functional data in simple heart disease</i>	<ul style="list-style-type: none"> • Performs a complete transthoracic echocardiogram following institutional protocol and attempts to optimize image quality • Performs a complete study demonstrating tetralogy of Fallot • Interprets secondary echocardiographic findings in a patient with left to right shunt, such as chamber dilation and valve integrity
Level 4 Performs transthoracic echocardiogram for complex heart disease and adapts the study to patient needs <i>Interprets anatomic, hemodynamic, and functional data in complex heart disease</i>	<ul style="list-style-type: none"> • Performs a comprehensive echocardiogram of a patient with hypoplastic left heart syndrome and creates a report highlighting pertinent positive and negative findings • Identifies the presence of a restrictive atrial septum and provides guidance on the need for atrial septostomy
Level 5 Serves as a resource for other learners in performing a transthoracic echocardiogram for complex heart disease <i>Serves as a resource for other learners in interpreting a transthoracic echocardiogram for complex heart disease</i>	<ul style="list-style-type: none"> • Provides expert counsel to junior fellows on the acquisition and interpretation of complex echocardiographic images. • Applies skills from the TTE to other advanced imaging, such as TEE and fetal echocardiography
Assessment Models or Tools	<ul style="list-style-type: none"> • Case-based discussion/conferences • Direct observation • End-of-rotation evaluations • Image review

	<ul style="list-style-type: none"> • Portfolios • Procedure logs • Report review
Curriculum Mapping	<ul style="list-style-type: none"> •
Notes and Resources	<ul style="list-style-type: none"> • Many categorical cardiology fellows may have limited exposure to advanced techniques, such as fetal echocardiography, transesophageal echocardiography, or intravascular ultrasound, and these are not intended to be evaluated in this subcompetency • Lai, Wyman W, Tal Geva, Girish S. Shirali, Peter C. Frommelt, Richard A. Humes, Michael M. Brook, Ricardo H. Pignatelli, and Jack Rychik. 2006. "Guidelines and Standards for Performance of a Pediatric Echocardiogram: A Report from the Task Force of the Pediatric Council of the American Society of Echocardiography." <i>Journal of the American Society of Echocardiography</i> 19(12): 1413-1430. doi:10.1016/j.echo.2006.09.001. • Lopez, Leo, Steven D. Colan, Peter C. Frommelt, Gregory J. Ensing, Kathleen Kendall, Adel K. Younoszai, Wyman W. Lai, and Tal Geva. 2010. "Recommendations for Quantification Methods During the Performance of a Pediatric Echocardiogram: A Report from the Pediatric Measurements Writing Group of the American Society of Echocardiography Pediatric and Congenital Heart Disease Council." <i>Journal of the American Society of Echocardiography</i> 23(5): 465-577. doi:10.1016/j.echo.2010.03.019.

Medical Knowledge 1: Anatomy, Physiology, and Natural (and Modified) History of Cardiac Conditions Overall Intent: To develop a broad foundation of knowledge to manage children with heart disease	
Milestones	Examples
Level 1 <i>Describes anatomy and physiology of a structurally normal heart</i>	<ul style="list-style-type: none"> • Describes normal fetal and postnatal cardiac anatomy • Explains that pulmonary pressures are normally less than systemic pressure after birth
Level 2 <i>Describes anatomy and physiology of simple cardiac conditions</i> <i>Discusses natural history of common or simple heart conditions</i>	<ul style="list-style-type: none"> • Describes anatomy of basic congenital heart defects and their subtypes, such as atrial septal defect (ASD): secundum, primum, sinus venosus, and coronary sinus • Describes the basic physiology of obstructive congenital heart lesions such as pulmonic stenosis, aortic stenosis, and coarctation of the aorta • In an infant with a large VSD, describes the signs and symptoms in the first six months of life as the pulmonary vascular resistance decreases
Level 3 <i>Describes anatomy and physiology of complex cardiac conditions</i> <i>Discusses the impact of intervention on the natural history of common or simple heart conditions</i>	<ul style="list-style-type: none"> • Identifies different subtypes of total anomalous pulmonary venous return and its variable presentations, obstructive versus nonobstructive • Distinguishes the variable physiologies that are possible in a cyanotic infant, such as inadequate pulmonary blood flow, single ventricle, and transposition of the great vessels • Explains how balloon valvuloplasty is used to relieve aortic stenosis with the potential for aortic insufficiency and restenosis • Discusses the potential and need for pacemaker after surgical closure of a VSD in congenitally corrected transposition of the great arteries
Level 4 <i>Integrates anatomy and physiology to predict clinical presentation and progression with a high level of detail</i> <i>Discusses anticipated course of uncommon or complex heart conditions, with or without treatment</i>	<ul style="list-style-type: none"> • Describes the anatomic subtypes of double outlet right ventricle with its various physiologic permutations and clinical presentations • Identifies the postnatal implications of aberrations of fetal physiology such as a critical obstruction lesion • Anticipates the possibility of progressive restriction to pulmonary blood flow in a patient with tricuspid atresia and normally related great arteries
Level 5 <i>Appraises and applies evidence to challenging treatment decisions for anatomic and physiologic variants</i> <i>Discusses anticipated course of rare heart conditions, with or without treatment</i>	<ul style="list-style-type: none"> • Uses applicable literature and institutional experience to treat rare and complex congenital or acquired heart disease to decide and present that plan to other health care practitioners and refer for the appropriate medical and or surgical intervention • Discusses the evidence and anticipated course with patients' families and health care teams for rare and complex congenital and acquired heart disease

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Assessment Models or Tools	<ul style="list-style-type: none"> • Case-based discussion • Direct observation • In-training examinations
Curriculum Mapping	<ul style="list-style-type: none"> •
Notes and Resources	<ul style="list-style-type: none"> • Allen, Hugh D., David J. Driscoll, Robert E. Shaddy, and Timothy F. Feltes. 2007. <i>Moss and Adams' Heart Disease in Infants, Children and Adolescents: Including the Fetus and Young Adult, 2 Volume Set</i>, 9th ed. Lippincott Williams & Wilkins. ISBN:0781786843. • Eidem, Benjamin W., Bryan C. Cannon, Anthony C. Chang, Jonathon N. Johnson, Paul Kantor, Robert E. Shaddy, and Frank Cetta. 2022. <i>Pediatric Cardiology Board Review</i>, 3rd ed. Wolters Kluwer. ISBN/ISSN: 9781975180478. • Rudolph, Abraham. 2009. <i>Congenital Diseases of the Heart: Clinical-Physiological Considerations</i>, 3rd ed. Wiley-Blackwell. ISBN: 978-1-405-16245-6.

Medical Knowledge 2: Diagnostic Cardiac Catheterization Overall Intent: To interpret diagnostic cardiac catheterization and integrate data into patient care	
Milestones	Examples
Level 1 <i>Describes data available from cardiac catheterization</i>	<ul style="list-style-type: none"> • Lists the commonly acquired saturations and chamber pressures measured in a diagnostic catheterization • Describes normal saturations and pressures obtained during a cardiac catheterization
Level 2 <i>Reports angiographic findings and calculates hemodynamic data from a cardiac catheterization</i>	<ul style="list-style-type: none"> • Calculates Qp/Qs in a patient with a ventricular septal defect • Describes the angiographic features of a ventricular septal defect
Level 3 <i>Interprets and synthesizes angiographic and hemodynamic data from a straightforward cardiac catheterization</i>	<ul style="list-style-type: none"> • Calculates hemodynamic data and ascertains candidacy for cavopulmonary anastomosis in a patient with a single ventricle aortopulmonary shunt • Ascertains candidacy for unilateral balloon pulmonary angioplasty with stent placement after interpreting the hemodynamic and angiographic data • Identifies partial anomalous pulmonary venous return from hemodynamic and angiographic data
Level 4 <i>Interprets and synthesizes angiographic and hemodynamic data from a complex cardiac catheterization</i>	<ul style="list-style-type: none"> • Identifies right ventricular dependent coronary circulation and its implications for management in a neonate with pulmonary atresia and intact ventricular septum • Discusses the limitations of and alternatives for calculating the Qp/Qs in a patient with multi-source pulmonary blood flow
Level 5 <i>Coaches others to interpret and synthesize angiographic and hemodynamic data from a complex cardiac catheterization</i>	<ul style="list-style-type: none"> • After reviewing the diagnostic catheterization and pulmonary vasoreactivity testing in a patient with severe pulmonary hypertension, leads a discussion referring to literature weighing risks and benefits of a palliative Potts shunt versus lung transplantation referral, incorporating consideration of the impact of the patient’s extracardiac disease on decision making
Assessment Models or Tools	<ul style="list-style-type: none"> • Case-based discussion • Direct observation • In-training exam • Medical record (chart) audit • Multisource feedback • Procedure log
Curriculum Mapping	<ul style="list-style-type: none"> •
Notes or Resources	<ul style="list-style-type: none"> • Feltes, Timothy F., Emile Bacha, Robert H. Beekman III, John P. Cheatham, Jeffrey A. Feinstein, Antoinette S. Gomes, Ziyad M. Hijazi, et al. 2011. “Indications for Cardiac Catheterization and Intervention in Pediatric Cardiac Disease; A Scientific Statement from

the American Heart Association." *Circulation* 123(22): 2607–2652.
[doi:10.1161/CIR.0b013e31821b1f10](https://doi.org/10.1161/CIR.0b013e31821b1f10).

