Supplemental Guide: Interventional Cardiology

ACGME

December 2020

TABLE OF CONTENTS

Milestones Supplemental Guide

This document provides additional guidance and examples for the Interventional 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 on the Resources page of the Milestones section of the ACGME website.

Patient Care 1: Pre-Procedural Care and Procedural Selection **Overall Intent:** To optimize pre-procedural evaluation, decision making, and care	
Milestones	**Examples**
Level 1 *Lists indications, risks, and benefits for straightforward procedures* *Lists prerequisite diagnostic testing and optimal medical management strategies*	● Lists indications for an early invasive approach for an acute coronary syndrome ● Understands the benefits of stress testing in evaluation of a patient with chest pain
Level 2 *With direct supervision, identifies the indications, risks, and benefits to individualized patient care* *With direct supervision, evaluates diagnostic testing and optimizes medical management*	● With attending, discusses medical optimization prior to percutaneous coronary intervention for angina ● Reviews pharmacologic nuclear stress testing with attending prior to coronary angiography
Level 3 *With guidance, selects procedures based on indications, risks, and benefits to individualized patient care* *With guidance, evaluates diagnostic testing and optimizes medical management*	● Outlines a procedural plan based on prior angiography with assistance ● Discusses upstream loading of dual anti-platelet therapy prior to staged percutaneous coronary intervention
Level 4 *Independently selects procedures based on indications, risks, and benefits to individualized patient care* *Independently evaluates diagnostic testing and optimizes medical management*	● Recommends hemodynamic support in a patient with cardiogenic shock ● Integrates findings of stress and viability testing in assessing appropriateness of patient for percutaneous coronary intervention
Level 5 *Demonstrates advanced decision making in complex clinical scenarios and procedural selection* *Demonstrates advanced decision making in managing complex clinical scenarios*	● Identifies appropriate anatomy and procedural strategy for a chronic total occlusion intervention ● Develops a procedural plan for a critically ill patient with coronary artery disease who is hemodynamically unstable with concomitant aortic stenosis
Assessment Models or Tools	● Direct observation ● Medical record (chart) review ● Multisource feedback
Curriculum Mapping	●

Notes or Resources	● Appropriate Use Criteria Journal of the American College of Cardiology (JACC) 2016; 2017 and other updates ● American College of Cariology (ACC)/American Heart Association (AHA) Guidelines http://www.onlinejacc.org/content/74/10/1376 2020.

Patient Care 2: Technical Skills for Percutaneous Interventions **Overall Intent:** To evaluate procedural technical skills and decision making	
Milestones	**Examples**
Level 1 *With direct supervision, performs straightforward procedures (e.g., angioplasty, stenting)*	● Assists in the angioplasty and stenting of a Type A lesion
With direct supervision, performs basic clinical management in straightforward situations	● Assists in the initiation of dual anti-platelet therapy post- percutaneous coronary intervention
Level 2 *With guidance, performs straightforward procedures (e.g., invasive imaging, mechanical support)*	● Performs intravascular ultrasound-guided angioplasty and stenting with direct attending participation
With guidance, demonstrates intra-procedural decision making, composure, and clinical and complication management in straightforward situations	● Recognizes and manages transient hypotension during percutaneous coronary intervention with direct attending participation
Level 3 *Independently performs straightforward procedures (e.g., invasive imaging, mechanical support)*	● Performs intravascular ultrasound-guided angioplasty and stenting of a Type B lesion
Independently demonstrates intra-procedural decision making, composure, and clinical and complication management in straightforward situations	● Recognizes subtherapeutic active clotting time and orders additional heparin anticoagulation
Level 4 *Independently performs complex procedures (e.g., atherectomy, bifurcation left main intervention)*	● Performs rotational atherectomy and stenting of a calcified coronary lesion
Independently demonstrates intra-procedural decision making, composure, and clinical and complication management in complex situations	● Recognizes and manages a coronary perforation
Level 5 *Demonstrates superior technical skill in the most complex, high-risk procedures*	● Performs a chronic total occlusion intervention

Demonstrates advanced leadership in the complex catheterization laboratory environment	● Recognized by the staff for leadership through an intraprocedural cardiac arrest in a calm and composed fashion
Assessment Models or Tools	● Direct observation ● Multisource feedback ● Simulation
Curriculum Mapping	●
Notes or Resources	● Society for Cardiovascular Angiography & Interventions (SCAI). SCAI Online Learning. http://www.scai.org/eLearning/default.aspx. 2020 ● American College of Cardiology (ACC). CathSAP. https://www.acc.org/education-and-meetings/products-and-resources/cathsap. 2020. ● Kern MJ. *SCAI Interventional Cardiology Review*. 3rd ed. Philadelphia, PA: Wolters Kluwer; 2018.

