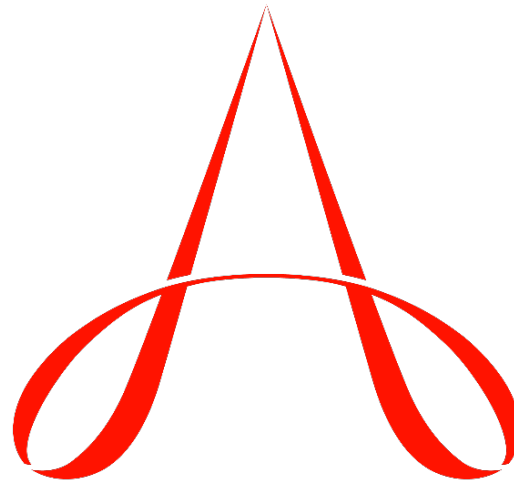


Supplemental Guide: Congenital Cardiac Surgery



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Milestones Supplemental Guide

This document provides additional guidance and examples for the Congenital Cardiac Surgery 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 on the [Resources](#) page of the Milestones section of the ACGME website.

Patient Care 1: Technical Skills and Performance

Overall Intent: To progressively develop the technical skills needed to complete an operation

Milestones	Examples
Level 1 <i>Performs components of basic complexity procedures</i>	<ul style="list-style-type: none"> Performs components of operations such as patent ductus arteriosus closure in neonates weighing more than one kilogram or older infants and children, atrial septal defect closure, non-neonatal/infant coarctation repair, pulmonary artery banding, vascular ring repair, epicardial pacemakers, or cannulation of infants
Level 2 <i>Performs basic complexity procedures</i>	<ul style="list-style-type: none"> Cannulates and manages cardiopulmonary bypass in neonates and infants Performs procedures for: ventricular septal defect, simple tetralogy of Fallot, sinus venosus atrial septal defect, pulmonary valve replacement
Level 3 <i>Performs moderate complexity procedures and recognizes intra-operative complications</i>	<ul style="list-style-type: none"> Performs procedures for transitional and complete atrioventricular septal defect, unobstructed total anomalous pulmonary venous return, Glenn, Fontan, systemic to pulmonary artery shunt, complete repair of tetralogy with stenosis
Level 4 <i>Performs high complexity procedures and manages intra-operative complications</i>	<ul style="list-style-type: none"> Manages air embolism during an operation Performs fourth time or more redo sternotomy in an adult congenital patient Performs Stage 1 procedure for hypoplastic left heart syndrome, tetralogy of Fallot with pulmonary atresia and major aortopulmonary collateral arteries (MAPCAs), arterial switch for simple transposition, repair of common arterial trunk, Damus-Kaye-Stansel, obstructed total anomalous pulmonary venous return, and Ebstein's anomaly of the tricuspid valve
Level 5 <i>Independently performs basic complexity procedures</i>	<ul style="list-style-type: none"> Performs procedures such as an atrial septal defect, ventricular septal defect, coarctation, pink Tetralogy of Fallot with the physician assistant or first assist, with the attending in the room but not assisting
Assessment Models or Tools	<ul style="list-style-type: none"> Direct observation Mock oral examination Simulation
Curriculum Mapping	<ul style="list-style-type: none">
Notes or Resources	<ul style="list-style-type: none"> Lacour-Gayet F, Clarke D, Jacobs J, et al. The Aristotle score for congenital heart surgery. <i>Semin Thorac Cardiovasc Surg Pediatr Card Surg Annu.</i> 2004;7:185-191. https://linkinghub.elsevier.com/retrieve/pii/S1092-9126(04)00012-2.

Patient Care 2: Patient Evaluation and Decision Making	
Overall Intent: To identify and integrate patient-specific factors for design of a diagnostic work-up and formulation of a surgical management plan for patients with congenital heart disease	
Milestones	Examples
Level 1 <i>Identifies patient specific factors needed to design a diagnostic work-up and surgical plan for a basic complexity procedure</i>	<ul style="list-style-type: none"> ● Integrates information from echocardiography and computed tomography (CT) or magnetic resonance imaging (MRI) to plan for a patient with sinus-venosus atrial septal defect and partial anomalous pulmonary venous return ● Identifies patient-specific factors to determine indication for palliation with pulmonary artery band versus complete repair of ventricular septal defect or atrioventricular canal defect ● Identifies patient-specific factors to determine appropriate modes of pacing and approaches for pacemaker implantation
Level 2 <i>Integrates information with patient specific factors to design a succinct diagnostic work-up and surgical plan for a basic complexity procedure</i>	<ul style="list-style-type: none"> ● Based on available echocardiographic, cardiac catheterization, and other imaging data, determines the timing and surgical approach for a bidirectional Glenn procedure with or without concomitant branch pulmonary artery augmentation
Level 3 <i>Integrates information with patient specific factors to design a succinct diagnostic work-up and surgical plan for a moderate complexity procedure</i>	<ul style="list-style-type: none"> ● Analyzes aortic arch dimensions in a neonate with coarctation of the aorta and hypoplastic aortic arch to decide on surgical approach, namely repair via thoracotomy versus patch augmentation via sternotomy ● Decides on two-patch versus modified single-patch repair for an infant with complete atrioventricular septal defect based on echocardiographic images ● Describes indications for surgical systemic-to-pulmonary artery shunt versus catheter-based intervention to provide a stable source of pulmonary blood flow
Level 4 <i>Integrates information with patient specific factors to design a succinct diagnostic work-up and surgical plan for a high complexity procedure</i>	<ul style="list-style-type: none"> ● Formulates a surgical plan for an infant with tetralogy of Fallot, pulmonary atresia with MAPCAs including extent of unifocalization and determination of complete repair versus shunt placement ● Synthesizes information from echocardiography and other available imaging to plan and perform a Norwood procedure ● Integrates patient-specific factors with clinical data to determine indications and candidacy for heart transplant
Level 5 <i>Formulates an approach for complex patients who do not fit into traditional algorithms</i>	<ul style="list-style-type: none"> ● Determines a treatment plan for a neonate with severe Ebstein’s anomaly, cyanosis, and heart failure ● Determines a surgical plan for a patient with borderline left heart structures, deciding on two-ventricle versus single ventricle pathway ● Determines options for mechanical support in patients awaiting heart transplant
Assessment Models or Tools	<ul style="list-style-type: none"> ● Congenital Thoracic Surgery Directors Association (TSDA) in-service examination

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	<ul style="list-style-type: none">• CT Surgery Benchmark Quizzes/ Self-Education Self-Assessment in Thoracic Surgery (SESATS)• Direct observation• End-of-rotation evaluation• Milestones evaluation• Mock oral examination
Curriculum Mapping	<ul style="list-style-type: none">•
Notes or Resources	<ul style="list-style-type: none">• LaPar DJ, Mery CM, Turek JW, et al. <i>TSRA Review of Cardiothoracic Surgery</i>. 2nd ed. Chicago, IL: Thoracic Surgery Residents Association; 2015. ISBN:978-1523217168.• The Society of Thoracic Surgery (STS). STS Cardiothoracic Surgery E-Book. https://www.sts.org/online-learning/sts-cardiothoracic-surgery-e-book. Accessed 2021.