Medical Knowledge 3: Electrophysiologic Testing	
Overall Intent: To interpret electrophysiologic testing and integrate data into patient care	
Milestones	Examples
Level 1 <i>Recognizes features of a normal electrocardiogram (ECG)</i>	<ul style="list-style-type: none"> • Identifies normal sinus rhythm, P wave, QRS complex, ST segment and T wave • Measures PR and QRS intervals and calculates QTc interval length
Level 2 <i>Interprets ECG patterns for common conditions using simple testing (e.g., 12-lead ECG, telemetry)</i>	<ul style="list-style-type: none"> • Differentiates sinus tachycardia versus supraventricular tachycardia • Distinguishes ectopy from artifact on ECG and telemetry
Level 3 <i>Interprets abnormalities of increasing complexity using a wider array of electrophysiologic testing (e.g., Holter monitor, event recorder, stress testing)</i>	<ul style="list-style-type: none"> • For a patient with palpitations, interprets events recording and Holter monitor data • Identifies polymorphic ventricular tachycardia that is elicited on an exercise stress test • Identifies Wolff-Parkinson-White (WPW) pattern on ECG
Level 4 <i>Interprets subtle and more complex abnormalities of non-invasive and common abnormalities of invasive electrophysiologic testing</i>	<ul style="list-style-type: none"> • Interprets refractory arrhythmias like permanent junctional reciprocating tachycardia (PJRT) or ectopic atrial tachycardia • Recognizes and interprets borderline prolonged QTc interval and refers to exercise stress testing for risk stratification • Refers a symptomatic patient with WPW for exercise stress testing and electrophysiologic testing for risk stratification and possible ablation
Level 5 <i>Coaches others to interpret and act on more complex abnormalities of non-invasive electrophysiologic testing</i>	<ul style="list-style-type: none"> • Leads a weekly conference to teach fellows to analyze complex arrhythmias, provide accurate differentials, and apply evidence-based therapies
Assessment Models or Tools	<ul style="list-style-type: none"> • Case-based discussion • Direct observation • In-training exam • Medical record (chart) review • Multisource feedback
Curriculum Mapping	<ul style="list-style-type: none"> •
Notes or Resources	<ul style="list-style-type: none"> • Callans, David J. 2021. <i>Josephson’s Clinical Cardiac Electrophysiology: Techniques and Interpretations</i>, 6th edition. Wolters Kluwer. • Fogoros, Richard N., and John M. Mandrola. 2017. <i>Fogoros’ Electrophysiologic Testing</i>, 6th ed. John Wiley & Sons.

Systems-Based Practice 1: Patient Safety	
Overall Intent: To engage in the analysis and management of patient safety events, including relevant communication with patients, patients’ families, and health care professionals	
Milestones	Examples
<p>Level 1 <i>Demonstrates knowledge of common patient safety events</i></p> <p><i>Demonstrates knowledge of how to report patient safety events</i></p>	<ul style="list-style-type: none"> ● Lists common patient safety events such as patient misidentification or medication errors ● Lists “patient safety reporting system” or “patient safety hotline” as ways to report safety events
<p>Level 2 <i>Identifies system factors that lead to patient safety events</i></p> <p><i>Reports patient safety events through institutional reporting systems (simulated or actual)</i></p>	<ul style="list-style-type: none"> ● Identifies that electronic health record (EHR) default timing of orders as “routine” (without changing to “stat”) may lead to delays in antibiotic administration time for sepsis ● Reports delayed antibiotic administration time using the appropriate reporting mechanism
<p>Level 3 <i>Participates in analysis of patient safety events (simulated or actual)</i></p> <p><i>Participates in disclosure of patient safety events to patients and families (simulated or actual)</i></p>	<ul style="list-style-type: none"> ● Participates in department morbidity and mortality presentations ● Participates in root cause analyses (mock or actual) ● With the support of an attending or risk management team member, participates in the disclosure of a medication order error to a patient’s family
<p>Level 4 <i>Conducts analysis of patient safety events and offers error prevention strategies (simulated or actual)</i></p> <p><i>Discloses patient safety events to patients and families (simulated or actual)</i></p>	<ul style="list-style-type: none"> ● Leads a simulated or actual root cause analysis related to a patient fall from a crib and develops action plan that includes signs to remind caregivers to always put side rails up and add floor mats under cribs, bedside shift report fall prevention checklists, and environmental stressors ● Following consultation with risk management and other team members, independently discloses a medication error to a patient’s family
<p>Level 5 <i>Actively engages teams and processes to modify systems to prevent patient safety events</i></p> <p><i>Role models or mentors others in the disclosure of patient safety events</i></p>	<ul style="list-style-type: none"> ● Leads a multidisciplinary team to work on improved medication reconciliation processes to prevent discharge medication errors and considers biases amongst team members ● Conducts a simulation demonstrating techniques and approaches for disclosing patient safety events ● Teaches a course during PGY-1 bootcamp about the resident’s role in disclosure of patient safety events

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<p>Assessment Models or Tools</p>	<ul style="list-style-type: none"> ● Case-based discussion ● Direct observation ● E-module multiple choice tests ● Guided reflection ● Medical record (chart) audit ● Multisource feedback ● Portfolio ● Simulation
<p>Curriculum Mapping</p>	<ul style="list-style-type: none"> ●
<p>Notes or Resources</p>	<ul style="list-style-type: none"> ● Guralnick, Susan, Stephen Ludwig, and Robert Englander. 2014. "Domain of Competence: Systems-Based Practice." <i>Academic Pediatrics</i>. 14(2 Suppl): S70-S79. https://doi.org/10.1016/j.acap.2013.11.015. ● Institute for Healthcare Improvement. http://www.ihl.org/Pages/default.aspx. Accessed 2020. ● Singh, Ranjit, Bruce Naughton, John S. Taylor, Marlon R. Koenigsberg, Diana R. Anderson, Linda L. McCausland, Robert G. Wahler, Amanda Robinson, and Gurdev Singh. 2005. "A Comprehensive Collaborative Patient Safety Residency Curriculum to Address the ACGME Core Competencies." <i>Medical Education</i> 39(12): 1195-204. DOI: 10.1111/j.1365-2929.2005.02333.x.

Systems-Based Practice 2: Quality Improvement	
Overall Intent: To understand and implement quality improvement methodologies to improve patient care	
Milestones	Examples
Level 1 <i>Demonstrates knowledge of basic quality improvement methodologies and metrics</i>	<ul style="list-style-type: none"> •Lists tools utilized in quality improvement tools such as fishbone diagrams, PDSA (Plan, Do, Study, Act) cycles, key driver diagrams, root cause analysis, etc.
Level 2 <i>Describes local quality improvement initiatives (e.g., community vaccination rate, infection rate, smoking cessation)</i>	<ul style="list-style-type: none"> •Describes an initiative to improve documentation of infective endocarditis prophylaxis or exercise restrictions in the clinic •Describes an initiative to improve efficacy in ordering echocardiograms in the hospital
Level 3 <i>Participates in local quality improvement initiatives</i>	<ul style="list-style-type: none"> •Participates in an ongoing interdisciplinary project to improve medication reconciliation •Collaborates on a project to improve discharge efficiency •Participates in division or programmatic quality review and/or morbidity and mortality conferences
Level 4 <i>Demonstrates the skills required to identify, develop, implement, and analyze a quality improvement project</i>	<ul style="list-style-type: none"> •Initiates a quality improvement project to improve the accuracy of blood pressure measurements within a practice site, that includes engaging the office team, assessing the problem, articulating a broad goal, developing a SMART (Specific, Measurable, Attainable, Realistic, Time-bound) aim, collecting data, analyzing, and monitoring progress and challenges •In developing a quality improvement project, considers team bias and social determinants of health in patient population
Level 5 <i>Creates, implements, and assesses quality improvement initiatives at the institutional or community level</i>	<ul style="list-style-type: none"> •Initiates and completes a quality improvement project to improve referral rates and reduce time to referral from local and regional emergency rooms to cardiology in collaboration with the county health department •Consistently engages in quality improvement and mentors learners in projects •Participates on a collaborative level with national QI initiatives (e.g., National Pediatric Cardiology Quality Improvement Collaborative (NPC-QIC)), leads efforts at an institutional level, and submits for publication
Assessment Models or Tools	<ul style="list-style-type: none"> •Direct observation •Portfolio •Poster or other presentation •Team evaluations
Curriculum Mapping	<ul style="list-style-type: none"> •
Notes or Resources	<ul style="list-style-type: none"> • Bright Futures Quality Improvement. "QI Office System Tools." https://www.aap.org/en/practice-management/bright-futures/bright-futures-quality-improvement/qi-office-system-tools/. Updated April 2022. Accessed 2022.

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Systems-Based Practice 3: System Navigation for Patient-Centered Care – Coordination of Care	
Overall Intent: To effectively navigate the health care system, including the interdisciplinary team and other care practitioners; to adapt care to a specific patient population to ensure high-quality patient outcomes	
Milestones	Examples
Level 1 <i>Lists the various interprofessional individuals involved in the patient’s care coordination</i>	<ul style="list-style-type: none"> • For a patient with congenital or acquired heart disease, identifies the team members and roles as part of the team, including pediatric cardiologist, cardiac surgeon, clinic and hospital nurses, and social workers • Recognizes implicit bias as a contributor to health care disparities • Identifies access to care and insurance coverage as social determinants of health
Level 2 <i>Coordinates care of patients in routine clinical situations, incorporating interprofessional teams with consideration of patient and family needs</i>	<ul style="list-style-type: none"> • After initial cardiology diagnosis, incorporates other health care practitioners and discusses their roles with the patient’s family • Understands and communicates the need for interstage single ventricle monitoring (scale and home oxygen saturation monitor) with the patient’s family • Coordinates postoperative care and follow up with referring cardiologist
Level 3 <i>Coordinates care of patients in complex clinical situations, effectively utilizing the roles of interprofessional teams, and incorporating patient and family needs and goals</i>	<ul style="list-style-type: none"> • Works with the case manager/social worker to coordinate outpatient care and ensure appropriate cardiology clinic follow up for a patient who resides in a rural area with limited family transportation options • Recognizes that marginalized communities may have additional barriers to access and involves a social worker or case manager in finding community resources
Level 4 <i>Coordinates interprofessional, patient-centered care among different disciplines and specialties, actively assisting families in navigating the health care system</i>	<ul style="list-style-type: none"> • During inpatient rotations, leads team members in approaching consultants to review cases/recommendations and arranges interdisciplinary rounds for the team • Coordinates a multidisciplinary team/family meeting to include appropriate subspecialists, physical therapist/occupational therapist, nutrition, child life, mental health resources, chaplain services, the primary care physician, etc. • Understands the complexity of coordination and executes hand-off from the pediatric cardiologist to the adult cardiologist specializing in congenital heart disease
Level 5 <i>Coaches others in interprofessional, patient-centered care coordination</i>	<ul style="list-style-type: none"> • Leads an initiative to educate residents about home health services or medical home model for medically complex children, ensuring inclusion of discussion on health care disparities • Coaches and mentors colleagues through a multidisciplinary team meeting for a child with complex health care needs • Implements a program to improve the transition of patients to adult congenital cardiology
Assessment Models or Tools	<ul style="list-style-type: none"> • Direct observation and Entrustable Professional Activities • Medical record (chart) audit • Multisource feedback • Review of discharge planning documentation