Patient Care 3: Post-Procedural Management (Inpatient and Outpatient) **Overall Intent:** To provide guideline directed therapies to optimize immediate and long-term outcomes	
Milestones	**Examples**
Level 1 *Evaluates for post-procedural issues* *With direct supervision, optimizes patient care in the outpatient setting*	● Performs an access site check after procedure and recognizes complications ● Sees a patient in clinic post-procedure and completes medication reconciliation
Level 2 *Manages straightforward care and issues* *With guidance, optimizes straightforward care of patients in the outpatient setting*	● Orders ultrasound to evaluate groin pain after procedure and establishes a management plan ● Determines optimal duration of dual anti-platelet therapy, with the attending
Level 3 *Manages complex care and issues* *With guidance, optimizes complex care of patients in the outpatient setting*	● Manages a patient with post-percutaneous coronary intervention chest pain and hypotension ● Consults with team members regarding the decision to continue anti-platelet therapy in a patient with atrial fibrillation
Level 4 *Anticipates issues and manages complex post-procedural care* *Independently optimizes patient care in the outpatient setting*	● Manages a patient with complex vascular access who develops retroperitoneal bleed ● Coordinates a multidisciplinary team to manage a patient with heart failure and coronary artery disease needing implantable cardioverter defibrillator placement
Level 5 *Develops a clinical pathway or guideline for management of complex post-procedural issues* *Implements strategies for advancing multidisciplinary care*	● Develops a same-day discharge pathway for percutaneous coronary intervention ● Coordinates cardiovascular assessment for kidney transplant candidates
Assessment Models or Tools	● Direct observation ● Medical record (chart) audit ● Multisource feedback
Curriculum Mapping	●
Notes or Resources	● ACC Guidelines for Management http://www.onlinejacc.org/keyword/accaha-clinical-practice-guidelines ● Society for Cardiovascular Angiography & Interventions (SCAI). SCAI Online Learning. http://www.scai.org/eLearning/default.aspx. 2020 ● PCI Guidelines https://www.ahajournals.org/doi/full/10.1161/cir.0b013e31823ba622 2020.

Medical Knowledge 1: Anatomy and Physiology **Overall Intent:** To understand the implications of anatomy and physiology in the practice of interventional cardiology	
Milestones	**Examples**
Level 1 *Identifies normal anatomy during procedures* *Demonstrates knowledge of pathophysiology of straightforward conditions*	● Identifies an 80 percent stenosis in the mid-left anterior descending artery ● Knows the effect of coronary stenosis on angina
Level 2 *Identifies anatomic variants during procedures* *Demonstrates knowledge of pathophysiology of complex conditions*	● Identifies vein graft anastomosis to obtuse marginal artery ● Recognizes spontaneous coronary artery dissection on angiogram ● Identifies a Type 2 myocardial infarction
Level 3 *Identifies the implications of varying anatomy for procedural planning* *Demonstrates knowledge of pathophysiology and treatment of patients with straightforward conditions*	● Identifies anomalous circumflex coronary origin from the right coronary cusp and selects appropriate guide catheter ● Describes a fractional flow reserve evaluation of serial lesions in the coronary artery
Level 4 *Identifies therapeutic options targeted to complex anatomy* *Demonstrates knowledge of pathophysiology and treatment of patients with complex conditions*	● Selects appropriate technique for a bifurcation lesion ● Identifies and directs hemodynamic support of a patient with a right ventricular infarction
Level 5 *Demonstrates a command of medical knowledge regarding rare anatomic variants* *Contributes to peer-reviewed literature on pathophysiology and/or treatment*	● Identifies and manages coronary fistulae ● Publishes an unusual case report on coronary fistulae
Assessment Models or Tools	● Direct observation ● Medical record (chart) audit ● Multisource feedback
Curriculum Mapping	●
Notes or Resources	● Moscucci M. *Grossman and Baim's Cardiac Catheterization, Angiography, and Intervention*. 8th ed. Lippinscott Williams & Wilkins; Philadelphia, PA. 2014

Medical Knowledge 2: Pharmacology **Overall Intent:** To understand the appropriate use of pharmacologic agents in interventional cardiology practice	
Milestones	**Examples**
Level 1 *Demonstrates basic knowledge of pharmacologic agents*	● Lists options for dual anti-platelet therapy post percutaneous coronary intervention
Level 2 *Demonstrates knowledge of selection and dosing of commonly used pharmacologic agents*	● Appropriately doses heparin during performance of percutaneous coronary intervention
Level 3 *Demonstrates knowledge of the indications, contraindications, side effects, and complications of pharmacologic agents*	● Tailors an anti-platelet regimen in an elderly patient with a history of stroke
Level 4 *Integrates knowledge of pharmacology into procedures and peri-procedural care*	● Customizes an anti-platelet/anti-coagulation regimen post percutaneous coronary intervention in a patient with afib and a high bleeding risk
Level 5 *Develops pharmacologic protocols or departmental guidelines*	● Rewrites order set to help guide anti-platelet choices after percutaneous coronary intervention
Assessment Models or Tools	● Conference presentation ● Direct observation ● Medical record (chart) audit ● Multisource feedback
Curriculum Mapping	●
Notes or Resources	● European Society of Cardiology (ESC). Clinical Practice Guidelines. https://www.escardio.org/Guidelines/Clinical-Practice-Guidelines. 2020. ● ACC. Guidelines and Clinical Documents. https://www.acc.org/guidelines#doctype=Guidelines. 2020. ● American College of Cardiology (ACC). CathSAP. https://www.acc.org/education-and-meetings/products-and-resources/cathsap. 2020.