Patient Care 3: Critical Care

Overall Intent: To provide care for the critically ill through complex procedures and treatment plans

Milestones	Examples
<p>Level 1 <i>Interprets diagnostic data for a critically ill patient</i></p> <p><i>Performs basic complexity bedside procedures</i></p>	<ul style="list-style-type: none"> ● Reviews chest x-rays and bedside ultrasounds to assess for effusions, pneumothoraces, appropriate line position ● Detects low cardiac output state based on hemodynamics, near-infrared spectroscopy monitoring, and blood gas analyses ● Performs thoracostomy, cut down for arterial access, peritoneal drains, percutaneous placement of venous and arterial monitoring lines
<p>Level 2 <i>Implements a treatment plan for peri-operative patients with basic complexity procedures</i></p> <p><i>Performs moderate complexity bedside procedures</i></p>	<ul style="list-style-type: none"> ● Provides for alteration of vasoactive medications, ventilator management for post-operative respiratory failure, and product resuscitation for coagulopathy ● Performs mediastinal exploration/wash out for bleeding/tamponade, elective bedside chest closure with attending oversight or availability
<p>Level 3 <i>Implements a treatment plan for peri-operative patients with moderate complexity procedures</i></p> <p><i>Performs high complexity bedside procedures</i></p>	<ul style="list-style-type: none"> ● Manages post-operative single ventricle (Norwood, superior cavopulmonary and total cavopulmonary connections) low cardiac output, pulmonary overcirculation, cyanosis ● Manages neonatal repairs: tetralogy of Fallot, arterial switch operation, truncus arteriosus, biventricular shunted patients ● Performs extracorporeal membrane oxygenation (ECMO) cannulation central or peripheral ● Performs procedures in catheterization laboratory (cath lab) or electrophysiology (EP) suite for planned assistance with generators and hybrid procedures with attending oversight
<p>Level 4 <i>Implements a comprehensive treatment plan for peri-operative patients with high complexity procedures</i></p> <p><i>Performs high complexity procedures in urgent scenarios and determine need for emergent surgical intervention</i></p>	<ul style="list-style-type: none"> ● Manages double switch, ventricular assist device, and post-transplant patients ● Manages ventilator for acute respiratory distress syndrome ● Manages of refractory pulmonary hypertension ● Performs ECMO cannulation for double switch, extracorporeal cardiopulmonary resuscitation (ECPR) ● Performs emergent procedures in cath lab for perforation, vascular injury, and device emobilization

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<p>Level 5 <i>Implements a comprehensive treatment plan for a patient condition that does not have clear guidelines</i></p> <p><i>Teaches moderate complexity procedures to junior learners</i></p>	<ul style="list-style-type: none"> ● Critical decision making about indications for ECMO, alternate management strategies for complex, chronic patients, and determination of futility ● Proctors junior resident with low to moderate complexity procedures (noted above)
<p>Assessment Models or Tools</p>	<ul style="list-style-type: none"> ● Direct observation ● Mock oral examination ● Simulation
<p>Curriculum Mapping</p>	<ul style="list-style-type: none"> ●
<p>Notes or Resources</p>	<ul style="list-style-type: none"> ● LaPar DJ, Mery CM, Turek JW, et al. <i>TSRA Review of Cardiothoracic Surgery</i>. 2nd ed. Chicago, IL: Thoracic Surgery Residents Association; 2015. ISBN:978-1523217168. ● STS. STS Cardiothoracic Surgery E-Book. https://www.sts.org/online-learning/sts-cardiothoracic-surgery-e-book. Accessed 2021.

Medical Knowledge 1: Morphology	
Overall Intent: To develop knowledge of congenital cardiac disease morphology and physiology for application in surgical management of patients	
Milestones	Examples
Level 1 <i>Demonstrates comprehension and explains morphology for basic complexity congenital cardiac defects</i>	<ul style="list-style-type: none"> ● Explains the anatomy and physiology of a ventricular septal defect including the different locations within the septum and the defects relation to the conduction system ● Explains the anatomy and physiology of a partial atrioventricular canal defect including typical location of the left sided cleft and the relationship of the conduction system to the septal defect
Level 2 <i>Demonstrates comprehension and applies knowledge of morphology for moderate complexity defects</i>	<ul style="list-style-type: none"> ● Explains the relationship of a subaortic membrane to the membranous septum and the conduction system ● Understands and can explain where the first septal perforation is in relation to the right ventricular outflow tract in a patient undergoing the Ross procedure
Level 3 <i>Demonstrates comprehension of morphology for higher complexity defects and distinguishes between different morphologies</i>	<ul style="list-style-type: none"> ● Explains and describes multiple types of coronary artery patterns in patients with transposition of the great arteries ● Explains the anatomy and physiology of a complete atrioventricular septal defect with particular attention to the deformation of the left ventricular outflow tract, location of the atrioventricular valve cleft, and typical location and displacement of the conduction system
Level 4 <i>Demonstrates comprehension and integrates knowledge of morphology for most complex defects and uncommon or rare variants</i>	<ul style="list-style-type: none"> ● Explains the anatomy and physiology of tetralogy of Fallot with pulmonary atresia and MAPCAs, the spectrum of double outlet right ventricle, identifies the location of the conduction system in corrected transposition
Level 5 <i>Teaches morphology for complex defects to junior learners</i>	<ul style="list-style-type: none"> ● Teaches other learners about the anatomy of types of ventricular septal defects, variations in tetralogy and implications for physiology, and the anatomy and physiology of simple transposition
Assessment Models or Tools	<ul style="list-style-type: none"> ● Congenital TSDA In-service examination ● Cardiothoracic surgery benchmark quizzes/SESATS ● Direct observation ● Mock oral examination
Curriculum Mapping	<ul style="list-style-type: none"> ●
Notes or Resources	<ul style="list-style-type: none"> ● Mavroudis C, Lewis Backer C, Idriss RF. <i>Atlas of Pediatric Cardiac Surgery</i>. 1st ed. New York, NY: Springer; 2015. ISBN:978-1447153184. ● Mavroudis C, Dearani JA. <i>Atlas of Adult Congenital Heart Surgery</i>. 1st ed. Switzerland: Springer; 2020. ISBN:978-3030141622.