Curriculum Mapping	•
Notes or Resources	<ul style="list-style-type: none"> • American Academy of Pediatrics (AAP). https://www.aap.org/en-us/Pages/Default.aspx. Accessed 2020. • AAP. Pediatric Care Coordination Resources. https://www.aap.org/en/practice-management/care-delivery-approaches/care-coordination-resources/. Accessed 2022. • American Board of Pediatrics. “Entrustable Professional Activities for General Pediatrics.” https://www.abp.org/entrustable-professional-activities-epas. Accessed 2020. • American College of Cardiology. 2018. “Congenital Heart Disease Young Adult Transfer and Transition Policy.” https://www.acc.org/-/media/Non-Clinical/Files-PDFs-Excel-MS-Word-etc/Membership/ACPC/2018/02/CHD-Young-Adult-Transfer-and-Transition-Policy-QMs-Feb-9-2018.pdf?la=en&hash=B8AE8E8499BEE3503AF1A28CFFAEA429C83D44F1. Accessed 2022. • Rudd, Nancy A., Nancy S. Ghanayem, Garick D. Hill, Linda M. Lambert, Kathleen A. Mussatto, Jo Ann Nieves, Sarah Robinson, et al. 2020. “Interstage Home Monitoring for Infants with Single Ventricle Heart Disease: Education and Management: A Scientific Statement from the American Heart Association.” <i>Journal of the American Heart Association</i> 9: e014548. doi: 10.1161/JAHA.119.014548. • Skochelak, Susan E., Maya M. Hammond, Kimberly D. Lomis, Jeffrey M. Borkan, Jed. D. Gonzalo, Luan E. Lawson, and Stephanie R. Starr. 2020. <i>AMA Education Consortium: Health Systems Science</i>, 2nd ed. Elsevier. • Starr, Stephanie R., Neera Agrwal, Michael J. Bryan, Yuna Buhrman, Jack Gilbert, Jill M. Huber, Andrea N. Leep Hunderfund, et al. 2017. “Science of Health Care Delivery: An Innovation in Undergraduate Medical Education to Meet Society’s Needs.” <i>Mayo Clinic Proceedings: Innovations, Quality & Outcomes</i>. 1(2): 117-129. https://www.sciencedirect.com/science/article/pii/S2542454817300395. • Wernovsky, Gil, Stacey L. Lihn, and Melissa M. Olen. 2017. “Creating a Lesion-specific ‘Roadmap’ for Ambulatory Care Following Surgery for Complex Congenital Cardiac Disease.” <i>Cardiology in the Young</i>. 27(4): 648-662. doi:10.1017/S1047951116000974.

Systems-Based Practice 4: System Navigation for Patient-Centered Care – Transitions in Care	
Overall Intent: To effectively navigate the health care delivery system during transitions of care to ensure high-quality patient outcomes	
Milestones	Examples
Level 1 <i>Uses a standard template for transitions of care/hand-offs</i>	<ul style="list-style-type: none"> • When handing off to colleagues, reads verbatim from a templated hand-off which includes all relevant systems and patient problems, but lacks context, is not appropriately specific in next steps, and does not provide contingency plans
Level 2 <i>Adapts a standard template, recognizing key elements for safe and effective transitions of care/hand-offs in routine clinical situations</i>	<ul style="list-style-type: none"> • Routinely uses a standardized hand-off for a stable patient, verbalizes a basic understanding of active problems, and provides basic contingency plans • Discusses a discharge of a child with a VSD who requires outpatient follow up, ensuring appropriate follow up has been set up and the primary team and family are well informed
Level 3 <i>Performs safe and effective transitions of care/hand-offs in complex clinical situations, and ensures closed-loop communication</i>	<ul style="list-style-type: none"> • Routinely uses a standardized hand-off when transferring a patient to the cardiac intensive care unit with direct communication of clinical reasoning, problems warranting a higher level of care, and status of completed/planned interventions; solicits read-back and confirms/uses specific resources and timeline for transfer to occur • Performs the hand-off for a patient with congenital heart disease who had a surgical palliation and is ready to move from the intensive care unit (ICU) to the acute care unit; provides the floor team with a succinct summary by problem or system and a timeline for outpatient follow up with clearly delineated responsibilities • Discusses discharge of an infant with a VSD with pulmonary hypertension and from the neonatal intensive care unit (NICU) who requires outpatient follow up, ensuring appropriate follow up has been set up and the primary team and family are well informed
Level 4 <i>Performs and advocates for safe and effective transitions of care/hand-offs within and across health care delivery systems, including transitions to adult care</i>	<ul style="list-style-type: none"> • Seeks out appropriate adult general and subspecialty practitioners to facilitate the transition of a 20-year-old patient with complex health care needs to adult care; ensures a thorough hand-off, including the patient’s cultural preferences and social needs, to the identified new adult practitioners • Discusses with adolescents and their families the importance of insurance and continuity of medical care, raising awareness of barriers to maintain a comprehensive medical home • Facilitates the transition of a single ventricle, shunt-dependent patient to an institution in the patient’s home state • Discusses discharge of an infant with a complete atrioventricular (AV) canal and duodenal atresia from the NICU who requires outpatient follow up with multiple subspecialties, ensuring appropriate follow up has been set up and the primary team, family, and referring physician are well informed
Level 5 <i>Coaches others in improving transitions of care within and across health care delivery systems to optimize patient outcomes</i>	<ul style="list-style-type: none"> • Designs and implements standardized hand-off workshop exercises for medical students and residents prior to the start of their clinical rotations • Develops and implements a process for cardiology clinics to improve the transition from pediatric to adult congenital cardiology clinics

<p>Assessment Models or Tools</p>	<ul style="list-style-type: none"> • Portfolio assessment • Direct observation • I-PASS assessment checklist • Multisource feedback • Review of sign-out tools, use and review of checklists
<p>Curriculum Mapping</p>	<ul style="list-style-type: none"> •
<p>Notes or Resources</p>	<ul style="list-style-type: none"> • American Board of Pediatrics. “Entrustable Professional Activities for Subspecialties: Cardiology.” https://www.abp.org/content/entrustable-professional-activities-subspecialties. Accessed 2022. • Everitt, Ian K., Jennifer F. Gerardin, Fred H. Rodriguez, and Wendy M. Book. 2017. “Improving the Quality of Transition and Transfer of Care in Young Adults with Congenital Heart Disease.” <i>Congenital Heart Disease</i>. 242-250. doi:10.1111/chd.12463. • Got Transition. “Clinician Education and Resources.” https://www.gottransition.org/resources-and-research/clinician-education-resources.cfm. Accessed 2020. • Matern, Lukas H., Jeanne M. Farnan, Kristen W. Hirsch, Melissa Cappaert, Ellen S. Byrne, and Vineet M. Arora. 2018. “A Standardized Handoff Simulation Promotes Recovery from Auditory Distractions in Resident Physicians.” <i>Simulation in Healthcare</i>. 13(4): 233-238. DOI: 10.1097/SIH.0000000000000322. • Society for Adolescent Health and Medicine. “Transition to Adulthood for Youth with Chronic Conditions and Special Health Care Needs.” <i>Journal of Adolescent Health</i> 66(5): P631-634. https://doi.org/10.1016/j.jadohealth.2020.02.006. • Starmer, Amy J., Nancy D. Spector, Rajendu Srivastava, Daniel C. West, Glenn Rosenbluth, April D. Allen, Elizabeth L. Noble, et al. “Changes in Medical Errors after Implementation of a Handoff Program.” <i>New England Journal of Medicine</i>. 371:1803-1812. DOI: 10.1056/NEJMsa1405556. • Stout, Karen, Anne Marie Valente, Peter J. Bartz, Stephen Cook, Michelle Gurvitz, Arwa Saidi, and Robert D. Ross. 2015. “Task Force 6: Pediatric Cardiology Fellowship Training in Adult Congenital Heart Disease.” <i>Journal of the American College of Cardiology</i>. 66(6):723-731. [published correction appears in <i>Journal of the American College of Cardiology</i> 2015 Aug 11;66(6):762]. doi:10.1016/j.jacc.2015.03.011.