Medical Knowledge 3: Devices, Techniques, and Outcomes **Overall Intent:** To understand the implications of the choice of technique and devices in terms of procedural and long-term outcomes	
Milestones	**Examples**
Level 1 *Identifies commonly used devices*	● Identifies fundamental properties of guide catheters and wires
Level 2 *Demonstrates knowledge of commonly used devices, techniques, and outcomes*	● Appropriately interprets results of intravascular ultrasound
Level 3 *Demonstrates knowledge of the indications, contraindications, side effects, and complications of commonly used devices, techniques, and outcomes*	● Understands different bifurcation techniques and the challenges and benefits of each
Level 4 *Integrates knowledge of devices, techniques, and outcomes into procedures and peri-procedural care*	● For a patient in cardiogenic shock post percutaneous coronary intervention, manages and troubleshoots mechanical circulatory support
Level 5 *Achieves a superior level of knowledge to effectively teach others about devices, techniques, and outcomes*	● Demonstrates superior knowledge of chronic total occlusion intervention
Assessment Models or Tools	● Direct observation ● Medical record (chart) audit ● Multisource feedback
Curriculum Mapping	●
Notes or Resources	● SCAI fellow website http://www.scai.org/fellows 2020. ● Online training

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**
Level 1 *Demonstrates knowledge of common patient safety events* *Demonstrates knowledge of how to report patient safety events* *Demonstrates knowledge of basic quality improvement methodologies and metrics*	● Describes the basics of reporting pathways and QI strategies, but has not yet participated in such activities
Level 2 *Identifies system factors that lead to patient safety events* *Reports patient safety events through institutional reporting systems (simulated or actual)* *Describes quality improvement initiatives at the institutional or departmental level*	● Identifies and reports the accidental discontinuation of dual antiplatelet agents after percutaneous coronary intervention, along with contributing system factors ● Is aware of available hospital and departmental reporting mechanisms for adverse events and near-misses ● Describes the mechanisms for referral for cardiac rehab post-percutaneous coronary intervention
Level 3 *Participates in analysis of patient safety events (simulated or actual)* *Participates in disclosure of patient safety events to patients and families (simulated or actual)* *Participates in quality improvement initiatives at the institutional or departmental level*	● Prepares a morbidity and mortality (M and M) presentation and has communicated with patients/families about such an event ● Participates in a project aimed at decreasing kidney injury post-percutaneous coronary intervention
Level 4 *Conducts analysis of patient safety events and offers error prevention strategies (simulated or actual)* *Discloses patient safety events to patients and families (simulated or actual)*	● Collaborates with a team to lead the analysis of a patient safety event and can competently communicate with patients/families about those events ● Completes a QI project for decreasing post-percutaneous coronary intervention bleeding and assesses the effect of the intervention

Demonstrates the skills required to identify, develop, implement, and analyze a quality improvement project	
Level 5 *Actively engages teams and processes to modify systems to prevent patient safety events* *Role models or mentors others in the disclosure of patient safety events* *Creates, implements, and assesses quality improvement initiatives at the institutional or community level*	● Competently assumes a leadership role at the institutional or community level for patient safety and/or QI initiatives
Assessment Models or Tools	● Chart or other system documentation by fellow ● Direct observation ● Multisource feedback ● Portfolio ● Reflection ● Simulation
Curriculum Mapping	●
Notes or Resources	● Institute of Healthcare Improvement. http://www.ihi.org/Pages/default.aspx. 2020.

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**
Level 1 *Demonstrates knowledge of care coordination*	● Identifies the various members of the heart team and defines their roles
Identifies key elements for effective transitions of care	● Lists the essential components of an effective sign-out and care transition
Level 2 *Coordinates care of patients in routine clinical situations, effectively using the roles of the interprofessional teams*	● Contacts cath lab team members for routine cases, but requires supervision to ensure all necessary referrals, testing, and care transitions are made
Performs effective transitions of care in routine clinical situations	● Performs a routine case sign-out but still needs guidance and direct supervision to identify and appropriately triage cases or calls
Demonstrates general knowledge of financial, cultural, and social barriers to adherence of care	● Identifies components of social determinants of health and how they impact the delivery of patient care
Level 3 *Coordinates care of patients in complex clinical situations, effectively using the roles of the interprofessional teams*	● Uses care coordinators to help prevent readmission after percutaneous coronary intervention
Performs effective transitions of care in complex clinical situations	● Performs safe and effective transitions of care with clinical service at shift change
Identifies financial, cultural, and social barriers to adherence of care to specific populations	● Knows which patients are at high risk for specific health outcomes related to health literacy concerns, cost of testing or therapy, etc.
Level 4 *Role models effective coordination of patient-centered care among different disciplines and specialties*	● Role models and educates students and junior team members regarding the engagement of appropriate interprofessional team members and ensures the necessary resources have been arranged
Role models and advocates for effective transitions of care within and across health care delivery systems	● Coaches cardiology fellows on effective transition from the inpatient to outpatient setting
Adapts practice to address the financial, cultural, and social barriers to adherence of care	● Adjusts practice to consistently assess patients with payment barriers and ensure they are prescribed lower-cost medications