Medical Knowledge 2: Pathophysiology and Surgical Outcomes	
Overall Intent: To develop knowledge of congenital cardiac disease pathophysiology and surgical outcomes for application in surgical management of patients	
Milestones	Examples
Level 1 <i>Demonstrates basic comprehension of pathophysiology and surgical outcomes of basic complexity defects, including timing of repair</i>	<ul style="list-style-type: none"> • Discusses the pathophysiology and outcomes of defects such as patent ductus arteriosus, atrial septal defect, coarctation, and perimembranous ventricular septal defect • Knows and describes the natural history of unrepaired atrial and ventricular septal defects, and coarctation
Level 2 <i>Demonstrates general comprehension of pathophysiology and surgical outcomes of moderate complexity defects, including timing of repair</i>	<ul style="list-style-type: none"> • Discusses valvar stenosis and valvar insufficiency, atrioventricular septal defects, tetralogy of Fallot, bidirectional Glenn procedure, and Fontan procedure • Describes indications for ventricular septal defect closure versus medical management • Describes transannular patch and valve sparing outcomes of tetralogy of Fallot • Counsels families on basic and moderate complexity defects in regards to pathophysiology, risk of surgery and risk of not doing surgery, timing of repair and expected outcomes
Level 3 <i>Demonstrates detailed comprehension of pathophysiology and surgical outcomes of higher complexity defects, including timing of repair</i>	<ul style="list-style-type: none"> • Discusses the higher complexity defects such as tricuspid atresia and single ventricle, Pulmonary atresia with ventricular septal defect and MAPCAs, the different types of total anomalous pulmonary venous return, simple transposition, and lesions-producing heart failure • Teaches medical students and residents anatomy and pathophysiology of simple congenital heart details as well as surgical options/timing
Level 4 <i>Demonstrates in-depth comprehension of pathophysiology and surgical outcomes of most complex defects and uncommon or rare variants</i>	<ul style="list-style-type: none"> • Discusses higher complexity defects such as double inlet left ventricle, nuanced differences in hypoplastic left heart syndrome between aortic stenosis/mitral stenosis, aortic stenosis/mitral atresia, aortic atresia/mitral stenosis, aortic atresia/mitral atresia, the full spectrum of double outlet right ventricle, corrected transposition, and common arterial trunk with interrupted aortic arch • Discusses higher complexity defects such as tricuspid atresia and single ventricle, pulmonary atresia with ventricular septal defects and MAPCAs, the different types of total anomalous pulmonary venous return, simple transposition, and lesions-producing heart failure • Teaches medical students and residents anatomy and pathophysiology of moderately complex congenital heart defects as well as surgical options/timing • Demonstrates knowledge of contraindications to repair in complex lesions
Level 5 <i>Teaches pathophysiology and surgical outcomes of complex defects to junior learners</i>	<ul style="list-style-type: none"> • Teaches single ventricle heart disease, complex intracardiac repairs, and rare complex heart defects
Assessment Models or Tools	<ul style="list-style-type: none"> • Direct observation • Mock oral exams

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	<ul style="list-style-type: none"> • Cardiothoracic surgery benchmark quizzes/SESATS • Congenital TSDA In-service examination
Curriculum Mapping	•
Notes or Resources	<ul style="list-style-type: none"> • STS. STS Cardiothoracic Surgery E-Book. https://www.sts.org/online-learning/sts-cardiothoracic-surgery-e-book. Accessed 2021. • Mavroudis C, Lewis Backer C, Idriss RF. <i>Atlas of Pediatric Cardiac Surgery</i>. 1st ed. New York, NY: Springer; 2015. ISBN:978-1447153184. • Mavroudis C, Dearani JA. <i>Atlas of Adult Congenital Heart Surgery</i>. 1st ed. Switzerland: Springer; 2020. ISBN:978-3030141622.

Systems-Based Practice 1: Patient Safety and Quality Improvement (QI)	
Overall Intent: To engage in the analysis and management of patient safety events, including relevant communication with patients, families, and health care professionals; to conduct a QI project	
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> <p><i>Demonstrates knowledge of basic quality improvement methodologies and metrics</i></p>	<ul style="list-style-type: none"> ● Lists patient misidentification or medication errors as common patient safety events ● Describes how to report errors in your environment ● Describes STS database and root cause analysis ● Participates in a morbidity and mortality (M and M) conference
<p>Level 2 <i>Identifies system factors that lead to patient safety events</i></p> <p><i>Reports patient safety events to superiors/faculty members</i></p> <p><i>Describes local quality improvement initiatives</i></p>	<ul style="list-style-type: none"> ● Identifies that lack of hand sanitizer dispenser at each clinical exam room may lead to increased infection rates; identifies that outpatient medications are not reconciled to inpatient medications ● Reports lack of hand sanitizer dispenser at each clinical exam room to appropriate supervisor ● Summarizes protocols resulting in decreased spread of hospital-acquired <i>C. diff</i>
<p>Level 3 <i>Participates in analysis of patient safety events (simulated or actual)</i></p> <p><i>Reports patient safety events through institutional reporting systems (actual or simulated)</i></p> <p><i>Participates in local quality improvement initiatives</i></p>	<ul style="list-style-type: none"> ● Preparing for M and M presentations or participates in data entry for quality assurance (QA) database ● Through simulation, communicates with patients/families about a medication administration error ● Participates in project identifying root cause of operating room turnover inefficiency, leads M and M case, or participates on a quality committee
<p>Level 4 <i>Conducts analysis of patient safety events and offers error prevention strategies (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"> ● Collaborates with a team to conduct the analysis of a medication administration errors and effectively communicates with patients/families about those events ● Participates in the completion of a QI project, including assessing the problem, articulating a broad goal, developing a SMART (Specific, Measurable, Attainable, Realistic, Time-Based) objective plan, and monitoring progress and challenges

<p><i>Demonstrates the skills required to identify, develop, implement, and analyze a quality improvement project</i></p>	
<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 reporting/disclosure of patient safety events to superiors/organization</i></p> <p><i>Creates, implements, and assesses quality improvement initiatives at the institutional or community level</i></p>	<ul style="list-style-type: none"> ● Assumes a leadership role at the departmental or institutional level for patient safety ● Conducts a simulation for disclosing patient safety events ● Initiates and completes a QI project at hospital, county, or state level
<p>Assessment Models or Tools</p>	<ul style="list-style-type: none"> ● Direct observation ● E-module multiple choice tests ● Medical record (chart) audit ● Multisource feedback ● Portfolio ● Reflection ● Simulation
<p>Curriculum Mapping</p>	<ul style="list-style-type: none"> ●
<p>Notes or Resources</p>	<ul style="list-style-type: none"> ● Gallagher T, Studdert D, Levinson W. Disclosing harmful medical errors to patients. <i>N Engl J Med</i>. 2007;356(26):2713-2719. https://www.nejm.org/doi/full/10.1056/NEJMra070568?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%3dpubmed. ● Gallagher TH, Etchegaray JM, Bergstedt B, et al. Improving communication and resolution following adverse events using a patient-created simulation exercise. <i>Health Serv Res</i>. 2016;51(6):2537-2549. https://onlinelibrary.wiley.com/doi/abs/10.1111/1475-6773.12601. ● Institute of Healthcare Improvement. http://www.ihl.org/Pages/default.aspx. Accessed 2021. ● STS Database. www.sts.org. Accessed 2021.