Systems-Based Practice 5: Population and Community Health	
Overall Intent: To promote and improve health across communities and populations through patient care and advocacy including public education and elimination of structural racism	
Milestones	Examples
Level 1 <i>Demonstrates awareness of population and community health needs and disparities</i>	<ul style="list-style-type: none"> Identifies social determinants of health, such as poverty and structural racism
Level 2 <i>Identifies specific population and community health needs and disparities; identifies local resources</i>	<ul style="list-style-type: none"> Acknowledges the impact of structural racism on outcomes for individual patients with congenital heart disease Identifies local congenital heart disease parent groups for family support
Level 3 <i>Uses local resources effectively to meet the needs and reduce health disparities of a patient population and community</i>	<ul style="list-style-type: none"> Consistently refers patients to neurodevelopmental clinic and subspecialty clinics as needed Refers patients to local resources and programs aimed at eliminating structural racism and improving health disparities
Level 4 <i>Adapts practice to provide for the needs of and reduce health disparities of a specific population</i>	<ul style="list-style-type: none"> Participates in an advocacy project to improve health care access and/or decrease practices that support inequity in fetal detection of congenital heart disease population Modifies discharge/follow-up plans to incorporate individuals' barriers to care
Level 5 <i>Advocates at the local, regional, or national level for populations and communities with health care disparities</i>	<ul style="list-style-type: none"> Engages in a project to train obstetric sonographers in underserved areas to detect congenital heart disease Participates in longitudinal discussions with local, state, or national government policy makers to eliminate structural racism and reduce health disparities Organizes a telehealth platform for subspecialty care within cardiology for patients who live in rural locations
Assessment Models or Tools	<ul style="list-style-type: none"> Direct observation Medical record (chart) audit Multisource feedback Reflection
Curriculum Mapping	<ul style="list-style-type: none">
Notes or Resources	<ul style="list-style-type: none"> AAP. "Advocacy." https://services.aap.org/en/advocacy/. 2020. Blankenburg, Rebecca, Patricia Poitevien, Javier Gonzalez del Rey, Megan Aylor, John Frohna, Heather McPhillips, Linda Waggoner-Fountain, and Laura Degnon. 2020. "Dismantling Racism: Association of Pediatric Program Directors' Commitment to Action." <i>Academic Pediatrics</i>. 20(8): 1051-1053. doi: 10.1016/j.acap.2020.08.017. Brunetti, Marissa A., Heather M. Griffis, Michael L. Obyrne, Andrew C. Glatz, Jing Huang, Titus Chan, Kurt Schumacher, et al. 2022. "Racial and Ethnic Variation in ECMO Use, Failure to Rescue, and Mortality in Pediatric Cardiac ICU Patients: A Multicenter Cohort

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Systems-Based Practice 6: Physician Role in Health Care Systems	
Overall Intent: To understand the physician’s role in health systems science to optimize patient care delivery, including cost-conscious care	
Milestones	Examples
Level 1 <i>Engages with patients and other providers in discussions about cost-conscious care and key components of the health care delivery system</i>	<ul style="list-style-type: none"> ● Considers that insurance coverage, or lack of coverage, can affect prescription drug availability/cost for individual patients ● Identifies that one’s own implicit biases contribute to disparities and less-than-optimal care delivery
Level 2 <i>Identifies the relationships between the delivery system and cost-conscious care and the impact on the patient care</i>	<ul style="list-style-type: none"> ● Considers the patient’s prescription drug coverage when choosing a heart failure regimen ● Ensures that a hospitalized patient has a scheduled follow-up appointment at discharge
Level 3 <i>Discusses the need for changes in clinical approaches based on evidence, outcomes, and cost-effectiveness to improve care for patients and families</i>	<ul style="list-style-type: none"> ● Adapts plan and identifies additional resources for uninsured patient ● Considers health care disparities in pursuit of holistic care ● Judiciously orders echocardiograms for patients with murmurs after consideration of the history and physical
Level 4 <i>Advocates for the promotion of safe, quality, and high-value care</i>	<ul style="list-style-type: none"> ● Works collaboratively to identify additional services for a patient with a recent tracheostomy and gastrostomy tube (g-tube) following complex cardiovascular course ● Consistently identifies the value of outpatient medication reconciliation to minimize hospital readmissions
Level 5 <i>Coaches others to promote safe, quality, and high-value care across health care systems</i>	<ul style="list-style-type: none"> ● Raises awareness at a systems level to promote cost-conscious care such as implementation of echocardiographic appropriate use criteria ● Leads team members in conversations around care gaps for patients and families with limited English proficiency and creates team plans to provide comprehensive care in a clinic
Assessment Models or Tools	<ul style="list-style-type: none"> ● Direct observation ● Medical record (chart) audit ● Multisource feedback ● Review and guided reflection on costs accrued for individual patients or patient populations with a given diagnosis
Curriculum Mapping	<ul style="list-style-type: none"> ●
Notes and Resources	<ul style="list-style-type: none"> ● Agency for Healthcare Research and Quality (AHRQ). “Measuring the Quality of Physician Care.” https://www.ahrq.gov/talkingquality/asures/setting/physician/index.html Accessed 2022. ● AAP. “Practice Management.” https://www.aap.org/en/practice-management/. Accessed 2022.

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Practice-Based Learning and Improvement 1: Evidence-Based and Informed Practice Overall Intent: To incorporate evidence and apply it to individual patients and patient populations	
Milestones	Examples
Level 1 <i>Develops an answerable clinical question and demonstrates how to access available evidence, with guidance</i>	<ul style="list-style-type: none"> ● Identifies a question such as, “What is the appropriate treatment for this extremely low birth weight infant with patent ductus arteriosus (PDA)?”, but needs guidance to focus it into a searchable question ● Uses general medical resources such as UpToDate or textbooks to search for answers
Level 2 <i>Independently articulates clinical question and accesses available evidence</i>	<ul style="list-style-type: none"> ● Clearly identifies a focused, answerable question, such as, “Among extremely low birth weight pre-term infants, does percutaneous closure of the PDA improve morbidity when compared to surgical closure?” ● Searches the literature using PubMed to guide the answer to a clinical question and appropriately filters results
Level 3 <i>Locates and applies the evidence, integrated with patient preference, to the care of patients</i>	<ul style="list-style-type: none"> ● Obtains, appraises, and applies evidence for transcatheter closure to treat an extremely low birth weight infant with PDA ● Efficiently searches and filters key databases, retrieving information that is specific to the clinical question ● Locates literature for alternatives to blood transfusions for a patient who is a Jehovah’s Witness and requires heart surgery
Level 4 <i>Critically appraises and applies evidence, even in the face of uncertainty and conflicting evidence to guide care tailored to the individual patient</i>	<ul style="list-style-type: none"> ● Adds to library of resources with updated primary literature or clinical guidelines with new revisions ● Weighs primary and secondary outcomes to enhance specificity to individual patients ● Elicits a distrustful patient’s prior experiences with health care inequity to adapt management plan to incorporate patient preferences
Level 5 <i>Coaches others to critically appraise and apply evidence for complex patients</i>	<ul style="list-style-type: none"> ● Provides feedback to junior fellows on their ability to formulate questions, search for the best available evidence, appraise evidence, and apply that information to the care of patients ● Participates in the development of clinical guidelines/pathways ● As part of a team, develops an evidence-based clinical pathway in the EHR for extremely low birth weight infants with PDA, awaiting possible percutaneous PDA closure
Assessment Models or Tools	<ul style="list-style-type: none"> ● Direct observation to inform milestones and Entrustable Professional Activities ● Oral or written examinations ● Presentation evaluation
Curriculum Mapping	<ul style="list-style-type: none"> ●
Notes or Resources	<ul style="list-style-type: none"> ● Duke University. “Evidence-Based Practice.” https://guides.mclibrary.duke.edu/ebm/home. Accessed 2020.

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Practice-Based Learning and Improvement 2: Reflective Practice and Commitment to Personal Growth Overall Intent: To continuously improve patient care based on self-evaluation and lifelong learning	
Milestones	Examples
Level 1 <i>Participates in feedback sessions</i> <i>Develops personal and professional goals, with assistance</i>	<ul style="list-style-type: none"> ● Attends scheduled feedback sessions ● Has a goal to improve echocardiogram skills with faculty mentorship ● Acknowledges own implicit/explicit biases
Level 2 <i>Demonstrates openness to feedback and performance data</i> <i>Designs a learning plan based on established goals, feedback, and performance data, with assistance</i>	<ul style="list-style-type: none"> ● Acknowledges concerns about timely note completion and works with clinic preceptor to develop goals for improvement ● After receiving feedback about echocardiogram quality during annual review, integrates feedback into own personal practice ● Devises a plan to explore biases and how they impact care of peer relationships
Level 3 <i>Seeks and incorporates feedback and performance data episodically</i> <i>Designs and implements a learning plan by analyzing and reflecting on the factors which contribute to gap(s) between performance expectations and actual performance</i>	<ul style="list-style-type: none"> ● Occasionally seeks feedback about prioritization skills from the attending after a busy call night and incorporates the next day ● After reviewing evaluations, identifies problems performing specific transthoracic echocardiogram views and takes initiative to spend more time with a sonographer to improve skills ● Recognizes own implicit biases that affected care for a patient and takes steps to mitigate bias
Level 4 <i>Seeks and incorporates feedback and performance data consistently</i> <i>Adapts a learning plan using long-term professional goals, self-reflection, and performance data to measure its effectiveness</i>	<ul style="list-style-type: none"> ● Regularly seeks feedback on performance in the continuity clinic ● Schedules additional time in the echo lab after identifying a goal to pursue a fourth-year fellowship in advanced imaging ● Actively seeks out conferences to learn about anti-racism and bystander culture to improve patient care
Level 5 <i>Role models and coaches others in seeking and incorporating feedback and performance data</i> <i>Demonstrates continuous self-reflection and coaching of others on reflective practice</i>	<ul style="list-style-type: none"> ● Meets with learners to provide feedback on practice habits and coaches them in development of their learning goals ● Openly shares own diagnostic errors in echocardiography to foster an environment of psychological safety and quality improvement
Assessment Models or Tools	<ul style="list-style-type: none"> ● Direct observation ● Medical record (chart) audit