Level 5 *Analyzes the process of care coordination and leads in the design and implementation of improvements* *Improves quality of transitions of care within and across health care delivery systems to optimize patient outcomes* *Leads innovations and advocates for populations with health care inequities*	● Works with hospital or ambulatory site team members or leadership to analyze care coordination in that setting, and takes a leadership role in designing and implementing changes to improve the care coordination ● Works with a QI mentor to identify better hand-off tools for on-call services ● Designs a health curriculum to help others learn to identify social determinants of health, local resources, and barriers to care ● Helps develop telehealth program to ensure that patients in rural areas can be seen by all cardiology specialists
Assessment Models or Tools	● Case management quality metrics and goals mined from electronic health records (EHRs) ● Direct observation ● Medical record (chart) review ● Multisource feedback
Curriculum Mapping	●
Notes or Resources	● CDC. Population Health Training in Place Program (PH-TIPP). https://www.cdc.gov/pophealthtraining/whatis.html. 2020. ● Skochelak SE, Hawkins RE, Lawson LE, Starr SR, Borkan JM, Gonzalo JD. *AMA Education Consortium: Health Systems Science.* 1st ed. Philadelphia, PA: Elsevier; 2016. https://commerce.ama-assn.org/store/ui/catalog/productDetail?product_id=prod2780003. 2020.

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**
Level 1 *Identifies key components of the health care system (e.g., hospital, skilled nursing facility, finance, personnel, technology)* *Describes basic health payment systems, (e.g., government, private, public, uninsured care) and practice models*	● Recognizes that hospitals, skilled nursing facilities, and technology are components of the health care system and describes different payment systems, such as Medicare, Medicaid, the VA, and commercial third-party payers
Level 2 *Describes how components of a complex health care system are interrelated, and how this impacts patient care* *Delivers care with consideration of each patient's payment model (e.g., insurance type)* *Demonstrates essential skills for documentation required for independent practice (e.g., electronic health record, documentation required for billing and coding)*	● Describes how improving patient satisfaction improves patient adherence and remuneration to the health system ● Applies knowledge of health plan features, including formularies and network requirements in patient care situations ● Completes a note template following a routine patient encounter and applies appropriate coding in compliance with regulations
Level 3 *Discusses how individual practice affects the broader system (e.g., length of stay, readmission rates, clinical efficiency)* *Engages with patients in shared decision making, informed by each patient's payment models* *Seeks knowledge in non-clinical topics needed for independent practice (e.g., malpractice insurance, government regulation, compliance)*	● Understands, accesses, and analyzes performance data at departmental or individual level; relevant data may include: ○ Myocardial infarction mortality from national registry ○ Group's post-percutaneous coronary intervention readmission rates ● Uses shared decision making to select the most cost-effective testing depending on the relevant clinical needs ● Understands the process of contract negotiations and choosing malpractice insurance carriers and features
Level 4 *Manages various components of the complex health care system to provide efficient and effective patient care and transition of care*	● Works collaboratively with the institution to improve patient assistance resources or design the institution's community health needs assessment, or develop/implement/assess the resulting action plans

Advocates for patient care needs (e.g., community resources, patient assistance resources) with consideration of the limitations of each patient's payment model *Applies knowledge in non-clinical topics needed for independent practice*	● Applies knowledge of contract negotiations and choosing malpractice insurance carriers and features
Level 5 *Advocates for or leads systems change that enhances high-value, efficient, and effective patient care and transition of care* *Participates in health policy advocacy activities* *Educates others in non-clinical topics to prepare them for independent practice*	● Works with community or professional organizations to advocate for no smoking ordinances ● Develops processes to coordinate regional ST-elevation myocardial infarction care ● Improves informed consent process for non-English-speaking patients requiring interpreter services
Assessment Models or Tools	● Direct observation ● Medical record (chart) review ● QI project
Curriculum Mapping	●
Notes or Resources	● Agency for Healthcare Research and Quality. Measuring the Quality of Physician Care. https://www.ahrq.gov/talkingquality/measures/setting/physician/index.html. 2020. ● AHRQ. Major Physician Measurement Sets. https://www.ahrq.gov/talkingquality/measures/setting/physician/measurement-sets.html. 2020. ● American Board of Internal Medicine. QI/PI Activities. https://www.abim.org/maintenance-of-certification/earning-points/qi-pi-activities.aspx. 2020. ● The Commonwealth Fund. Health System Data Center. http://datacenter.commonwealthfund.org/?_ga=2.110888517.1505146611.1495417431-1811932185.1495417431#ind=1/sc=1. 2020. ● Dzau VJ, McClellan M, Burke S, et al. Vital directions for health and health care: priorities from a National Academy of Medicine Initiative. *NAM Perspectives*. Discussion Paper, National Academy of Medicine, Washington, DC. https://nam.edu/vital-directions-for-health-health-care-priorities-from-a-national-academy-of-medicine-initiative/. 2020. ● The Kaiser Family Foundation. www.kff.org. 2020.