Systems-Based Practice 2: System Navigation for Patient-Centered Care	
Overall Intent: To effectively navigate the health care system, including the interdisciplinary team and other care providers, to adapt care to a specific patient population to ensure high-quality patient outcomes	
Milestones	Examples
<p>Level 1 <i>Demonstrates knowledge of care coordination</i></p> <p><i>Identifies key elements for safe and effective transitions of care and hand-offs</i></p> <p><i>Demonstrates knowledge of population and community health needs and disparities</i></p>	<ul style="list-style-type: none"> ● For a patient with congenital heart defect requiring multidisciplinary care, identifies need for communication with cardiologist and critical care medicine ● Lists the essential components of a structured sign-out tool during care transitions and hand-offs ● Identifies that patients in rural areas may have different needs and access to a cardiology and cardiac surgery care than urban patients
<p>Level 2 <i>Coordinates care of patients in routine clinical/social situations effectively using the roles of the interprofessional teams</i></p> <p><i>Performs safe and effective transitions of care/hand-offs in routine clinical situations</i></p> <p><i>Identifies specific population and community health needs and inequities for their local population</i></p>	<ul style="list-style-type: none"> ● Coordinates care with the cardiologist at the time of discharge from the hospital ● Routinely uses a structured sign-out tool for a stable patient ● Identifies that limited transportation options may be a factor in rural patients getting to multiple cardiology appointments
<p>Level 3 <i>Coordinates care of patients in complex clinical/social situations effectively using the roles of the interprofessional teams</i></p> <p><i>Performs safe and effective transitions of care/hand-offs in complex clinical situations</i></p> <p><i>Uses local resources effectively to meet the needs of a patient population and community</i></p>	<ul style="list-style-type: none"> ● Works with the social worker to coordinate care for a patient with a complex family situation that will ensure follow-up to a cardiology clinic after discharge from the hospital ● Routinely uses a structured sign-out tool when transferring a patient to the intensive care unit (ICU) ● Makes appropriate referral for patients who cannot afford post discharge medication
<p>Level 4 <i>Role models effective coordination of patient-centered care among different disciplines and specialties</i></p>	<ul style="list-style-type: none"> ● Leads team members in approaching interdisciplinary approach to patient care

<p><i>Role models and advocates for safe and effective transitions of care/hand-offs within and across health care delivery systems</i></p> <p><i>Adapts personal practice to provide for the needs of specific populations</i></p>	<ul style="list-style-type: none"> ● Prior to going on vacation, proactively informs the covering resident about a plan of care for a patient with a complex wound ● Incorporates interstage monitoring for single ventricle patients
<p>Level 5 <i>Analyzes the process of care coordination and leads in the design and implementation of improvements</i></p> <p><i>Improves quality of transitions of care within and across health care delivery systems to optimize patient outcomes</i></p> <p><i>Leads innovations and advocates for populations and communities with health care inequities</i></p>	<ul style="list-style-type: none"> ● Develops clinical care pathways ● Participates in development of an enhanced recovery after surgery pathway ● Develops a protocol to improve transitions to adult congenital heart disease care ● Leads development of telehealth diagnostic services for a rural site
<p>Assessment Models or Tools</p>	<ul style="list-style-type: none"> ● Direct observation ● Medical record (chart) audit ● Multisource feedback ● Quality metrics and goals mined from electronic health records (EHRs) ● 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"> ● Centers for Disease Control and Prevention. Population Health Training in Place Program. https://www.cdc.gov/pophealthtraining/whatis.html. Accessed 2021. ● Kaplan KJ. TissuePathology. In pursuit of patient-centered care. http://tissuepathology.com/2016/03/29/in-pursuit-of-patient-centered-care/#axzz5e7nSsAns. Accessed 2021. ● Skochelak SE, Hawkins RE, Lawson LE, Starr SR, Borkan JM, Gonzalo JD. <i>AMA Education Consortium: Health Systems Science</i>. 1st ed. Philadelphia, PA: Elsevier; 2016. ISBN:978-0323461160.

Systems-Based Practice 3: Physician Role in Health Care Systems	
Overall Intent: To understand the physician’s role in the complex health care system and how to optimize the system to improve patient care and the health system’s performance	
Milestones	Examples
<p>Level 1 <i>Identifies key components of the health care system (e.g., hospital, finance, personnel, technology)</i></p> <p><i>Understands the mechanisms for reimbursement, including practice models</i></p>	<ul style="list-style-type: none"> ● Articulates differences between Medicaid and private insurance ● Understands the impact of health plan coverage on prescription drugs for individual patients ● Identifies that patient notes must meet coding requirements
<p>Level 2 <i>Recognizes the components of how a health care system are interrelated, and its impact on patient care</i></p> <p><i>Recognizes the impact of component selection on overall cost</i></p>	<ul style="list-style-type: none"> ● Explains that improving patient satisfaction impacts patient adherence and payment to the health system ● Takes into consideration patient’s prescription drug coverage when choosing pulmonary hypertension therapy ● Selects cost effective patch material
<p>Level 3 <i>Understands how individual practice affects the broader system (e.g., length of stay, readmission rates, clinical efficiency)</i></p> <p><i>Discusses the impact of component selection on overall costs</i></p>	<ul style="list-style-type: none"> ● Ensures that patient with congenital heart defects has a scheduled follow-up appointment at discharge within seven days to reduce risk of readmission ● Discusses costs and benefits of family screening for Marfan’s syndrome
<p>Level 4 <i>Discusses various components of the health care system to provide efficient and effective patient care and transition of care</i></p> <p><i>Makes cost effective decisions</i></p>	<ul style="list-style-type: none"> ● Provides proper documentation to the primary care team at time of discharge ● Works collaboratively to improve patient assistance resources for a patient with limited resources
<p>Level 5 <i>Advocates for systems change that enhances high-value, efficient and effective patient care and transition of care</i></p> <p><i>Participates in health policy advocacy activities</i></p>	<ul style="list-style-type: none"> ● Works with community or professional organizations to advocate for fetal screening ● Improves informed consent process for non-English-speaking families requiring interpreter services
Assessment Models or Tools	<ul style="list-style-type: none"> ● Direct observation

	<ul style="list-style-type: none"> ● Medical record (chart) audit ● Multisource feedback
Curriculum Mapping	<ul style="list-style-type: none"> ●
Notes or Resources	<ul style="list-style-type: none"> ● Agency for Healthcare Research and Quality (AHRQ). Major Physician Measurement Sets. https://www.ahrq.gov/professionals/quality-patient-safety/talkingquality/create/physician/measurementsets.html. Accessed 2021. ● AHRQ. Measuring the Quality of Physician Care. https://www.ahrq.gov/professionals/quality-patient-safety/talkingquality/create/physician/challenges.html. Accessed 2021. ● The Commonwealth Fund. Health System Data Center. http://datacenter.commonwealthfund.org/?_ga=2.110888517.1505146611.1495417431-1811932185.1495417431#ind=1/sc=1. Accessed 2021. ● Dzau VJ, McClellan MB, McGinnis JM, et al. Vital directions for health and health care: Priorities from a National Academy of Medicine initiative. <i>JAMA</i>. 2017;317(14):1461-1470. https://nam.edu/vital-directions-for-health-health-care-priorities-from-a-national-academy-of-medicine-initiative/. ● The Kaiser Family Foundation. www.kff.org. Accessed 2021. ● The Kaiser Family Foundation: Topic: Health Reform. https://www.kff.org/topic/health-reform/. Accessed 2021.