	<ul style="list-style-type: none"> ● Multisource feedback ● Reflective discussion ● Review of learning plan
Curriculum Mapping	<ul style="list-style-type: none"> ●
Notes or Resources	<ul style="list-style-type: none"> ● Burke, Anne E., Bradley Benson, Robert Englander, Carol Carraccio, and Patricia J. Hicks. 2014. "Domain of Competence: Practice-Based Learning and Improvement." <i>Academic Pediatrics</i>. 14(2): S38-S54. DOI: https://doi.org/10.1016/j.acap.2013.11.018. ● Lockspeiser, Tai M., Su-Ting T. Li, Ann E. Burke, Adam A. Rosenberg, Alston E. Dunbar 3rd, Kimberly A. Gifford, Gregory H. Gorman, et al. 2016. "In Pursuit of Meaningful Use of Learning Goals in Residency: A Qualitative Study of Pediatric Residents." <i>Academic Medicine</i>. 91(6): 839-846. DOI: 10.1097/ACM.0000000000001015. ● Lockspeiser, Tai M., Patricia A. Schmitter, J. Lindsey Lane, Janice L. Hanson, Adam A. Rosenberg, and Yoon Soo Park. 2013. "Assessing Residents' Written Learning Goals and Goal Writing Skill: Validity Evidence for the Learning Goal Scoring Rubric." <i>Academic Medicine</i>. 88(10): 1558-1563. DOI: 10.1097/ACM.0b013e3182a352e6. ● Narang, Akhil, Poonam Velagapudi, Bharath Rajagopalan, Bryan LeBude, Aaron P. Kithcart, David Snipelisky, and Shashank S. Sinha. 2018. "A New Educational Framework to Improve Lifelong Learning for Cardiologists." <i>Journal of the American College of Cardiology</i> 71(4): 454-462. doi: 10.1016/j.jacc.2017.11.045.

Professionalism 1: Professional Behavior	
Overall Intent: To demonstrate ethical and professional behaviors and promote these behaviors in others, and to use appropriate resources to manage professional dilemmas	
Milestones	Examples
<p>Level 1 <i>Identifies expected professional behaviors and potential triggers for lapses</i></p> <p><i>Identifies the value and role of pediatric cardiology as a vocation/career</i></p>	<ul style="list-style-type: none"> ● When the program director presents the fellow with an email from a concerned emergency department attending, recognizes that fatigue may have contributed to a lapse in own professional behavior ● Acknowledges the importance of pediatric cardiologists in a pediatric or subspecialty hospital
<p>Level 2 <i>Demonstrates professional behavior with occasional lapses</i></p> <p><i>Demonstrates accountability for patient care as a pediatric cardiologist, with guidance</i></p>	<ul style="list-style-type: none"> ● Is late to morning rounds, acknowledges this lapse, and immediately apologizes to peers and attendings upon arrival ● While performing an inpatient consult on a known child with hypertrophic cardiomyopathy and asked to fill out a sport clearance form, works with the supervising physician to relay the paperwork to the patient’s primary cardiologist
<p>Level 3 <i>Maintains professional behavior in increasingly complex or stressful situations</i></p> <p><i>Fully engages in patient care and holds oneself accountable</i></p>	<ul style="list-style-type: none"> ● Advocates for an individual patient’s needs in a humanistic and professional manner regarding home care, medication approval, and need for care by another subspecialist ● During a busy night on the wards, demonstrates caring and compassionate behaviors with patients, patients’ families, colleagues, and staff members
<p>Level 4 <i>Recognizes situations that may trigger professionalism lapses and intervenes to prevent lapses in self and others</i></p> <p><i>Exhibits a sense of duty to patient care and professional responsibilities</i></p>	<ul style="list-style-type: none"> ● Recognizes own tendency to be curt to consulting practitioners when sleep deprived, and utilizes effective mitigation strategies to prevent lapses in professionalism ● Without prompting, assists colleagues with seeing patients when the clinic is busy ● Speaks up in the moment when observing racist/sexist behavior within the health care team and uses reporting mechanisms to address it
<p>Level 5 <i>Models professional behavior and coaches others when their behavior fails to meet professional expectations</i></p> <p><i>Extends the role of the pediatric cardiologist beyond the care of patients by engaging with the community, specialty, and medical profession as a whole</i></p>	<ul style="list-style-type: none"> ● Discusses the need to be on time with a junior fellow who continues to be late, making a plan together to address the underlying issues of why the learner is late ● Identifies need for process improvement and advocates to help a cohort of patients, takes on larger projects to remedy a system issue that is affecting patients, and sees the opportunity to improve care as a responsibility ● Develops education and/or modules to improve care in underserved areas
Assessment Models or Tools	<ul style="list-style-type: none"> ● Direct observation

	<ul style="list-style-type: none"> ● Global evaluation ● Multisource feedback ● Oral or written self-reflection ● Simulation
Curriculum Mapping	<ul style="list-style-type: none"> ●
Notes or Resources	<ul style="list-style-type: none"> ● Below are resources that define professionalism and seek to focus it on what key knowledge, skills, and attitudes are required to ensure public trust and promote integrity within the profession. It is important to note a historical context in which the informal and formal assessment of “professionalism” has extended beyond these ideals to negatively impact the careers of women, LGBTQIA+ people, and underrepresented minorities in medicine. Explicitly, examples of this have included the way in which women, marginalized learners, and LGBTQIA+ learners have been targeted for certain forms of self-expression of racial, ethnic, or gender identity. The assessment of professionalism should seek to be anti-racist and eliminate all forms of bias. ● AbdelHameid, Duaa. 2020. “Professionalism 101 for Black Physicians.” <i>New England Journal of Medicine</i>. 383(5): e34. doi:10.1056/NEJMp2022773. ● AAP. “Residency Curriculum: Mental Health Education Resources.” https://www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/Mental-Health/Pages/Residency-Curriculum.aspx. Accessed 2020. ● American Board of Internal Medicine Foundation, ACP-ASIM Foundation, and European Federation of Internal Medicine. 2002. “Medical Professionalism in the New Millennium: A Physician Charter.” <i>Annals of Internal Medicine</i> 136: 243-246. https://doi.org/10.7326/0003-4819-136-3-200202050-00012. ● American Board of Pediatrics. “Entrustable Professional Activities for Subspecialties: Cardiology.” https://www.abp.org/content/entrustable-professional-activities-subspecialties. Accessed 2022. ● American Board of Pediatrics. “Medical Professionalism.” https://www.abp.org/content/medical-professionalism. Accessed 2020. ● American Board of Pediatrics. “Teaching, Promoting, and Assessing Professionalism Across the Continuum: A Medical Educator’s Guide.” https://www.abp.org/professionalism-guide. Accessed 2020. ● American Medical Association. “Ethics.” https://www.ama-assn.org/delivering-care/ama-code-medical-ethics. Accessed 2020. ● Bynny, Richard L., Douglas S. Paauw, Maxine Papadakis, and Sheryl Pfeil. 2017. <i>Medical Professionalism Best Practices: Professionalism in the Modern Era</i>. Menlo Park, CA: Alpha Omega Alpha Medical Society. https://www.alphaomegalpha.org/wp-content/uploads/2022/01/Monograph2018.pdf. ISBN: 978-1-5323-6516-4.

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Professionalism 2: Ethical Principles	
Overall Intent: To recognize and address or resolve common and complex ethical dilemmas or situations	
Milestones	Examples
Level 1 <i>Demonstrates knowledge of the ethical principles underlying informed consent, surrogate decision making, advance directives, confidentiality, error disclosure, stewardship of limited resources, and related topics</i>	<ul style="list-style-type: none"> ● Identifies the principles involved in informed consent
Level 2 <i>Applies ethical principles in common situations</i>	<ul style="list-style-type: none"> ● Articulates how the principle of “do no harm” applies to a patient who may not need a transesophageal echocardiogram even though it could provide a learning opportunity
Level 3 <i>Analyzes complex situations using ethical principles to address conflict/controversy; seeks help when needed to manage and resolve complex ethical situations</i>	<ul style="list-style-type: none"> ● Offers treatment options for a terminally ill patient, minimizing bias while recognizing own limitations, and consistently honoring the patient’s and patient’s family’s choice
Level 4 <i>Manages and seeks to resolve ethical dilemmas using appropriate resources (e.g., ethics consultations, literature review, risk management/legal consultation)</i>	<ul style="list-style-type: none"> ● Engages with a multidisciplinary team to address the family declining an arterial switch operation for a baby with dextro-transposition of the great arteries (d-TGA) and no comorbidities ● When patient’s family and physicians disagree on care plan for a patient with inoperable congenital heart disease, recognizes that prior experiences of racism for the patient and family influence their trust and defers discussion of most complex issues to those in whom the family have demonstrated trust, rather than assuming a hierarchical structure
Level 5 <i>Called upon by others to consult in cases of complex ethical dilemmas; identifies and seeks to address system-level factors that induce or exacerbate</i>	<ul style="list-style-type: none"> ● Participates as part of the ethics consult service, providing guidance for complex cases
Assessment Models or Tools	<ul style="list-style-type: none"> ● Direct observation ● Global evaluation ● Multisource feedback ● Oral or written self-reflection ● Simulation
Curriculum Mapping	<ul style="list-style-type: none"> ●
Notes or Resources	<ul style="list-style-type: none"> ● American Board of Internal Medicine, ACP-ASIM Foundation, European Federation of Internal Medicine. 2007. “Medical Professionalism in the New Millennium: A Physician Charter.” <i>Annals of Internal Medicine</i>.136: 243-246. http://abimfoundation.org/wp-content/uploads/2015/12/Medical-Professionalism-in-the-New-Millennium-A-Physician-Charter.pdf. Accessed 2020.