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 *Demonstrates how to access and use available evidence to manage a patient with cardiovascular disease*	● Obtains the appropriate evidence-based guidelines for management of coronary disease
Level 2 *Articulates clinical questions and elicits patient preferences to guide evidence-based care*	● Asks symptom driven and goals of care questions of the patient with coronary disease
Level 3 *Locates and applies the best available evidence to the care of patients with cardiovascular disease while integrating patient preference*	● Applies evidence in the care of a patient with symptomatic, severe coronary disease who does not want surgery ● Researches and applies the concept of frailty in the evaluation of a patient with severe aortic stenosis
Level 4 *Critically appraises and applies available, potentially conflicting evidence to guide care of an individual patient*	● Critically evaluates new primary literature, in the care of a patient with severe coronary disease and atrial fibrillation
Level 5 *Develops initiatives to educate others to critically appraise and apply evidence for complex patients and/or participates in the development of guidelines*	● Teaches others how to find and apply best practice or develops, independently or as a part of a team, thoughtful clinical guidelines on management of coronary disease ● Helps write a multi-team policy for the institution to address how to manage patients with complex coronary and valvular heart disease
Assessment Models or Tools	● Direct observation ● Evaluation of presentation ● Self-assessment tests such as in-training exams, CathSAP self-assessment tests
Curriculum Mapping	●
Notes or Resources	● Burke AE, Benson B, Englander R, Carraccio C, Hicks PJ. Domain of competence: practice-based learning and improvement. *Acad Pediatr*. 2014;14(2 Suppl):S38-S54. https://www.academicpedsjnl.net/article/S1876-2859(13)00333-1/fulltext. 2020. ● Harrington RA, Barac A, Brush JE Jr, et al. COCATS 4 Task Force 15: training in cardiovascular research and scholarly activity. *J Am Coll Cardiol*. 2015;65(17):1899-1906. https://www.sciencedirect.com/science/article/pii/S0735109715008396?via%3Dihub. 2020. ● NEJM Knowledge. Exploring the ACGME Core Competencies: Practice-Based Learning and Improvement. https://knowledgeplus.nejm.org/blog/practice-based-learning-and-improvement/. 2020.

Practice-Based Learning and Improvement 2: Reflective Practice and Commitment to Personal Growth **Overall Intent:** To seek performance information with the intent to improve care; to reflect on all domains of practice and develop goals for improvement	
Milestones	**Examples**
Level 1 *Accepts responsibility for personal and professional development by establishing goals* *Acknowledges limits and gaps between expectations and performance; demonstrates self-awareness*	● Sets goal to independently interpret coronary angiograms ● Acknowledges need to improve skills in arterial access
Level 2 *Demonstrates openness to feedback and performance data in order to form goals* *Analyzes the factors which contribute to limits and gaps; demonstrates appropriate help-seeking behaviors*	● Accepts feedback regarding need to improve skills in guide catheter manipulation ● Recognizes difficulty in delivering a stent and asks for assistance
Level 3 *Occasionally seeks feedback and performance data with adaptability and humility* *Creates and implements a learning plan*	● Asks attending for feedback on their performance after a challenging case ● Develops a plan to use online resources to learn more about intravascular imaging
Level 4 *Systematically seeks feedback and performance data with adaptability and humility* *Uses performance data to assess learning plan and improves it when necessary*	● With an attending, asks about performance and opportunities for improvement at the end of each week ● Consistently identifies ongoing gaps and chooses areas for further development
Level 5 *Coaches others to seek feedback and performance data* *Facilitates the design and implementation of learning plans for others*	● Mentors cardiology fellow to improve diagnostic angiography skills and ask for feedback ● Develops a form that cardiology fellows can use to document and implement a learning plan based on in-training exam results
Assessment Models or Tools	● Direct observation ● End-of-rotation evaluations ● Review of learning plan
Curriculum Mapping	●
Notes or Resources	● Hojat M, Veloski JJ, Gonnella JS. Measurement and correlates of physicians' lifelong learning. *Academic Medicine.* 2009;84(8):1066-1074.

	https://journals.lww.com/academicmedicine/fulltext/2009/08000/Measurement_and_Correlates_of_Physicians__Lifelong.21.aspx. 2020. ● 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. *Academic Medicine*. 2013;88(10):1558-1563. https://journals.lww.com/academicmedicine/fulltext/2013/10000/Assessing_Residents__Written_Learning_Goals_and.39.aspx. 2020.

Professionalism 1: Professional Behavior and 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 *Identifies and describes potential triggers for professionalism lapses* *Demonstrates knowledge of ethical principles (e.g., informed consent, advance directives, confidentiality, patient autonomy)*	● Recognizes that when in the catheterization laboratory, the fellow is less available to answer pages ● Discusses patient preferences during informed consent for percutaneous coronary intervention
Level 2 *Demonstrates insight into professional behavior in routine situations* *Applies knowledge of ethical principles to routine situations*	● Acknowledges a lapse without becoming defensive and make amends if needed ● Articulates strategies for preventing similar lapses in the future ● Recognizes and responds appropriately when peers seek coverage of a shift due to fatigue
Level 3 *Demonstrates professional behavior in complex or stressful situations* *Recognizes need to seek help in managing and resolving complex ethical situations*	● Behaves respectfully and calmly during a stressful interaction with a catheterization laboratory team member ● Requests a palliative care consult to establish goals of care as a component of procedural planning
Level 4 *Recognizes situations that may trigger professionalism lapses and intervenes to prevent lapses in self and others* *Uses appropriate resources for managing and resolving ethical dilemmas (e.g., ethics consultations, risk management)*	● Takes responsibility for unprofessional behavior ● Successfully leads a difficult conversation between the health care team and a distraught or angry family member ● Responds to possible ethical issues when discussing a case at M and M conference
Level 5 *Coaches others when their behavior fails to meet professional expectations* *Identifies and seeks to address system-level factors that induce or exacerbate ethical problems or impede their resolution*	● Mentors a fellow in the cardiovascular intensive care unit (ICU) after an interaction with a nurse led to a difficult discussion in front of a patient's family ● Engages in system-wide efforts to improve professionalism through participation in a work group, committee, or task force
Assessment Models or Tools	● Direct observation ● Multisource feedback ● Oral or written self-reflection (e.g., of a personal or observed lapse, ethical dilemma, or systems-level factors)

