Supplemental Guide:
Clinical Cardiac Electrophysiology

ACGME

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Milestones Supplemental Guide

This document provides additional guidance and examples for the Clinical Cardiac Electrophysiology 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: Atrial Fibrillation **Overall Intent:** To develop and implement a comprehensive management plan for patients with atrial fibrillation	
Milestones	**Examples**
Level 1 *Performs a disease specific history and physical exam and develops a diagnostic plan for patients with suspected or known atrial fibrillation; identifies reversible causes of atrial fibrillation*	● In a patient referred for evaluation and management of atrial fibrillation, takes comprehensive symptom history and confirms diagnosis of atrial fibrillation by review of electrocardiogram (EKG) or alternative tracing
Identifies indications for stroke prevention and rate and rhythm control and modifiable risk factors for atrial fibrillation	● Lists components of CHA_2DS_2-VASc (Congestive heart failure, Hypertension, Age greater than 75 years, Diabetes mellitus, Stroke or transient ischemic attack; Vascular disease, Age 65 to 74years, Sex Category) score and HAS-BLED (Hypertension, Abnormal liver/renal function, Stroke history, Bleeding history or predisposition, Labile INR, Elderly, Drug/alcohol usage) score
Obtains vascular access, positions catheters, and performs basic electrophysiology evaluation	● Demonstrates knowledge of femoral venous and arterial anatomy; obtains access and places diagnostic catheters in appropriate anatomical locations with assistance
Level 2 *Selects and interprets monitoring and additional diagnostic testing for a patient with atrial fibrillation*	● In patient with paroxysmal atrial fibrillation of unclear burden and infrequent symptoms, chooses a monitor of sufficient duration to correlate symptoms to rhythm and assess arrhythmia burden
Identifies patient comorbidities that impact choice of therapies	● In an obese patient with atrial fibrillation, obtains history of snoring and refers for evaluation for sleep apnea
Performs components of ablation procedure for atrial fibrillation, with assistance	● Performs transseptal puncture with attending assistance ● Creates the majority of a left atrial geometry in a three-dimensional electroanatomic map
Level 3 *Develops a comprehensive treatment plan for a patient with refractory atrial fibrillation and multiple comorbidities*	● In a patient with atrial fibrillation and chronic obstructive pulmonary disease where rate control cannot be medically achieved, discusses antiarrhythmic drug strategy, atrial fibrillation ablation, and atrioventricular nodal ablation with pacing, and elicits patient preference, with attending assistance
Individualizes pharmacologic and considers procedural therapeutic options for stroke prevention and rate and rhythm control, with assistance	● Appropriately modifies oral anticoagulant choice in a patient with CHA2DS2-VASc score of 5 and renal failure after prompt from attending

Formulates strategies and performs ablation for atrial fibrillation, with assistance; independently performs atrioventricular node ablation for rate control	● Performs transseptal puncture independently in most cases ● Creates left atrial geometry and formulates ablation lesion set based on patient specific characteristics such as chronicity of atrial fibrillation, left atrial size, and prior procedures ● Creates portions of ablation lesion set but, in most cases, requires assistance to complete pulmonary vein isolation
Level 4 *Independently develops and adapts a treatment plan for a patient with refractory atrial fibrillation and multiple comorbidities* *Independently individualizes pharmacologic and procedural therapeutic options for stroke prevention and rate and rhythm control* *Independently implements strategies and performs ablation for atrial fibrillation, repeat ablation, and related arrhythmias*	● Recognizes amiodarone induced hyperthyroidism as a cause of atrial fibrillation with rapid ventricular response and coordinates management with endocrine consult ● Independently identifies patients who would benefit from left atrial appendage occlusion and discusses risks/benefits with patient ● Discontinues flecainide atrial fibrillation antiarrhythmic therapy in a patient with recent myocardial infarction ● Discusses the benefits of surgical atrial fibrillation ablation and left atrial appendage resection for a patient with history of atrial fibrillation undergoing open heart surgery for coronary artery or mitral valve disease ● Performs transseptal puncture independently and rarely needs assistance with challenging cases ● Able to incorporate intracardiac echocardiography to all aspects of ablation procedure (Transeptal, Complication monitoring, Catheter contact) ● Completes all aspects of atrial fibrillation ablation, including pulmonary vein isolation, posterior wall isolation, and targeting of other non-pulmonary vein triggers of atrial fibrillation
Level 5 *Leads interdisciplinary care efforts for patients with atrial fibrillation* *Independently selects and applies innovative treatment protocols for atrial fibrillation* *Independently adopts novel strategies and technology in procedural treatment of atrial fibrillation*	● Coordinates new program for lifestyle risk reduction in patients with atrial fibrillation ● Develops protocols to improve patient follow-up after atrial fibrillation ablation ● Brings new ablation strategy to an interdisciplinary group involving novel approach/lesion set or ablation technology ● Independently performs percutaneous left atrial appendage occlusion procedure
Assessment Models or Tools	● Case Log ● Direct observation ● Multisource feedback ● Simulation