- American Medical Association. "Ethics." <https://www.ama-assn.org/delivering-care/ama-code-medical-ethics>. Accessed 2020.
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- Jurko, Tomas, Alexander Jurko, Michal Mestanik, Milan Minarik, and Zibolen M. 2022. "Ethical Problems in Pediatric Cardiology." *Journal of Cardiovascular Medicine and Cardiology* 3:016-019. doi: 10.17352/2455-2976.000180

Professionalism 3: Accountability/Conscientiousness	
Overall Intent: To take responsibility for one’s own actions and their impact on patients and other members of the health care team	
Milestones	Examples
Level 1 <i>Performs tasks and responsibilities, with prompting</i>	<ul style="list-style-type: none"> • Responds to reminders from program administrator to complete work hour logs • After being informed by the program director that too many conferences have been missed, changes habits to meet the minimum attendance requirement • Completes patient care tasks (e.g., callbacks, consultations, orders) after prompting from a supervisor
Level 2 <i>Performs tasks and responsibilities in a timely manner in routine situations</i>	<ul style="list-style-type: none"> • Completes administrative tasks (e.g., licensing requirements) by specified due date • Completes routine patient care tasks as assigned • Answers pages and emails promptly with rare need for reminders
Level 3 <i>Performs tasks and responsibilities in a thorough and timely manner in complex or stressful situations</i>	<ul style="list-style-type: none"> • Identifies multiple competing demands when caring for patients, appropriately triages tasks, and appropriately seeks help from other team members
Level 4 <i>Coaches others to ensure tasks and responsibilities are completed in a thorough and timely manner in complex or stressful situations</i>	<ul style="list-style-type: none"> • Reminds junior fellows to log work hours, gives tips on task prioritization • Supervises residents and/or medical students on a busy night, delegating tasks appropriately, and ensures that all tasks are completed for safe and thorough patient care
Level 5 <i>Creates strategies to enhance others’ ability to efficiently complete tasks and responsibilities</i>	<ul style="list-style-type: none"> • Meets with multidisciplinary team (e.g., nurses, social worker, case manager) to streamline patient discharges • Takes the initiative to write or create a handbook for the fellowship program detailing the administrative and patient care tasks and responsibilities
Assessment Models or Tools	<ul style="list-style-type: none"> • Compliance with deadlines and timelines • Direct observation • Global evaluations • Multisource feedback • Self-evaluations and reflective tools
Curriculum Mapping	<ul style="list-style-type: none"> •
Notes or Resources	<ul style="list-style-type: none"> • American Medical Association. “Ethics.” https://www.ama-assn.org/delivering-care/ama-code-medical-ethics. Accessed 2020. • Code of conduct from fellow/resident institutional manual • Expectations of residency program regarding accountability and professionalism

Professionalism 4: Well-Being	
Overall Intent: To identify resources to manage and improve well-being	
Milestones	Examples
Level 1 <i>Recognizes the importance of addressing personal and professional well-being</i>	<ul style="list-style-type: none"> ● Acknowledges how individual response to participating in a difficult resuscitation impacts well-being and may impact the approach to patients seen later the same day ● Discusses the importance of a faculty mentor
Level 2 <i>Describes institutional resources that are meant to promote well-being</i>	<ul style="list-style-type: none"> ● Identifies well-being resources such as meditation apps and mental health resources for students and residents available through the program and institution ● Meets with program director to discuss Family Medical Leave Act options when expecting a child
Level 3 <i>Recognizes institutional and personal factors that impact well-being</i>	<ul style="list-style-type: none"> ● Describes the tension between own professional and personal responsibilities, particularly while working in the cardiac ICU
Level 4 <i>Describes interactions between institutional and personal factors that impact well-being</i>	<ul style="list-style-type: none"> ● Discusses a plan to mitigate the tension between a busy schedule and time with family ● Recognizes how microaggressions from coworkers and/or faculty members are impacting performance or engagement in patient care
Level 5 <i>Coaches and supports colleagues to optimize well-being at the team, program, or institutional level</i>	<ul style="list-style-type: none"> ● Leads a team debrief after a stressful, busy shift; shares personal impact of the shift and plans to decompress ● Develops an affinity group to provide support for self and others to explore impact of microaggressions and biases
Assessment Models or Tools	<ul style="list-style-type: none"> ● Direct observation ● Group interview or discussions for team activities ● Individual interview ● Institutional online training modules ● Self-assessment and personal learning plan
Curriculum Mapping	<ul style="list-style-type: none"> ●
Notes or Resources	<ul style="list-style-type: none"> ● This subcompetency is not intended to evaluate a fellow’s well-being, but to ensure each fellow has the fundamental knowledge of factors that impact well-being, the mechanisms by which those factors impact well-being, and available resources and tools to improve well-being. ● Accreditation Council for Graduate Medical Education. “Well-Being Tools and Resources.” https://dl.acgme.org/pages/well-being-tools-resources. Accessed 2022. ● Hicks, Patricia J., Daniel Schumacher, Susan Guralnick, Carol Carraccio, and Ann E. Burke. 2014. “Domain of Competence: Personal and Professional Development.” <i>Academic Pediatrics</i> 14(2 Suppl): S80-97. https://doi.org/10.1016/j.acap.2013.11.017. ● Local resources, including employee assistance programs

Interpersonal and Communication Skills 1: Patient- and Family-Centered Communication	
Overall Intent: To establish a therapeutic relationship with patients and families, tailor communication to the needs of patients and their families, and effectively navigate difficult/sensitive conversations	
Milestones	Examples
<p>Level 1 <i>Demonstrates respect and attempts to establish rapport</i></p> <p><i>Attempts to adjust communication strategies based upon patient/family expectations</i></p>	<ul style="list-style-type: none"> • Introduces self and faculty member and other members of the cardiac team, identifies patient and others in the room, and engages all parties in health care discussion • Attempts to initiate sensitive conversations under direct supervision • Identifies need for trained interpreter with non-English-speaking patients and caregivers
<p>Level 2 <i>Establishes a therapeutic relationship in straightforward encounters</i></p> <p><i>Adjusts communication strategies as needed to mitigate barriers and meet patient/family expectations</i></p>	<ul style="list-style-type: none"> • Prioritizes and sets an agenda based on concerns of patient’s parents at the beginning of a patient encounter with a child with acquired or congenital heart disease • Uses nonjudgmental language to discuss sensitive topics • Uses patient’s preferred pronouns when addressing patient
<p>Level 3 <i>Establishes a culturally competent and therapeutic relationship in most encounters</i></p> <p><i>Communicates with sensitivity and compassion, elicits patient/family values, and acknowledges uncertainty and conflict</i></p>	<ul style="list-style-type: none"> • Prioritizes and sets an agenda based on concerns of patient’s parents at the beginning of a cardiology visit with a child with multiple chronic medical problems • Discusses sensitive topics while promoting trust, respect, and understanding • Participates as a team member in end-of-life discussion
<p>Level 4 <i>Establishes a therapeutic relationship in straightforward and complex encounters, including those with ambiguity and/or conflict</i></p> <p><i>Uses shared decision making with patient/family to make a personalized care plan</i></p>	<ul style="list-style-type: none"> • Continues to engage patients’ parents/caregivers who distrust or refuse cardiovascular care recommendations, addressing misinformation and reviewing risks/benefits to assuage concerns in a manner that engages rather than alienates • While maintaining trust, engages family of a child with medical complexity along with other members of the multispecialty care team in determining family wishes and expectations regarding resuscitative efforts in the event of an acute deterioration and end-of-life decisions
<p>Level 5 <i>Mentors others to develop positive therapeutic relationships</i></p>	<ul style="list-style-type: none"> • Acts as a mentor for junior resident disclosing bad news to a patient and the patient’s family • Models and coaches the spectrum of difficult communication

<p><i>Models and coaches others in patient- and family-centered communication</i></p>	<ul style="list-style-type: none"> • Develops a curriculum on patient- and family-centered communication, including navigating difficult conversations in patients with complex cardiac disease
<p>Assessment Models or Tools</p>	<ul style="list-style-type: none"> • Direct observation • Standardized/simulated patients
<p>Curriculum Mapping</p>	<ul style="list-style-type: none"> •
<p>Notes or Resources</p>	<ul style="list-style-type: none"> • Association of American Medical Colleges MedEdPORTAL. “Anti-Racism in Medicine Collection.” https://www.mededportal.org/anti-racism. Accessed 2022. • Benson Bradley J. 2014. “Domain of Competence: Interpersonal and Communication Skills.” <i>Academic Pediatrics</i> 14(2 Suppl): S55-S65. https://doi.org/10.1016/j.acap.2013.11.016. Accessed 2020. • Laidlaw, Anita, and Jo Hart. 2011. “Communication Skills: An Essential Component of Medical Curricula. Part I: Assessment of Clinical Communication: AMEE Guide No. 51.” <i>Medical Teacher</i> 33(1): 6-8. https://doi.org/10.3109/0142159X.2011.531170. • Makoul, Gregory. 2001. “Essential Elements of Communication in Medical Encounters: the Kalamazoo Consensus Statement.” <i>Academic Medicine</i> 76(4): 390-393. https://journals.lww.com/academicmedicine/Fulltext/2001/04000/Essential_Elements_of_Communication_in_Medical.21.aspx#pdf-link. • Makoul, Gregory. 2001. “The SEGUE Framework for Teaching and Assessing Communication Skills.” <i>Patient Education and Counseling</i> 45(1): 23-34. https://doi.org/10.1016/S0738-3991(01)00136-7. • National LGBTQIA+ Health and Education Center: https://www.lgbtqiahealtheducation.org/.