Practice-Based Learning and Improvement 1: Evidence-Based and Informed Practice Overall Intent: To incorporate evidence and patient values into clinical practice	
Milestones	Examples
Level 1 <i>Demonstrates how to access and use available evidence to take care of a routine patient</i>	<ul style="list-style-type: none"> • Looks up disease-specific professional guidelines
Level 2 <i>Articulates clinical questions and elicits patient preferences and values in order to guide evidence-based care</i>	<ul style="list-style-type: none"> • Discusses pros and cons of different conduit or valve options
Level 3 <i>Locates and applies the best available evidence, integrated with patient preference, to the care of complex patients</i>	<ul style="list-style-type: none"> • Researches highest quality evidence comparing treatment strategies
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"> • Discusses anticoagulation indications after surgery
Level 5 <i>Coaches others to critically appraise and apply evidence for complex patients; and/or participates in the development of guidelines</i>	<ul style="list-style-type: none"> • Leads local development of enhanced recovery from surgery protocols
Assessment Models or Tools	<ul style="list-style-type: none"> • Conference presentations • Direct observation • M and M • Oral or written examinations
Curriculum Mapping	<ul style="list-style-type: none"> •
Notes or Resources	<ul style="list-style-type: none"> • American College of Cardiology (ACC). Guidelines. https://www.acc.org/guidelines. Accessed 2021. • Stout KK et al. Clinical practice guideline: 2018 AHA [American Heart Association]/ACC guideline for the management of adults with congenital heart disease. <i>Journal of the American College of Cardiology</i> 2019;73(12):e81-192. doi: 10.1016/j.jacc.2018.08.1029. • Institutional Institutional Review Board (IRB) guidelines • National Institutes of Health. Write Your Application. https://grants.nih.gov/grants/how-to-apply-application-guide/format-and-write/write-your-application.htm. Accessed 2021. • National Institutes of Health. US National Library of Medicine. PubMed Online Training. https://www.nlm.nih.gov/bsd/disted/pubmedtutorial/cover.html. Accessed 2021.

Practice-Based Learning and Improvement 2: Reflective Practice and Commitment to Personal Growth	
Overall Intent: To seek clinical performance information with the intent to improve care; reflects on all domains of practice, personal interactions, and behaviors, and their impact on colleagues and patients (reflective mindfulness); develop clear objectives and goals for improvement in some form of a learning plan	
Milestones	Examples
Level 1 <i>Accepts responsibility for personal and professional development by establishing goals and actively seeking opportunities to improve</i>	<ul style="list-style-type: none"> ● Sets a personal practice goal of improving suture management ● Identifies gaps in knowledge of congenital heart disease ● Asks for feedback from patients, families, and patient care team members
Level 2 <i>When prompted, uses performance data to identify gaps, design, and implement a learning plan</i>	<ul style="list-style-type: none"> ● When prompted, uses Milestones feedback to identify areas for improvement ● When prompted, develops reading plan based on identified areas for improvement
Level 3 <i>Independently uses performance data to identify gaps, design, and implement a learning plan</i>	<ul style="list-style-type: none"> ● Uses SESATS exam and multisource feedback results to identify areas for improvement ● Implements reading plan based on identified areas for improvement
Level 4 <i>Independently uses performance data to measure the effectiveness of the learning plan and adapt the plan as needed</i>	<ul style="list-style-type: none"> ● Evaluates performance on technical feedback and adjusts study plan appropriately
Level 5 <i>Facilitates the design and implementing learning plans for others</i>	<ul style="list-style-type: none"> ● Assists more junior residents in developing their individualized learning plans
Assessment Models or Tools	<ul style="list-style-type: none"> ● Direct observation ● Review of learning plan
Curriculum Mapping	<ul style="list-style-type: none"> ●
Notes or Resources	<ul style="list-style-type: none"> ● Burke AE, Benson B, Englander R, Carraccio C, Hicks PJ. Domain of competence: Practice-based learning and improvement. <i>Acad Pediatr.</i> 2014;14(2 Suppl):S38-S54. https://www.academicpediatrics.net/article/S1876-2859(13)00333-1/fulltext. ● Hojat M, Veloski JJ, Gonnella JS. Measurement and correlates of physicians' lifelong learning. <i>Acad Med.</i> 2009;84(8):1066-74. https://insights.ovid.com/crossref?an=00001888-200908000-00021. ● Lockspeiser TM, Schmitter PA, Lane JL, Hanson JL, Rosenberg AA, Park YS. Assessing residents' written learning goals and goal writing skill: Validity evidence for the learning goal scoring rubric. <i>Acad Med.</i> 2013;88(10):1558-1563. https://insights.ovid.com/article/00001888-201310000-00039. ● SESATS. http://www.sesats.org/. Accessed 2021. ● STS. Learning Center. http://learnctsurgery.sts.org. Accessed 2021. ● TSDA. TSDA In-Training Exam. https://tsda.org/in-training-exam/. Accessed 2021.

Professionalism 1: Ethical Principles	
Overall Intent: To recognize and address lapses in ethical and professional behavior, demonstrates ethical and professional behaviors, and use appropriate resources for managing ethical and professional dilemmas	
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"> ● Discusses the basic principles of beneficence, nonmaleficence, justice, autonomy ● Discusses professional values and commitments and how they apply to informed consent process ● Lists elements of informed consent for procedures
Level 2 <i>Applies ethical principles during patient care</i>	<ul style="list-style-type: none"> ● Identifies surrogate for impaired patients ● Maintains patient confidentiality in public situations
Level 3 <i>Recognizes need to seek help in managing and resolving ethical situations</i>	<ul style="list-style-type: none"> ● Obtains institutional guidance on obtaining consent for blood transfusion in pediatric Jehovah’s Witness patient ● Analyzes difficult real or hypothetical ethics case scenarios or situations, recognizes own limitations
Level 4 <i>Uses appropriate resources for managing and resolving ethical dilemmas as needed</i>	<ul style="list-style-type: none"> ● Manages a near miss or sentinel event by contacting risk management ● Identifies ethical dilemmas of performing procedures in patients who are potential organ donors ● Recognizes and manages situations of medical futility
Level 5 <i>Identifies and seeks to address system-level factors that induce or exacerbate ethical problems or impede their resolution</i>	<ul style="list-style-type: none"> ● Identifies and seeks to address system-wide factors or barriers to promoting a culture of ethical behavior through participation in a work group, committee, or task force
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 Association for Thoracic Surgery (AATS). Code of Ethics. https://www.aats.org/aatsimis/AATSWeb/Association/About/Governance/By-Laws and Policies/Code of Ethics.aspx. Accessed 2021. ● American Medical Association. Ethics. https://www.ama-assn.org/delivering-care/ama-code-medical-ethics. Accessed 2021. ● Bynny RL, Paauw DS, Papadakis MA, Pfeil S. <i>Medical Professionalism Best Practices: Professionalism in the Modern Era</i>. Aurora, CO: Alpha Omega Alpha Medical Society; 2017. <i>Medical Professionalism Best Practices: Professionalism in the Modern Era</i>.