	● Simulation
Curriculum Mapping	●
Notes or Resources	● American Board of Internal Medicine, ACP-ASIM Foundation, European Federation of Internal Medicine. Medical professionalism in the new millennium: a physician charter. *Ann Intern Med*. 2002;136:243-246. http://abimfoundation.org/wp-content/uploads/2015/12/Medical-Professionalism-in-the-New-Millenium-A-Physician-Charter.pdf. 2020. ● American Medical Association. Ethics. https://www.ama-assn.org/delivering-care/ama-code-medical-ethics. 2020. ● Byyny RL, Papadakis MA, Paauw DS. *Medical Professionalism Best Practices*. Menlo Park, CA: Alpha Omega Alpha Medical Society; 2015. https://alphaomegaalpha.org/pdfs/2015MedicalProfessionalism.pdf. 2019. ● Levinson W, Ginsburg S, Hafferty FW, Lucey CR. *Understanding Medical Professionalism*. 1st ed. New York, NY: McGraw-Hill Education; 2014.

Professionalism 2: Accountability/Conscientiousness **Overall Intent:** To take responsibility for one's own actions and the impact on patients and other members of the health care team, as well as recognizes and manages potential conflicts of interest	
Milestones	**Examples**
Level 1 *Takes responsibility for failure to complete tasks and responsibilities, identifies potential contributing factors, and describes strategies for ensuring timely task completion in the future* *Recognizes the principles of conflict of interest in relationships with industry and other entities*	● Responds promptly to reminders from program administrator to complete work-hour logs ● Timely attendance at conferences ● Understands the potential conflict of interests in relationships with pharmaceutical and device companies
Level 2 *Performs tasks and responsibilities in a timely manner with appropriate attention to detail in routine situations* *Recognizes personal potential conflicts with industry*	● Completes procedure notes in a timely manner, with attention to detail and recognizes when the fellow will have trouble completing that task ● Completes and documents safety modules, procedure review, and licensing requirements ● Understands the potential conflict of interest in receiving gifts and educational resources from pharmaceutical and device companies
Level 3 *Performs tasks and responsibilities in a timely manner with appropriate attention to detail in complex or stressful situations* *Seeks assistance in managing personal relationships with industry and other entities to minimize bias and undue influence in practice*	● Appropriately responds to a nurse call for a patient with a hematoma; orders appropriate work-up and notifies attending ● In collaboration with peers and supervisors, reviews and critiques promotional materials provided by pharmaceutical and device representatives ● Follows institutional policies regarding relationships with industry representatives
Level 4 *Recognizes situations that may impact others' ability to complete tasks and responsibilities in a timely manner* *Identifies, discloses, and manages relationships with industry and other entities to minimize bias and undue influence in practice*	● Advises cardiology fellows how to manage their time in completing patient care tasks when working in the catheterization laboratory ● Takes responsibility for potential adverse outcomes and professionally discusses with the interprofessional team ● Independently reviews and critiques promotional materials provided by pharmaceutical and device representatives
Level 5 *Engages with the system to improve outcomes*	● Sets up a meeting with the nurse manager to streamline patient discharges ● Leads multidisciplinary team in a root cause analysis
Assessment Models or Tools	● Compliance with deadlines and timelines ● Direct observation

	● Multisource feedback ● Self-evaluations and reflective tools
Curriculum Mapping	●
Notes or Resources	● American Board of Internal Medicine, ACP-ASIM Foundation, European Federation of Internal Medicine. Medical professionalism in the new millennium: a physician charter. *Ann Intern Med*. 2002;136:243-246. http://abimfoundation.org/wp-content/uploads/2015/12/Medical-Professionalism-in-the-New-Millenium-A-Physician-Charter.pdf. 2020. ● Code of conduct from resident/fellow institutional manual ● Expectations of residency/fellow program regarding accountability and professionalism