Curriculum Mapping	●
Notes or Resources	● Zipes DP, Calkins H, Daubert JP, et al. 2015 ACC/HRS/AHA Advanced training statement on Clinical Cardiac Electrophysiology. *Circ Arrhythm Electrophysiol*. 2015;8:1522–1551 https://www.ahajournals.org/doi/10.1161/HAE.0000000000000014 ● Heart Rhythm Society. 2017 HRS/EHRA/ECAS/APHRS/SOLAECE expert consensus statement on catheter and surgical ablation of atrial fibrillation. May 2017. https://www.hrsonline.org/clinical-resources/2017-hrsehraecasaphrssolaece-expert-consensus-statement-catheter-and-surgical-ablation-atrial ● January CT, Wann S, Calkins G, et al.2019 AHA/ACC/HRS Focused update of the 2014 AHA/ACC/HRS guideline for the management of patients with atrial fibrillation. *Circ Arrhythm Electrophysiol*. 2019;140:e125–e151 https://www.ahajournals.org/doi/full/10.1161/CIR.0000000000000665 ● Textbook

Patient Care 2: Supraventricular Tachycardia **Overall Intent:** To develop and implement a comprehensive management plan for patients with supraventricular tachycardia	
Milestones	**Examples**
Level 1 *Performs a disease specific history and physical exam and develops a diagnostic plan for patients with suspected or known supraventricular tachycardia*	● Recognizes supraventricular tachycardia on event monitor ● Describes the risks, benefits, and alternatives of supraventricular tachycardia ablation
Obtains vascular access, positions catheters, and performs basic electrophysiology evaluation	● Demonstrates knowledge of femoral venous and arterial anatomy; obtains access and places diagnostic catheters in appropriate locations with assistance; performs baseline electrophysiology study with assistance
Level 2 *Selects and interprets results of monitoring and additional diagnostic testing for a patient with supraventricular tachycardia*	● Orders an exercise stress test for a patient who has not had arrhythmia documented on event monitor, but has symptoms triggered by activity
Performs induction and diagnostic maneuvers for differentiation of supraventricular tachycardia mechanisms, with assistance	● Demonstrates presence or absence of accessory pathway in patients with supraventricular tachycardia
Level 3 *Develops a comprehensive treatment plan for a patient with supraventricular tachycardia including pharmacologic and/or ablative strategies*	● Discusses with patient pharmacologic and procedural options for supraventricular tachycardia management including a discussion of risks versus benefits of medical therapy versus catheter ablation
Diagnoses arrhythmia mechanisms and performs ablation for supraventricular tachycardias, with assistance	● Interprets results of diagnostic maneuvers and consistently recognizes classic characteristics of typical atrioventricular nodal reentry tachycardia, orthodromic atrioventricular reciprocating tachycardia, and atrial tachycardia, but may misinterpret results when more complex variants are seen ● Positions catheter and ablates with some assistance
Level 4 *Independently develops and executes a treatment plan for a patient with supraventricular tachycardia including pharmacologic and/or ablative strategies*	● Independently discusses risks and benefits of ablation versus antiarrhythmic drug therapy in patient with supraventricular tachycardia; elicits preference for ablation due to frequent travel to high altitudes, and coordinates scheduling of procedure
Independently diagnoses arrhythmia mechanisms and performs catheter ablation for supraventricular tachycardias	● Obtains access, places catheters, performs mapping and electrophysiology study, diagnoses arrhythmia mechanism, and performs ablation