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Professionalism 2: Professional Behavior and Accountability	
Overall Intent: To take responsibility for their actions and the impact on patients and other members of the health care team and recognize limits of one’s own knowledge and skill	
Milestones	Examples
<p>Level 1 <i>Completes patient care tasks and responsibilities, identifies potential barriers, and describes strategies for ensuring timely task completion</i></p> <p><i>Describes when and how to appropriately report lapses in professional behavior</i></p> <p><i>Accepts feedback highlighting gaps</i></p>	<ul style="list-style-type: none"> ● Evaluates and documents a consult in a timely manner ● Knows how to report unprofessional behavior at their institution ● Acknowledges gaps in skill during a case debriefing and spends additional time in the simulation lab
<p>Level 2 <i>Performs patient care tasks and responsibilities in a timely manner with appropriate attention to detail in routine situations</i></p> <p><i>Takes responsibility for his or her own professional behavior and reports lapses in self and others</i></p> <p><i>Episodically seeks feedback</i></p>	<ul style="list-style-type: none"> ● Consents patient and schedules patent ductus arteriosus ligation ● Apologizes to team member(s) for unprofessional behavior without prompting ● Recognizes difficulty placing chest tube and requests feedback before next procedure
<p>Level 3 <i>Performs patient care tasks and responsibilities in a timely manner with appropriate attention to detail in complex or stressful situations</i></p> <p><i>Demonstrates professional behavior in complex or stressful situations</i></p> <p><i>Intentionally seeks and integrates multisource feedback into practice</i></p>	<ul style="list-style-type: none"> ● Counsels angry family with complaints about care team while having multiple other clinical responsibilities ● Asks for help when patient is unstable and treatment pathway is unclear ● Consistently integrates intra-operative feedback into performance improvement
<p>Level 4 <i>Recognizes situations that may impact others’ ability to complete patient-care tasks and responsibilities in a timely manner</i></p>	<ul style="list-style-type: none"> ● Coordinates with the ICU to avoid procedures during ICU rounds

<p><i>Intervenes to prevent and correct lapses in professional behavior in self and others</i></p> <p><i>Provides constructive feedback to others</i></p>	<ul style="list-style-type: none"> ● Asks another team member to perform tasks when fatigued ● Provides medical students with resources and performance feedback
<p>Level 5 <i>Develops systems to enhance other's ability to efficiently complete patient-care tasks and responsibilities</i></p> <p><i>Coaches others when their behavior fails to meet professional expectations</i></p>	<ul style="list-style-type: none"> ● Sets up a meeting with the nurse manager to streamline patient care ● Shares templates for documentation ● Coaches others on how to avoid conflict with team members
<p>Assessment Models or Tools</p>	<ul style="list-style-type: none"> ● Compliance with deadlines and timelines ● Direct observation ● Multisource feedback ● Self-evaluations ● Simulation
<p>Curriculum Mapping</p>	<ul style="list-style-type: none"> ●
<p>Notes or Resources</p>	<ul style="list-style-type: none"> ● AATS. Code of Ethics. https://www.aats.org/aatsimis/AATSWeb/Association/About/Governance/By-Laws and Policies/Code of Ethics.aspx. Accessed 2021. ● American College of Surgeons. Code of Professional Conduct. https://www.facs.org/about-ac/s/statements/stonprin#code. Accessed 2021. ● Code of conduct from institutional manual ● STS. Code of Ethics. https://www.sts.org/about-sts/policies/code-ethics. Accessed 2021.

Professionalism 3: Administrative Tasks	
Overall Intent: To develop the skills and behaviors required to complete the administrative duties of being a surgeon, such as clinical work and education hours, case logs, evaluations, discharge summaries, operative reports, daily progress notes, and conference/meeting attendance	
Milestones	Examples
Level 1 <i>Recognizes the need to complete administrative tasks and responsibilities</i>	<ul style="list-style-type: none"> • Creates a plan to log all cases at the end of every day
Level 2 <i>Performs administrative tasks and responsibilities in a timely manner with appropriate attention to detail in routine situations</i>	<ul style="list-style-type: none"> • Logs clinical and educational work hours and case logs regularly • Responds to pages, texts, and emails
Level 3 <i>Performs administrative tasks and responsibilities in a timely manner with appropriate attention to detail in complex or stressful situations</i>	<ul style="list-style-type: none"> • Completes timely documentation while having multiple clinical responsibilities
Level 4 <i>Recognizes situations that may impact others' ability to complete administrative tasks and responsibilities in a timely manner</i>	<ul style="list-style-type: none"> • Before attending a family wedding, makes the appropriate arrangements to avoid service interruptions
Level 5 <i>Facilitates efforts to enhance other's ability to efficiently complete administrative tasks and responsibilities</i>	<ul style="list-style-type: none"> • Works with the hospital information technology department to develop a service shared file directory to facilitate completion of administrative requirements such as transition of patient care documents
Assessment Models or Tools	<ul style="list-style-type: none"> • Case logs • Clinical and educational work hours logs • Conference attendance logs • Evaluation compliance • Medical chart review • Multisource feedback • Program director's reports documenting compliance with administrative requirements
Curriculum Mapping	<ul style="list-style-type: none"> •
Notes or Resources	<ul style="list-style-type: none"> • ACGME Program Requirements for Graduate Medical Education in Thoracic Surgery. https://www.acgme.org/specialties/thoracic-surgery/program-requirements-and-faqs-and-applications/. Accessed 2021. • Institutional guidelines

Professionalism 4: Well-Being	
Overall Intent: To identify, use, manage, improve, and seek help for personal and professional well-being for self and others	
Milestones	Examples
Level 1 <i>With assistance, recognizes status of personal and professional well-being</i>	<ul style="list-style-type: none"> ● Acknowledges own response to patient’s death
Level 2 <i>Independently recognizes status of personal and professional well-being</i>	<ul style="list-style-type: none"> ● Independently identifies and communicates impact of a personal family tragedy ● Identifies the impact of lack of sleep on performance ● States symptoms of burnout
Level 3 <i>Proposes a plan to optimize personal and professional well-being</i>	<ul style="list-style-type: none"> ● With the multidisciplinary team, develops a reflective response to deal with personal impact of difficult patient encounters and disclosures ● Does self-reflection to identify symptoms of burnout
Level 4 <i>Executes a plan to optimize personal and professional well-being</i>	<ul style="list-style-type: none"> ● Independently identifies ways to manage personal stress ● Engages in activities to build resilience and well-being
Level 5 <i>Coaches others when emotional responses do not meet professional expectations</i>	<ul style="list-style-type: none"> ● Assists in organizational efforts to address clinician well-being after patient diagnosis/prognosis/death
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. ● ACGME. “Well-Being Tools and Resources.” https://dl.acgme.org/pages/well-being-tools-resources. Accessed 2022. ● American Board of Pediatrics. “Entrustable Professional Activities for Subspecialties.” 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. ● Hicks, Patricia J., Daniel Schumacher, Susan Guralnick, Carol Carraccio, and Ann E. Burke. 2014. “Domain of Competence: Personal and Professional Development.”