Professionalism 3: Self-Awareness and 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 *Recognizes the importance of personal and professional well-being*	● Accepts responsibility to monitor one's own well-being
Level 2 *Independently recognizes status of personal and professional well-being*	● Identifies possible sources of personal stress and independently seeks help
Level 3 *With assistance, proposes a plan to optimize personal and professional well-being*	● With assistance, develops an action plan to address sources of burnout for self or team
Level 4 *Independently develops a plan to optimize personal and professional well-being*	● Independently develops action plans for continued personal and professional growth, and limits stress and burnout for self or team
Level 5 *Participates in a system change to improve well-being in self and others*	● Mentors patients and colleagues in self-awareness and establishes health management plans to limit stress and burnout
Assessment Models or Tools	● Direct observation ● Group interview or discussions for team activities ● Individual interview ● Institutional online training modules ● Participation in institutional well-being programs ● Self-assessment and personal learning plan
Curriculum Mapping	●
Notes or Resources	● This subcompetency is not intended to evaluate a resident's well-being. Rather, the intent is to ensure that each resident has the fundamental knowledge of factors that impact well-being, the mechanism 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. 2020. ● Hicks PJ, Schumacher D, Guralnick S, Carraccio C, Burke AE. Domain of competence: personal and professional development. *Acad Pediatr*. 2014;14(2 Suppl):S80-97. https://linkinghub.elsevier.com/retrieve/pii/S1876-2859(13)00332-X. 2020. ● Local resources, including Employee Assistance Plan (EAP)

Interpersonal and Communication Skills 1: Patient- and Family-Centered Communication **Overall Intent:** To use language and behaviors to form constructive relationships with patients, identifies communication barriers including self-reflection on personal biases, and minimizes them in the doctor-patient relationships; to organize and lead communication around shared decision making	
Milestones	**Examples**
Level 1 *Demonstrates respect and establishes rapport in patient encounters* *Knows barriers to effective communication (e.g., language, disability, health literacy, cultural, personal bias)* *Identifies the need to adjust communication strategies to achieve shared decision making*	● Self-monitors and controls tone, non-verbal responses, and language and asks questions to invite patient/family participation ● Can list examples of common communication barriers in patient care ● Avoids medical jargon when talking to patients
Level 2 *Establishes a therapeutic relationship in routine patient encounters* *Identifies barriers to effective communication in patient encounters* *Organizes and initiates communication with patient/family to facilitate shared decision making*	● Develops a professional relationship with patients/families, with active listening and attention to communication barriers in patient and family encounters ● Takes the lead in organizing a meeting time and agenda with the patient, family, and consulting teams; begins the meeting, reassessing patient and family understanding and anxiety
Level 3 *Establishes a therapeutic relationship in challenging patient encounters, with guidance* *Attempts to minimize communication barriers, including reflection on any personal biases* *Uses shared decision making to implement a personalized care plan, under guidance*	● Can articulate personal challenges in the patient care relationship, how personal biases may impact the relationship, and strategies to use going forward ● Recognizes communication barriers and reflects on implicit biases ● Elicits what is most important to the patient and family, and acknowledges uncertainty in the medical complexity and prognosis
Level 4 *Independently establishes a therapeutic relationship in challenging patient encounters* *Proactively minimizes communication barriers and independently manages personal biases*	● Independently establishes a therapeutic relationship with a patient who is at the end of life and the risks and benefits of a procedure are unclear ● Anticipates and proactively addresses communication barriers, including recognition of own implicit bias

Independently, uses shared decision making to implement a personalized care plan	● Engages in shared decision making process with the patient and family, including a recommended plan to align patient's unique goals with treatment options
Level 5 *Mentors others in situational awareness and critical self-reflection to consistently develop positive therapeutic relationships* *Role models self-awareness to minimize communication barriers* *Role models shared decision making*	● Supports colleagues in self-awareness and reflection to improve therapeutic relationships with patients ● Becomes a role model for proactive self-awareness and reflection around explicit and implicit biases with a context specific approach to mitigate communication barriers ● Exemplifies shared decision making with clear recommendations to patients and families in complex clinical situations
Assessment Models or Tools	● Direct observation ● Multisource feedback ● Self-assessment including self-reflection exercises ● Standardized patients or structured case discussions
Curriculum Mapping	●
Notes or Resources	● Braddock III CH, Edwards KA, Hasenberg NM, Laidley TL, Levinson W. Informed decision making in outpatient practice: time to get back to basics. *JAMA.* 1999;282(24):2313-2320. https://jamanetwork.com/journals/jama/fullarticle/192233. 2020. ● Laidlaw A, Hart J. Communication skills: an essential component of medical curricula. Part I: Assessment of clinical communication: AMEE Guide No. 51. *Med Teach*. 2011;33(1):6-8. https://www.tandfonline.com/doi/full/10.3109/0142159X.2011.531170. 2020. ● Lane JL, Gottlieb RP. Structured clinical observations: a method to teach clinical skills with limited time and financial resources. *Pediatrics*. 2000;105(4 Pt 2):973-977. https://pediatrics.aappublications.org/content/105/Supplement_3/973. 2020. ● Symons AB, Swanson A, McGuigan D, Orrange S, Akl EA. A tool for self-assessment of communication skills and professionalism in residents. *BMC Med Educ*. 2009;9:1. https://bmcmededuc.biomedcentral.com/articles/10.1186/1472-6920-9-1. 2020.