Level 5 *Independently evaluates and treats complex supraventricular tachycardia including complex substrates and specialized populations* *Independently adopts novel technology in ablation and performs ablation in high-risk or complex arrhythmias*	● Discusses risks and benefits of ablation versus antiarrhythmic drug therapy in a young patient with Fontan physiology and documented atrial flutter; develops ablation plan and strategy, including pre-procedural imaging ● Learns about new ablation strategy at conference, reads comprehensively regarding the impact of the new procedure, and brings plan to lab to trial for specific case
Assessment Models or Tools	● Case Log ● Direct observation ● Multisource feedback ● Simulation
Curriculum Mapping	●
Notes or Resources	● Zipes DP, Calkins H, Daubert JP, et al. 2015 ACC/HRS/AHA Advanced training statement on Clinical Cardiac Electrophysiology. *Circ Arrhythm Electrophysiol*. 2015;8:1522–1551 https://www.ahajournals.org/doi/10.1161/HAE.0000000000000014 ● Page RL, Joglar JA, Caldwell MA, et al. 2015 ACC/AHA/HRS Guideline for the management of adult patients with supraventricular tachycardia. *JACC CardioOncol*. 2016;67(13) http://www.onlinejacc.org/content/67/13/e27 ● Textbooks

Patient Care 3: Bradycardia **Overall Intent:** To develop and implement a comprehensive management plan for patients with bradycardia	
Milestones	**Examples**
Level 1 *Identifies symptoms and causes of bradycardia and treatment of reversible causes* *Identifies the steps to implant a pacemaker and can create an incision/pocket, obtain vascular access, and close the incision*	● Recognizes symptoms of dizziness, syncope, exertional fatigue, and dyspnea on exertion as potentially due to bradycardia ● Lists sequence of steps of device implant from incision, pocket creation, vascular access, lead manipulation/placement, and incision closure, but not able to perform without significant assistance
Level 2 *Selects and interprets monitoring and additional diagnostic testing for a patient with bradycardia and/or chronotropic incompetence* *Performs elements of pacemaker implant including effective manipulation of pacing leads/and or leadless device*	● Identifies when Holter, event monitor, implanted loop recorder, or exercise test is most helpful in correlating symptoms and bradyarrhythmia ● Assists with steps of device implant such as basic pocket creation, vascular access and lead manipulation but still requires significant assistance to complete steps; closes pocket with occasional assistance
Level 3 *Develops a comprehensive treatment plan including identifying pacing indications and device selection for a patient with bradycardia and multiple comorbidities* *Implants a pacemaker, evaluates and interprets interrogation data and performs programming, with assistance*	● Discusses risks and benefits of choosing a dual chamber versus a single chamber device in a frail elderly patient, with assistance ● Moves through all steps of device implant with minimal prompting and performs initial device assessment and programming in elderly patient with sinus dysfunction ● Recognizes need for venogram when vascular access initially unsuccessful
Level 4 *Independently develops and adapts a treatment plan including consideration of cardiovascular implantable electronic device type and location and long-term implications* *Independently implants a pacemaker in patients with complex comorbidities, interprets data and performs programming*	● Formulates plan for right sided device implant after noting arteriovenous dialysis fistula on left upper extremity ● Decides on implantation of a leadless device for a patient with atrioventricular nodal disease and high infectious risk ● Moves through steps of device implant without hesitation and troubleshoots and adjust implant strategy based on patient stability and comorbidity; individualizes device programming across a multitude of patient complexities/circumstances ● Independently repositions a pacing lead to another site with better lead parameters
Level 5 *Independently selects and applies innovative diagnostic and treatment protocols*	● Implements protocol to improve timeliness of post-implant chest x-ray

Independently adopts novel technology in pacing	● Delivers talk on physiologic pacing and starts program delivering new strategy in electrophysiology lab
Assessment Models or Tools	● Case Log ● Direct observation ● Multisource feedback ● Simulation
Curriculum Mapping	●
Notes or Resources	● Zipes DP, Calkins H, Daubert JP, et al. 2015 ACC/HRS/AHA Advanced training statement on Clinical Cardiac Electrophysiology. *Circ Arrhythm Electrophysiol*. 2015;8:1522–1551 https://www.ahajournals.org/doi/10.1161/HAE.0000000000000014 ● Kusumoto FM, Schoenfeld MH, Barrett C, et al.2018 ACC/AHA/HRS guideline on the evaluation and management of patients with bradycardia and cardiac conduction delay. *JACC CardioOncol*. 2019;74(7) http://www.onlinejacc.org/content/74/7/932 ● Textbooks