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<https://www.sciencedirect.com/science/article/abs/pii/S187628591300332X>.
● Local resources, including Employee Assistance programs

Interpersonal and Communication Skills 1: Patient and Family-Centered Communication	
Overall Intent: To deliberately use language and behaviors to form a therapeutic relationship with patients and their families; to identify communication barriers, including self-reflection on personal biases, and minimize them in the doctor-patient relationship; organize and lead communication around shared decision making	
Milestones	Examples
<p>Level 1 <i>Introduces themselves and explains their role to the patient and family</i></p> <p><i>Provides timely updates to patients and families</i></p> <p><i>Identifies common barriers to effective communication</i></p>	<ul style="list-style-type: none"> ● Self-monitors and controls tone, non-verbal responses, and language and asks questions to invite the patient’s participation ● Accurately communicates their role in the health care system to patients and families ● Communicates with patients and patients’ families on changing conditions ● Provides patients with routine information, such as chest x-ray obtained earlier in the day is normal or that the hematocrit is stable ● Identifies need for trained interpreter with non-English-speaking patients
<p>Level 2 <i>Delivers routine information to patients and families and confirms understanding</i></p> <p><i>Actively listens to patients and families to elicit patient preferences and expectations</i></p> <p><i>Identifies complex barriers to effective communication</i></p>	<ul style="list-style-type: none"> ● Shares information and verifies patient understanding ● Leads a discussion about acute pain management with the patient and the family, reassessing the patient’s and family’s understanding and anxiety ● Identifies culture, religious beliefs, health literacy as complex communication barriers in patient and family encounters
<p>Level 3 <i>Delivers complex and difficult information to patients and families and confirms understanding</i></p> <p><i>Uses shared decision making to make a personalized care plan</i></p> <p><i>When prompted, reflects on personal biases while attempting to minimize communication barriers</i></p>	<ul style="list-style-type: none"> ● Establishes and maintains a therapeutic relationship with challenging patients and families ● When speaking to a patient, acknowledges uncertainty in a patient’s medical complexity and prognosis ● Independently engages in shared decision making with the patient and family, to align a patient’s unique goals with treatment options ● Recognizes and attempts to mitigate implicit biases
<p>Level 4 <i>Facilitates interdisciplinary patient and family conferences</i></p>	<ul style="list-style-type: none"> ● Facilitates family conference when family members disagree about the goals of care

<p><i>Effectively negotiates and manages conflict among patients, families, and the health care team</i></p> <p><i>Manages communication barriers and biases</i></p>	<ul style="list-style-type: none"> ● Negotiates care management plan when surgical interventions may be ineffective ● Reflects on personal bias and solicits input from faculty members about mitigation of communication barriers
<p>Level 5 <i>Coaches others in the facilitation of difficult conversations</i></p> <p><i>Coaches others in conflict resolution</i></p> <p><i>Coaches others to manage communication barriers and biases</i></p>	<ul style="list-style-type: none"> ● Mentors/coaches and supports colleagues in self-awareness and reflection to improve therapeutic relationships with patients ● Creates a curriculum to teach conflict resolution in family conferences ● Reviews finer points of biases to residents and directs them to established resources
<p>Assessment Models or Tools</p>	<ul style="list-style-type: none"> ● Direct observation ● Kalamazoo Essential Elements Communication Checklist (Adapted) ● Mini-clinical evaluation exercise ● Multisource feedback ● Self-assessment including self-reflection exercises ● Standardized patients or structured case discussions
<p>Curriculum Mapping</p>	<ul style="list-style-type: none"> ●
<p>Notes or Resources</p>	<ul style="list-style-type: none"> ● American College of Surgeons (ACS). Communicating with Patients about Surgical Errors and Adverse Outcomes. https://web4.facs.org/ebusiness/ProductCatalog/product.aspx?ID=229. Accessed 2021. ● ACS. Disclosing Surgical Error: Vignettes for Discussion. https://web4.facs.org/ebusiness/ProductCatalog/product.aspx?ID=157. Accessed 2021. ● Baile WF, Buckman R, Lenzi R, et al. SPIKES - A six-step protocol for delivering bad news: Application to the patient with cancer. <i>Oncologist</i>. 2000;5:302-311. https://theoncologist.onlinelibrary.wiley.com/doi/full/10.1634/theoncologist.5-4-302. ● Gallagher T, Etchegaray JM, Bergstedt B, et al. Improving communication and resolution following adverse events using a patient-created simulation exercise. <i>HSR</i>. 2016;51(6):2537-2549. https://onlinelibrary.wiley.com/doi/abs/10.1111/1475-6773.12601. ● Gallagher T, Studdert D, Levinson W. Disclosing harmful medical errors to patients. <i>N Engl J Med</i>. 2007;356(26):2713-2719. https://www.nejm.org/doi/full/10.1056/NEJMra070568?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%3dpubmed. ● Laidlaw A, Hart J. Communication skills: An essential component of medical curricula. Part I: Assessment of clinical communication: AMEE Guide No. 51. <i>Med Teach</i>.

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<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2631014/>.

Interpersonal and Communication Skills 2: Interprofessional and Team Communication Overall Intent: To effectively communicate with the health care team, including consultants, in both straightforward and complex situations	
Milestones	Examples
<p>Level 1 <i>Respectfully requests a consultation</i></p> <p><i>Respectfully receives a consultation request</i></p> <p><i>Uses language that values all members of the health care team</i></p>	<ul style="list-style-type: none"> ● Politely ask for a cardiology consultation for a patient with post-operative pericardial effusion ● Receives consult request for a patient with poor cardiac function, asks clarifying questions politely, and expresses gratitude for the consult ● Acknowledges the contribution of each member of the surgical team to the patient
<p>Level 2 <i>Clearly and concisely requests a consultation</i></p> <p><i>Clearly and concisely responds to a consultation request</i></p> <p><i>Communicates information effectively with all health care team members</i></p>	<ul style="list-style-type: none"> ● When asking for a cardiology consultation for a patient with post-operative pericardial effusion, respectfully discusses potential drainage in the cath lab ● Responds in a timely manner to primary team regarding lack of surgical options for a patient with poor cardiac function ● Attends cardiac intensive care unit rounds and provides surgical input
<p>Level 3 <i>Verifies own understanding of consultant recommendations</i></p> <p><i>Verifies understanding of recommendations when providing consultation</i></p> <p><i>Uses active listening to adapt communication style to fit team needs</i></p>	<ul style="list-style-type: none"> ● When receiving treatment recommendations from a consultant physician, verifies a clear understanding of the plan ● After a consultation from infectious disease has been completed, confirms understanding of the antibiotic course and who will place the order ● Summarizes a consultant recommendation in the progress notes
<p>Level 4 <i>Coordinates recommendations from different members of the health care team to optimize patient care</i></p> <p><i>Navigates and resolves disagreements with interprofessional team</i></p> <p><i>Mediates conflict within the team</i></p>	<ul style="list-style-type: none"> ● Initiates a multidisciplinary meeting to developed shared care plan for a patient with complex congenital heart needs ● Explains surgical rationale for contraindications of ECMO in a heart failure patient with the critical care and cardiology physicians ● Speaks directly to a consultant and does not address conflict in the EHR