Interpersonal and Communication Skills 2: Interprofessional and Team Communication **Overall Intent:** To effectively communicate with the health care team, including consultants, in both routine and complex situations	
Milestones	**Examples**
Level 1 *Respectfully receives a consultation request*	● Shows respect through words and actions when receiving calls for assistance from members of the health care team
Uses language that values all members of the health care team	● Listens to and considers others' points of view, is nonjudgmental and actively engaged, and demonstrates humility
Level 2 *Respectfully and thoroughly completes consultations with effective documentation and communication in common cases, with direct supervision*	● Demonstrates active listening by fully focusing on the health care provider
Communicates information effectively with all health care team members	● Communicates clearly and concisely in an organized and timely manner during consultant encounters, as well as with the health care team in general
Participates in team-based discussions to optimize team performance	● Participates in multidisciplinary discussions regarding treatment for particular patients
Level 3 *Completes consultations with effective documentation and communication in common cases, with indirect supervision*	● Respectfully accepts feedback from and provides feedback to members of the cath lab team for the purposes of improvement
Adapts communication style to fit team needs	● Uses reinforcement strategies to assess and receive understanding during consultations
Initiates team-based discussions to optimize team performance	● Arranges and facilitates multidisciplinary discussions regarding treatment for particular patients, under supervision
Level 4 *Completes consultations with effective documentation and communication in complex cases*	● Communicates recommendations effectively and in a timely manner with referring or collaborating members of the health care team
Coordinates recommendations from different members of the health care team to optimize patient care	● Arranges and leads multidisciplinary discussions regarding treatment for complex cases
Facilitates team-based discussions to optimize team performance	● Organizes a valve team discussion

Level 5 *Role models flexible communication strategies that value input from all health care team members, resolving conflict when needed* *Facilitates regular health care team-based feedback in complex situations*	● Guides others in organizing effective team meetings to resolve conflict ● Leads team discussions after adverse outcomes of complex cases
Assessment Models or Tools	● Direct observation ● Global assessment ● Medical record (chart) review ● Multisource feedback ● Simulation encounters
Curriculum Mapping	●
Notes or Resources	● Dehon E, Simpson K, Fowler D, Jones A. Development of the faculty 360. *MedEdPORTAL*. 2015;11:10174. https://www.mededportal.org/publication/10174/. 2020. ● Green M, Parrott T, Cook G., Improving your communication skills. *BMJ*. 2012;344:e357. https://www.bmj.com/content/344/bmj.e357. 2020. ● Henry SG, Holmboe ES, Frankel RM. Evidence-based competencies for improving communication skills in graduate medical education: a review with suggestions for implementation. *Med Teach*. 2013;35(5):395-403. https://www.tandfonline.com/doi/full/10.3109/0142159X.2013.769677. 2020. ● Roth CG, Eldin KW, Padmanabhan V, Freidman EM. Twelve tips for the introduction of emotional intelligence in medical education. *Med Teach.* 2018:1-4. https://www.tandfonline.com/doi/full/10.1080/0142159X.2018.1481499. 2020.

Interpersonal and Communication Skills 3: Communication within Health Care Systems **Overall Intent:** To effectively communicate using a variety of methods	
Milestones	**Examples**
Level 1 *Accurately records information in the patient record and safeguards patient personal health information*	● Notes are accurate but may lack organization and include extraneous information ● Only uses methods of communication that are HIPAA compliant to transmit patients' health information
Level 2 *Demonstrates organized diagnostic and therapeutic reasoning through notes in the patient record* *Identifies appropriate communication channels (e.g., cell phone/ pager usage, medical record, email) as required by institutional policy*	● Notes are organized and accurate but may still contain extraneous information ● Identifies method for sharing results needing urgent attention ● Recognizes that a communication breakdown has happened and respectfully brings the breakdown to the attention of the faculty member
Level 3 *Concisely reports diagnostic and therapeutic reasoning in the patient record* *Respectfully communicates concerns about the system*	● Documentation is accurate, organized, and concise, but may not consistently contain plan of care ● Communicates opportunities for improvement in the EHR interface
Level 4 *Independently communicates timely information in a written format and verbally when appropriate* *Uses appropriate channels to offer clear and constructive suggestions to improve the system*	● Writes a clear and concise note and transmits critical information to a colleague verbally ● Knows when to call the care team about unexpected or critical findings of clinical significance ● Participates in task force to update policy for sharing abnormal results
Level 5 *Models written communication to improve others' performance* *Guides departmental or institutional communication around policies and procedures*	● Leads a task force established by the hospital QI committee to develop a plan to improve patient hand-offs ● Develops process improvement for procedural documentation
Assessment Models or Tools	● Direct observation ● Medical record (chart) review ● Multisource feedback
Curriculum Mapping	●
Notes or Resources	● 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. *Teach Learn Med.* 2017;29(4):420-432. https://www.tandfonline.com/doi/full/10.1080/10401334.2017.1303385. 2020. ● Haig KM, Sutton S, Whittington J. SBAR: a shared mental model for improving communication between clinicians. *Jt Comm J Qual Patient Saf*. 2006;32(3):167-175. https://www.jointcommissionjournal.com/article/S1553-7250(06)32022-3/fulltext. 2020. ● Starmer AJ, et al. I-pass, a mnemonic to standardize verbal handoffs. *Pediatrics*. 2012;129(2):201-204. https://pediatrics.aappublications.org/content/129/2/201?sso=1&sso_redirect_count=1&nfstatus=401&nftoken=00000000-0000-0000-0000-000000000000&nfstatusdescription=ERROR%3a+No+local+token. 2020.

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/