Interpersonal and Communication Skills 2: Interprofessional and Team Communication Overall Intent: To communicate effectively with the health care team, including consultants	
Milestones	Examples
Level 1 <i>Respectfully requests a consultation, with guidance</i> <i>Identifies the members of the interprofessional team</i>	<ul style="list-style-type: none"> • Respectfully asks for a consultation from infectious disease service for an ICU patient • Identifies the pharmacist as a member of the transplant team
Level 2 <i>Clearly and concisely requests consultation by communicating patient information</i> <i>Participates within the interprofessional team</i>	<ul style="list-style-type: none"> • When requesting a consultation from the infectious disease team, clearly and concisely describes the recent history of patient with a transcatheter pulmonary valve in the ICU who has a new fever • Consults with the dietician to increase caloric density of the infant formula in a patient with a large ventricular septal defect and failure to thrive
Level 3 <i>Formulates a specific question for consultation and tailors communication strategy</i> <i>Uses bi-directional communication within the interprofessional team</i>	<ul style="list-style-type: none"> • After multiple positive blood cultures in a patient with a transcatheter pulmonary valve, consults the infectious disease team to develop a tailored antibiotic therapy plan • After initiating pulmonary vasodilator therapy for a patient with pulmonary hypertension, reengages with the pharmacist to discuss side effects and adjusts dosing appropriately
Level 4 <i>Coordinates consultant recommendations to optimize patient care</i> <i>Facilitates interprofessional team communication</i>	<ul style="list-style-type: none"> • Integrates multiple consultant recommendations from infectious disease, nephrology, and pharmacy to adjust antibiotic therapy for a patient with endocarditis and acute kidney injury • Initiates a multidisciplinary meeting with case management, home nursing, gastroenterology, and home monitoring program for a patient being discharged after a complicated post-Norwood course
Level 5 <i>Maintains a collaborative relationship with referring providers that maximizes adherence to practice recommendations</i> <i>Coaches others in effective communication within the interprofessional team</i>	<ul style="list-style-type: none"> • Frequently shares pertinent updates on inpatient care for a patient with a protracted course with referring outside cardiologists • Mediates a conflict among members of the health care team • Coaches junior fellows in how to run a family meeting with the interprofessional team regarding end-of-life care
Assessment Models or Tools	<ul style="list-style-type: none"> • Direct observation

	<ul style="list-style-type: none"> • Medical record (chart) audit • Multi-source feedback
Curriculum Mapping	<ul style="list-style-type: none"> •
Notes or Resources	<ul style="list-style-type: none"> • ACAPT. “NIPEC Assessment Resources and Tools.” https://acapt.org/about/consortium/national-interprofessional-education-consortium-(nipec)/nipec-assessment-resources-and-tools. Accessed 2020. • Dehon, Erin, Kimberly Simpson, David Fowler, Alan Jones. 2015. “Development of the Faculty 360.” <i>MedEdPORTAL</i> 11:10174. http://doi.org/10.15766/mep_2374-8265.10174. • Fay, David, Michael Mazzone, Linda Douglas, Bruce Ambuel. 2007. “A Validated, Behavior-Based Evaluation Instrument for Family Medicine Residents.” <i>MedEdPORTAL</i>. 2007. https://www.mededportal.org/doi/10.15766/mep_2374-8265.622. Accessed 2020. • François, José. 2011. “Tool to Assess the Quality of Consultation and Referral Request Letters in Family Medicine.” <i>Canadian Family Physician</i> 57(5):574–575. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3093595/. Accessed 2020. • Green, Matt, Teresa Parrott, and Graham Cook. 2012. “Improving Your Communication Skills.” <i>BMJ</i>. 344:e357. https://doi.org/10.1136/bmj.e357. • Henry, Stephen G., Eric S. Holmboe, and Richard M. Frankel. 2013. “Evidence-Based Competencies for Improving Communication Skills in Graduate Medical Education: A Review with Suggestions for Implementation.” <i>Medical Teacher</i>. 35(5):395-403. https://doi.org/10.3109/0142159X.2013.769677. • Interprofessional Education Collaborative Expert Panel. 2011. “Core Competencies for Interprofessional Collaborative Practice: Report of an Expert Panel.” Washington, D.C.: Interprofessional Education Collaborative. https://www.aacom.org/docs/default-source/insideome/ccrpt05-10-11.pdf?sfvrsn=77937f97_2. Accessed 2020. • Roth, Christine G., Karen W. Eldin, Vijayalakshmi Padmanabhan, and Ellen M. Freidman. 2019. “Twelve Tips for the Introduction of Emotional Intelligence in Medical Education.” <i>Medical Teacher</i> 41(7): 1-4. https://doi.org/10.1080/0142159X.2018.1481499.

Interpersonal and Communication Skills 3: Communication within Health Care Systems Overall Intent: To effectively communicate using a variety of tools and methods	
Milestones	Examples
<p>Level 1 <i>Records accurate information in the patient record</i></p> <p><i>Identifies the importance of and responds to multiple forms of communication (e.g., in-person, electronic health record (EHR), telephone, email)</i></p>	<ul style="list-style-type: none"> • Ensures that an updated and pertinent physical exam and plan are in the daily progress note and appropriately edits any copy/paste/forward information • Identifies team, departmental, and institutional communication tools, methods, and hierarchies for patient care needs, concerns, and safety issues
<p>Level 2 <i>Records accurate and timely information in the patient record</i></p> <p><i>Selects appropriate method of communication, with prompting</i></p>	<ul style="list-style-type: none"> • Provides organized and accurate documentation that supports the treatment plan and limits extraneous information • Completes the outpatient clinic notes (for surgical clearance) promptly for patient who is undergoing elective dental surgery with accurate documentation about the need for bacterial endocarditis prophylaxis • Avoids biased or stigmatized language in notes, e.g., stating that a teenager has a substance use disorder and not saying the patient is a drug abuser • After a patient has an unanticipated complication, calls primary cardiologist after prompting by attending to avoid delay, rather than email
<p>Level 3 <i>Concisely documents updated, prioritized, diagnostic and therapeutic reasoning in the patient record</i></p> <p><i>Aligns type of communication with message to be delivered (e.g., direct and indirect) based on urgency and complexity</i></p>	<ul style="list-style-type: none"> • Produces documentation that reflects complex clinical thinking and planning and is concise, but may not contain contingency planning (i.e., if/then statements) • When on call, reaches out to the primary cardiologist via secure EHR messaging or email (indirect communication) to help arrange follow up after a benign emergency department visit for non-cardiac chest pain • After activating the rapid response team, directly calls the on call attending for an acute care patient who decompensates
<p>Level 4 <i>Documents diagnostic and therapeutic reasoning, including anticipatory guidance</i></p>	<ul style="list-style-type: none"> • For an infant admitted to the NICU with recurrent supraventricular tachycardia (SVT), incorporates into written plan the initiation of propranolol with specific dosing and intervals, frequency and length of glucose checks to avoid hypoglycemia, recommendation of adenosine doses for sustained breakthrough SVT, and guidance for next cardiology evaluation

<p><i>Demonstrates exemplary written and verbal communication</i></p>	<ul style="list-style-type: none"> • Communicates effectively and proactively with collaborating physicians and teams about communication gaps in order to prevent recurrence
<p>Level 5 Models and coaches others in documenting diagnostic and therapeutic reasoning</p> <p><i>Coaches others in written and verbal communication</i></p>	<ul style="list-style-type: none"> • Models ability to demonstrate treatment plan with the rationale and gives feedback to junior fellows on how to improve their own documentation and reasoning • Coaches junior fellows in how to synthesize the case, identify pertinent information, and incorporate evidence to focus the conversation for their surgical case conference, and follows up with feedback after the presentation
<p>Assessment Models or Tools</p>	<ul style="list-style-type: none"> • Direct observation • Medical record (chart) audit • Multisource feedback
<p>Curriculum Mapping</p>	<ul style="list-style-type: none"> •
<p>Notes or Resources</p>	<ul style="list-style-type: none"> • Benson, Bradley J. 2014. "Domain of Competence: Interpersonal and Communication Skills." <i>Academic Pediatrics</i>.14(2 Suppl): S55-S65. https://doi.org/10.1016/j.acap.2013.11.016. https://www.acgme.org/Portals/0/PDFs/Milestones/InterpersonalandCommunicationSkillsPediatrics.pdf Accessed 2020. • Bierman, Jennifer A., Kathryn Kinner Hufmeyer, David T. Liss, A. Charlotta Weaver, and Heather L. Heiman. 2017. "Promoting Responsible Electronic Documentation: Validity Evidence for a Checklist to Assess Progress Notes in the Electronic Health Record." <i>Teaching and Learning in Medicine</i>. 29(4): 420-432. https://doi.org/10.1080/10401334.2017.1303385. • Haig, Kathleen M., Staci Sutton, and John Whittington. 2006. "SBAR: A Shared Mental Model for Improving Communications Between Clinicians." <i>Joint Commission Journal on Quality and Patient Safety</i>. 32(3):167-75. https://doi.org/10.1016/s1553-7250(06)32022-3. • Starmer, Amy J., Nancy D. Spector, Rajendu Srivastava, April D. Allen, Christopher P. Landrigan, Theodore Sectish, and I-PASS Study Group. 2012. "I-Pass, a Mnemonic to Standardize Verbal Handoffs." <i>Pediatrics</i> 129.2:201-204. https://doi.org/10.1542/peds.2011-2966.