<p>Level 5 Models flexible communication strategies that value input from all health care team members, resolving conflict when needed</p> <p><i>Coaches others in navigating interprofessional disagreements</i></p> <p><i>Coaches others in active listening and communication styles</i></p>	<ul style="list-style-type: none"> ● Teaches and models team communication and conflict resolution ● Participates in a course on difficult conversations
<p>Assessment Models or Tools</p>	<ul style="list-style-type: none"> ● Direct observation ● Global assessment ● Medical record (chart) audit ● Multisource feedback ● Simulation
<p>Curriculum Mapping</p>	<ul style="list-style-type: none"> ●
<p>Notes or Resources</p>	<ul style="list-style-type: none"> ● Braddock CH, Edwards KA, Hasenberg NM, Laidley TL, Levinson W. Informed decision making in outpatient practice: time to get back to basics. <i>JAMA</i>. 1999;282:2313-2320. https://pubmed.ncbi.nlm.nih.gov/10612318/. ● Dehon E, Simpson K, Fowler D, Jones A. Development of the faculty 360. <i>MedEdPORTAL</i>. 2015;11:10174. https://www.mededportal.org/doi/10.15766/mep_2374-8265.10174. ● Green M, Parrott T, Cook G. Improving your communication skills. <i>BMJ</i>. 2012;344:e357 https://www.bmj.com/content/344/bmj.e357. ● Henry SG, Holmboe ES, Frankel RM. Evidence-based competencies for improving communication skills in graduate medical education: A review with suggestions for implementation. <i>Med Teach</i>. 2013;35(5):395-403. https://www.tandfonline.com/doi/abs/10.3109/0142159X.2013.769677?journalCode=imte20. ● Lane JL, Gottlieb RP. Structured clinical observations: A method to teach clinical skills with limited time and financial resources. <i>Pediatrics</i>. 2000;105(4):973-977. https://pdfs.semanticscholar.org/8a78/600986dc5cfcab89146df67fe81aebeaecc.pdf. ● Roth CG, Eldin KW, Padmanabhan V, Freidman EM. Twelve tips for the introduction of emotional intelligence in medical education. <i>Med Teach</i>. 2018;21:1-4. https://www.tandfonline.com/doi/abs/10.1080/0142159X.2018.1481499?journalCode=imte20.

Interpersonal and Communication Skills 3: Communication within Health Care Systems Overall Intent: To effectively communicate using a variety of methods	
Milestones	Examples
<p>Level 1 <i>Accurately and timely documents information in the patient record</i></p> <p><i>Safeguards patient personal health information</i></p> <p><i>Communicates through appropriate channels as required by institutional policy</i></p>	<ul style="list-style-type: none"> ● Creates accurate documentation but may include extraneous information ● Shreds patient list after rounds; avoids talking about patients in the elevator ● Identifies institutional and departmental communication hierarchy for concerns and safety issues
<p>Level 2 <i>Completes documentation thoroughly and communicates diagnostic and therapeutic reasoning in an organized fashion</i></p> <p><i>Documents required data in formats specified by institutional policy</i></p> <p><i>Respectfully communicates concerns about the system</i></p>	<ul style="list-style-type: none"> ● Creates organized and accurate documentation outlining clinical reasoning that supports the treatment plan ● Uses documentation templates ● Recognizes that a communication breakdown has happened and respectfully brings the breakdown to the attention of the faculty member
<p>Level 3 <i>Completes documentation accurately, concisely, and completely</i></p> <p><i>Appropriately selects direct and indirect forms of communication</i></p> <p><i>Uses appropriate channels to offer clear and constructive suggestions to improve the system</i></p>	<ul style="list-style-type: none"> ● Documents complex clinical thinking concisely in notes but may not contain anticipatory guidance ● Calls patient immediately about potentially critical test result ● Uses institutional reporting system after a medication error
<p>Level 4 <i>Communicates in a clearly organized, concise, and timely manner, and includes anticipatory guidance</i></p> <p><i>Uses written and verbal communication (e.g., patient notes, email) in a professional manner</i></p> <p><i>Initiates difficult conversations with appropriate stakeholders to improve the system</i></p>	<ul style="list-style-type: none"> ● Creates documentation that is consistently accurate, organized, and concise, and frequently incorporates anticipatory guidance ● Notes are exemplary and used to teach others ● Respectfully closes the loop with an emergency room physician about breakdowns in communication to prevent recurrence

<p>Level 5 Models feedback to improve others' written communication</p> <p><i>Facilitates departmental or institutional communication policies and procedures</i></p> <p><i>Facilitates dialogue regarding systems issues among larger community stakeholders (institution, health care system, field)</i></p>	<ul style="list-style-type: none"> ● Leads a task force established by the hospital QI committee to develop a plan to improve house staff hand-offs ● Meaningfully participates in a committee following a patient safety event in the ICU such as inadvertent removal of ECMO cannula ● Participates on a task force generated by a root cause analysis
<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"> ● Bierman JA, Hufmeyer KK, Liss DT, Weaver AC, Heiman HL. Promoting responsible electronic documentation: Validity evidence for a checklist to assess progress notes in the electronic health record. <i>Teach Learn Med.</i> 2017;29(4):420-432. https://www.tandfonline.com/doi/full/10.1080/10401334.2017.1303385. ● Starmer AJ, Spector ND, Srivastava R, et al. I-pass, a mnemonic to standardize verbal handoffs. <i>Pediatrics.</i> 2012;129.2:201-204. https://pediatrics.aappublications.org/content/129/2/201.long?sso=1&sso_redirect_count=1&nfstatus=401&nftoken=00000000-0000-0000-0000-000000000000&nfstatusdescription=ERROR%3a+No+local+token.

Congenital Cardiac Surgery Supplemental Guide

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 where the subcompetencies 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: Technical Skills and Performance	PC1: Technical Skills and Performance
PC2: Pre- and Post-operative Care	PC2: Patient Evaluation and Decision Making
	PC3: Critical Care
MK1: Anatomy and Diagnosis	PC2: Patient Evaluation and Decision Making MK1: Morphology
MK2: Pathophysiology and Natural History of the Disease	MK2: Pathophysiology and Surgical Outcomes
MK3: Pathophysiology and Management of the Post-operative State	MK2: Pathophysiology and Surgical Outcomes
SBP: Systems-based Practice	SBP1: Patient Safety and Quality Improvement SBP2: System Navigation for Patient-Centered Care SBP3: Physician Role in Health Care Systems
PBLI: Practice-based Learning and Improvement	PBLI1: Evidence-Based and Informed Practice PBLI2: Reflective Practice and Commitment to Personal Growth
PROF: Professionalism	PROF1: Ethical Principles PROF2: Professional Behavior and Accountability PROF3: Administrative Tasks PROF4: Well-Being
ICS: Interpersonal and Communication Skills	ICS1: Patient and Family-Centered Communication ICS2: Interprofessional and Team Communication ICS3: Communication within Health Care Systems

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/>