Patient Care 4: Syncope and Palpitations **Overall Intent:** To manage and diagnose syncope and palpitations	
Milestones	**Examples**
Level 1 *Performs a symptom- specific history and physical exam, and develops a differential diagnosis for patients with syncope and/or palpitations and identifies patients, with high-risk features*	● Performs a history and physical examination in a young patient with exertional syncope, incorporating high-risk features and family history of sudden death
Identifies steps to perform indicated diagnostic testing	● Follows a normal baseline EKG with ambulatory monitoring as the next step to arrive at diagnosis
Level 2 *Selects and interprets monitoring and additional diagnostic testing to establish a symptom rhythm correlation for a patient with syncope and/or palpitations*	● Orders and interprets ambulatory monitoring and decides on the need or not for further testing
Performs indicated testing, including diagnostic electrophysiology study and drug challenge; implants loop recorder, with assistance	● Performs electrophysiology study in a patient with syncope and conduction system disease, with assistance
Level 3 *Identifies diagnosis/etiology of syncope and initiates therapeutic plan for mechanism underlying symptom profile, with assistance*	● Interprets implanted loop recorder findings and discusses whether the data and history meet guideline criteria for pacemaker implant
Independently implants loop recorder	● Implants loop recorder in any patient without assistance
Level 4 *Independently develops and adapts a testing, treatment, and surveillance plan for patient specific diagnosis*	● Independently develops a plan for loop recorder long-term monitoring in patient with unexplained syncope
Independently performs appropriate testing, including electrophysiology study, or drug challenge	● Independently performs comprehensive electrophysiology study
Level 5 *Leads an interdisciplinary team for patients with syncope and/or palpitations*	● Leads rounds with allied health professionals and residents to evaluate patients with syncope
Assessment Models or Tools	● Direct observation ● Multisource feedback ● Simulation

Curriculum Mapping	●
Notes or Resources	● Shen WK, Sheldon RS, Benditt DG, et al. 2017 ACC/AHA/HRS guideline for the evaluation and management of patients with syncope. *Circulation*. 2017;136:e60–e122https://www.ahajournals.org/doi/10.1161/CIR.0000000000000499 ● Brigenole M, Moya A, de Lange DJ, et al. 2018 ESC guidelines for the diagnosis and management of syncope. *Eur Heart J.* (2018)39, 1883–1948 doi:10.1093/eurheartj/ehy037

Patient Care 5: Ventricular Arrhythmias **Overall Intent:** To manage and diagnose ventricular arrhythmias, including premature ventricular complexes, ventricular tachycardia, and ventricular fibrillation	
Milestones	**Examples**
Level 1 *Performs a disease specific history and physical exam and develops a diagnostic plan for patients with suspected or known ventricular arrhythmia*	● Performs a history and physical examination in a patient with nonsustained ventricular tachycardia, and develops a differential diagnosis which includes idiopathic ventricular tachycardia, ventricular tachycardia due to ischemic cardiomyopathy, cardiac sarcoid, and arrhythmogenic right ventricular cardiomyopathy
Identifies arrhythmogenic substrate (includes anatomic, functional, and genetic) and potentially reversible factors for ventricular arrhythmia; determines indications for intervention	● Evaluates arrhythmogenic substrate in patient with ventricular tachycardia using cardiac magnetic resonance imaging (MRI)
Obtains vascular access, positions catheters, and performs basic electrophysiology evaluation	● Obtains venous access and position catheters for basic electrophysiology study, with assistance
Level 2 *Selects and interprets monitoring and additional diagnostic testing for a patient with ventricular arrhythmia*	● Orders a Holter monitor to evaluate premature ventricular contraction burden in patient with symptomatic ventricular ectopy
Initiates antiarrhythmic drugs and therapies to modify underlying arrhythmogenic substrate; assesses device programming	● Initiates amiodarone in a patient with implantable cardioverter defibrillator shocks from ventricular tachycardia
Performs diagnostic maneuvers and components of ablation for ventricular arrhythmia, with assistance	● Performs entrainment during electrophysiology study for ventricular tachycardia
Level 3 *Develops a comprehensive treatment plan including identifying indications for medical, catheter, and/or device-based therapy incorporating shared decision making*	● Develops a plan for patient with ischemic ventricular tachycardia, leading to implantable cardioverter defibrillator shocks; initiates amiodarone therapy, after patient declines invasive catheter ablation strategy
Individualizes pharmacologic choice for acute or chronic therapy; optimizes cardiac implantable electronic device (CIED) programming with assistance	● Initiates sotalol, after identifying contraindications to amiodarone therapy, in patient with recurrent implantable cardioverter defibrillator therapies, with oversight after discussion with faculty members