Interpersonal and Communication Skills 4: Complex Communication Around Serious Illness and Prognosis Overall Intent: To effectively communicate about serious illness with patients and their families/caregivers, adapting to family response, promoting shared decision making, and assessing the evolving impact on all involved	
Milestones	Examples
Level 1 <i>Recognizes when a topic may elicit emotional responses from patients and patients' families</i>	<ul style="list-style-type: none"> • Defers discussion with the patient's family to the senior fellow or attending for a patient newly diagnosed with congenital heart disease • In a clinic patient newly diagnosed with VSD, meets with the attending about how to deliver the information to the patient's family
Level 2 <i>Delivers challenging information in a scripted manner to patients and patients' families</i>	<ul style="list-style-type: none"> • Discusses a postnatal diagnosis of hypoplastic left heart syndrome, including the need for three surgeries and multiple catheterizations, regardless of the patient's family's emotional response
Level 3 <i>Delivers challenging information and responds to emotional cues of patients and patients' families</i>	<ul style="list-style-type: none"> • Meets with a family to discuss a ventricular assist device (VAD) for a newly diagnosed cardiomyopathy in an infant; during conversation senses family is overwhelmed, pauses appropriately, and offers to meet again later in the day to resume the conversation • When meeting with a patient's family to deliver a difficult diagnosis, responds to cues from the family and offers to wait for additional family members, pastoral care, or health care team to arrive
Level 4 <i>Anticipates patient and family needs; plans for and adapts communication according to the situation, emotional response, and medical uncertainty</i>	<ul style="list-style-type: none"> • Meets with a patient's family to discuss a VAD for a newly diagnosed cardiomyopathy in an infant; begins the conversation stating that "this is a lot of information to process and we may need to stop and come back later – and that is okay" • Before a family meeting, seeks out social worker to prepare for a conversation about a difficult diagnosis and arranges for additional family members, pastoral care, or others in their support system to join the meeting
Level 5 <i>Coaches others in the communication of challenging information</i>	<ul style="list-style-type: none"> • Develops a simulation module to teach communication of challenging issues to junior fellows • Leads a workshop on how to write a letter to the family of a patient who died
Assessment Models or Tools	<ul style="list-style-type: none"> • Direct observation • Multisource feedback • Objective structured clinical examination (OSCE) • Simulation
Curriculum Mapping	<ul style="list-style-type: none"> •
Notes or Resources	<ul style="list-style-type: none"> • We recognize that in many programs, categorical cardiology learners may have limited opportunities to be observed leading challenging discussions around serious or life-limiting illnesses. Due to this fact, these subcompetencies may only be able to be

- evaluated in simulated settings or in settings where the learner is a participant, but not necessarily the leader of these discussions.
- Back, Anthony L., Robert M. Arnold, Walter F. Baile, James A. Tulskey, and Kelly Fryer-Edwards. 2005. "Approaching Difficult Communication Tasks in Oncology." *CA: A Cancer Journal for Clinicians* 55(3):164-77. <https://doi.org/10.3322/canjclin.55.3.164>.
 - Edwards, Lindsay A., Christine Bui, Antonio G. Cabrera, and Jill Ann Jarrell. 2018. "Improving Outpatient Advance Care Planning for Adults with Congenital or Pediatric Heart Disease Followed in a Pediatric Heart Failure and Transplant Clinic." *Congenital Heart Disease* 13(3):362-368. doi: 10.1111/chd.12579.
 - Levetown, Marcia, and American Academy of Pediatrics Committee on Bioethics. 2008. "Communicating with Children and Families: From Everyday Interactions to Skill in Conveying Distressing Information." *Pediatrics* 121(5):e1441-60. <https://doi.org/10.1542/peds.2008-0565>.
 - VitalTalk. www.vitaltalk.org. Accessed 2021.
 - Walsh, Michael J., George R. Verghese, M. Eric Ferguson, Nora F. Fino, David J. Goldberg, Sonal T. Owens, Nelangi Pinto, Sinai C. Zyblewski, and Michael D. Quartermain. 2017. "Counseling Practices for Fetal Hypoplastic Left Heart Syndrome." *Pediatric Cardiology* 38(5): 946-958. doi:10.1007/s00246-017-1601-1.

To help programs transition to the new version of the Milestones, the ACGME has mapped the original Milestones 1.0 to the new Milestones 2.0. Indicated below are the subcompetencies that are similar between versions. These are not exact matches, but are areas that include similar elements. Not all subcompetencies map between versions. Inclusion or exclusion of any subcompetency does not change the educational value or impact on curriculum or assessment.

Milestones 1.0	Milestones 2.0
PC1: Provide transfer of care that ensures seamless transitions	SBP4: System Navigation for Patient-Centered Care – Transitions in Care
PC2: Make informed diagnostic and therapeutic decisions that result in optimal clinical judgement	PC1: Clinical Reasoning for Diagnosis
PC3: Develop and carry out management plans	PC2: Patient Management ICS1: Patient- and Family-Centered Communication
PC4: Provide appropriate role modeling	PBLI2: Reflective Practice and Commitment to Personal Growth
	PC3: Organization and Prioritization of Patient Care
	PC4: Transthoracic Echocardiography
MK1: Locate, appraise, and assimilate evidence from scientific studies related to their patients’ health problems	MK1: Anatomy, Physiology and Natural (and Modified) History of Cardiac Conditions PBLI1: Evidence Based and Informed Practice
	MK2: Diagnostic Cardiac Catheterization
	MK3: Electrophysiologic Testing
SBP1: Work effectively in various health care delivery settings and systems relevant to their clinical specialty	SBP3: System Navigation for Patient Centered Care – Coordination of Care SBP6: Physician Role in Health Care Systems
SBP2: Coordinate patient care within the health care system relevant to their clinical specialty	SBP3: System Navigation for Patient Centered Care – Coordination of Care SBP4: System Navigation for Patient-Centered Care – Transitions in Care SBP5: Population and Community Health ICS1: Patient- and Family-Centered Communications ICS2: Interprofessional and Team Communication
SBP3: Incorporate considerations of cost awareness and risk-benefit analysis in patient and/or population-based care as appropriate	SBP5: Population and Community Health SBP6: Physician Role in Health Care Systems
SBP4: Work in inter-professional teams to enhance patient safety and improve patient care quality	SBP1: Patient Safety ICS2: Interprofessional and Team Communication

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SBP5: Participate in identifying system errors and implementing potential systems solutions	SBP1: Patient Safety SBP2: Quality Improvement
PBL11: Identifying strengths, deficiencies, and limits to one's knowledge and expertise	PBL11: Evidence Based and Informed Practice PBLI2: Reflective Practice and Commitment to Personal Growth
PBLI2: Systematically analyze practice using quality improvement methods, and implement changes with the goal of practice improvement	SBP2: Quality Improvement PBLI2: Reflective Practice and Commitment to Personal Growth
PBLI3: Use information technology to optimize learning and care delivery	PBLI1: Evidence Based and Informed Practice PBLI2: Reflective Practice and Commitment to Personal Growth ICS3: Communication within Health Care Systems
PBLI4: Participate in the education of patients, families, students, residents, fellows, and other health professionals	SBP5: Population and Community Health PBLI1: Evidence Based and Informed Practice ICS1: Patient- and Family-Centered Communications
PROF1: Professional Conduct: High standards of ethical behavior which includes maintaining appropriate professional boundaries	PROF1: Professional Behavior PROF2: Ethical Principles
PROF2: Trustworthiness that makes colleagues feel secure when one is responsible for the care of patients	PBLI1: Evidence Based and Informed Practice PROF1: Professional Behavior PROF3: Accountability/Conscientiousness ICS1: Patient- and Family-Centered Communications
PROF3: Provide leadership skills that enhance team functioning, the learning environment, and/or the health care delivery system/environment with the ultimate intent of improving care of patients	ICS2: Interprofessional and Team Communication ICS3: Communication within Health Care Systems PROF2: Ethical Principles PROF3: Accountability/Conscientiousness
PROF4: The capacity to accept that ambiguity is part of clinical medicine and to recognize the need for and to utilize appropriate resources in dealing with uncertainty	PROF2: Ethical Principles ICS1: Patient- and Family-Centered Communication PBLI1: Evidence Based and Informed Practice
	PROF4: Well-Being
ICS1: Communicate effectively with physicians, other health professionals, and health-related agencies	ICS2: Interprofessional and Team Communication ICS3: Communication within Health Care Systems
ICS2: Work effectively as a member or leader of a health care team or other professional group	ICS2: Interprofessional and Team Communication PBLI2: Reflective Practice and Commitment to Personal Growth PROF3: Accountability/Conscientiousness
ICS3: Act in a consultative role to other physicians and health professionals	PC1: Clinical Reasoning for Diagnosis ICS2: Interprofessional and Team Communication ICS3: Communication within Health Care Systems

	ICS4: Complex Communication Around Serious Illness and Prognosis
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Available Milestones Resources

Milestones 2.0: Assessment, Implementation, and Clinical Competency Committees Supplement, 2021 - <https://meridian.allenpress.com/jgme/issue/13/2s>

Milestones Guidebooks: <https://www.acgme.org/milestones/resources/>

- *Assessment Guidebook*
- *Clinical Competency Committee Guidebook*
- *Clinical Competency Committee Guidebook Executive Summaries*
- *Implementation Guidebook*
- *Milestones Guidebook*

Milestones Guidebook for Residents and Fellows: <https://www.acgme.org/residents-and-fellows/the-acgme-for-residents-and-fellows/>

- *Milestones Guidebook for Residents and Fellows*
- *Milestones Guidebook for Residents and Fellows Presentation*
- *Milestones 2.0 Guide Sheet for Residents and Fellows*

Milestones Research and Reports: <https://www.acgme.org/milestones/research/>

- *Milestones National Report*, updated each fall
- *Milestones Predictive Probability Report*, updated each fall
- *Milestones Bibliography*, updated twice each year

Developing Faculty Competencies in Assessment courses - <https://www.acgme.org/meetings-and-educational-activities/courses-and-workshops/developing-faculty-competencies-in-assessment/>

Assessment Tool: Direct Observation of Clinical Care (DOCC) - <https://dl.acgme.org/pages/assessment>

Assessment Tool: Teamwork Effectiveness Assessment Module (TEAM) - <https://team.acgme.org/>

Improving Assessment Using Direct Observation Toolkit - <https://dl.acgme.org/pages/acgme-faculty-development-toolkit-improving-assessment-using-direct-observation>

Remediation Toolkit - <https://dl.acgme.org/courses/acgme-remediation-toolkit>

Learn at ACGME has several courses on Assessment and Milestones - <https://dl.acgme.org/>