Formulates strategies and performs ablation for ventricular arrhythmia in normal hearts, with assistance	● Identifies patient with idiopathic ventricular tachycardia and develops an ablation strategy as next treatment option
Level 4 *Independently develops and implements a treatment plan for a patient with recurrent ventricular arrhythmia; identifies and manages those at high risk of complication* *Independently individualizes pharmacologic and CIED therapies; escalates choice of therapy options as needed* *Independently performs ablation for ventricular arrhythmia in patients with or without structural heart disease*	● Develops treatment plan for patient with recurrent implantable cardioverter defibrillator shocks despite amiodarone therapy; orders a cardiac MRI to evaluate substrate in preparation for catheter ablation ● Initiates sotalol, after identifying contraindications to amiodarone therapy, and optimizes implantable cardioverter defibrillator programming in patient with recurrent implantable cardioverter defibrillator therapies ● Identifies patient who would benefit from lead extraction, develops plan for procedure, and discusses risks/benefits/alternatives with the patient ● Performs idiopathic ventricular tachycardia ablation procedure in its entirety
Level 5 *Leads an interdisciplinary team for the management of a patient with ventricular arrhythmia* *Independently selects and applies innovative treatment protocols and leads the interdisciplinary care team* *Independently performs ablation for ventricular arrhythmia in the setting of complex and high-risk substrate*	● Leads discussion with electrophysiology and heart failure team for the management of refractory ventricular tachycardia ● Identifies radiation therapy as a treatment option for a patient with recurrent implantable cardioverter defibrillator shocks despite prior multiple ablations in a patient with ischemic ventricular tachycardia ● Performs ventricular tachycardia ablation with epicardial access in patient with Chagas disease
Assessment Models or Tools	● Case Log ● Direct observation
Curriculum Mapping	●
Notes or Resources	● Al-Khatib SM, Stevenson WG, Ackerman MJ, et al. 2017 AHA/ACC/HRS guideline for management of patients with ventricular arrhythmias and the prevention of sudden cardiac death. *Circulation*. 2018;138:e272–e391 https://www.ahajournals.org/doi/10.1161/CIR.0000000000000549

	● Cronin EM, Bogun FM, Muary P, et al. 2019 HRS/EHRA/APHRS/LAHRS expert consensus statement on catheter ablation of ventricular arrhythmias. *Heart Rhythm*. 2019;17(1)e2-e154; https://doi.org/10.1016/j.hrthm.2019.03.002 ● Stiles MK, Fauchier L, Morillo CA, Wilkoff BL.2019 HRS/EHRA/APHRS/LAHRS focused update to 2015 expert consensus statement on optimal implantable cardioverter-defibrillator programming and testing. *Heart Rhythm* 2019;17(1)e220-e228. http://dx.doi.org/10.1016/j.hrthm.2019.02.034 ● Textbooks

Patient Care 6: Sudden Cardiac Death **Overall Intent:** To manage and diagnose etiologies of sudden cardiac death	
Milestones	**Examples**
Level 1 *Identifies patient populations at risk for sudden cardiac death including familial syndromes and cardiac substrate-based conditions*	● Identifies a QTc of 510 milliseconds as a high-risk marker for a patient with syncope
Identifies the steps to implant a defibrillator and can create an incision/pocket, obtain vascular access, and close the incision	● Under supervision of an attending physician, creates a pocket, obtains vascular access, and closes incision
Level 2 *Selects and interprets monitoring and additional diagnostic testing, including electrophysiologic, genetic, and imaging, for risk stratification for sudden cardiac death*	● Orders and reviews cardiac MRI findings in context of suspected arrhythmogenic right ventricular cardiomyopathy
Performs elements of defibrillator placement and replacement including implantation of defibrillator system via transvenous and alternative approaches	● Assists with steps of device implant such as basic pocket creation, vascular access, and lead manipulation but still requires significant assistance to complete steps; closes pocket with occasional assistance
Level 3 *Develops a comprehensive treatment plan including identifying indications for medical, catheter, and/or device-based therapy incorporating shared decision making*	● Formulates treatment plan for a patient with chronic systolic heart failure that includes consideration of using an implantable cardioverter defibrillator after optimal medical therapy is achieved
Implants a defibrillator system, interprets device parameters, programs device, and applies indications for defibrillation testing, with assistance	● Under supervision of an attending physician, performs all the steps to implant an implantable cardioverter defibrillator and programs it to minimize shocks
Level 4 *Independently develops a comprehensive treatment plan including identifying indications for medical, catheter, and/or device-based therapy including consideration of defibrillator type and location and long-term implications*	● Identifies clinical and high-risk features in a patient with hypertrophic cardiomyopathy, and suggests beta-blocker therapy and subcutaneous implantable cardioverter defibrillator over transvenous implantable cardioverter defibrillator, in order to eliminate vascular complications

Independently implants, assesses, and individualizes programming of the defibrillator system	● Independently performs all the steps to implant an implantable cardioverter defibrillator and programs it to minimize shocks using best available evidence
Level 5 *Leads interdisciplinary efforts in the prevention and management of sudden cardiac death* *Independently selects and applies innovative treatment protocols and technology in defibrillator therapy*	● Develops treatment plan in conjunction with genetic counseling and/or cardiac surgery for a patient with refractory and recurrent ventricular tachycardia ● Independently manages limited vascular access issues in patients requiring implantable cardioverter defibrillator including subcutaneous and surgical implantable cardioverter defibrillator placement
Assessment Models or Tools	● Case Log ● Direct observation
Curriculum Mapping	●
Notes or Resources	● Al-Khatib SM, Stevenson WG, Ackerman MJ, et al. 2017 AHA/ACC/HRS guideline for management of patients with ventricular arrhythmias and the prevention of sudden cardiac death. *Circulation*. 2018;138:e272–e391 https://www.ahajournals.org/doi/10.1161/CIR.0000000000000549 ● Textbooks

Patient Care 7: Heart Failure **Overall Intent:** To manage co-existing arrhythmias and heart failure that impact treatment and outcomes	
Milestones	**Examples**
Level 1 *Identifies the relationship between arrhythmia and heart failure*	● Recognizes onset of atrial fibrillation preceded a heart failure exacerbation
Identifies indications for arrhythmia control and/or need for cardiac resynchronization therapy	● Evaluates for left bundle branch block in defibrillator patient with worsening heart failure
Interprets intra-procedural anatomy for cardiac resynchronization therapy	● Identifies various coronary sinus branches including those with higher likelihood of cardiac resynchronization therapy response
Level 2 *Selects and interprets monitoring and additional diagnostic testing for a patient with arrhythmia and heart failure*	● Correlates chronology of atrial arrhythmias and heart failure episodes by cardiac implantable electronic device (CIED) interrogation
Identifies patient comorbidities that impact choice of therapies	● Distinguishes QRS morphology and/or cardiomyopathy etiologies to determine likelihood of cardiac resynchronization therapy response
Performs cannulation and venogram of coronary venous system or other cardiac resynchronization therapy targets	● Engages the coronary sinus using various tools and identifies available anatomic targets
Level 3 *Develops a comprehensive treatment plan for a patient with arrhythmia and heart failure*	● Plans appropriate medical therapy including anticoagulation and possibly anti-arrhythmic drug or ablation strategies to restore and maintain sinus rhythm for a patient in heart failure
Individualizes pharmacologic and ablation/device therapy for arrhythmia suppression and cardiac resynchronization therapy optimization	● Programs cardiac resynchronization therapy system to incorporate electrocardiographic, stimulation, and possibly imaging factors that improve response
Implants cardiac resynchronization therapy device, with assistance	● Cannulates coronary sinus, evaluates coronary sinus anatomy, places coronary sinus lead, and completes implanting a CIED
Level 4 *Independently develops and adapts a treatment plan for a patient with arrhythmia and heart failure*	● Schedules elective cardioversion or ablation of atrial arrhythmia that exacerbated heart failure with shared decision making regarding anti-arrhythmic drugs

Independently individualizes pharmacologic and ablation/device therapy for arrhythmia suppression and cardiac resynchronization therapy optimization	● Recognizes a cardiac resynchronization therapy non-responder and initiates evaluation of correctible factors
Independently implants cardiac resynchronization therapy device, including in patients with complex anatomy including device upgrades	● When coronary sinus methods fail or offer poor targets for resynchronization, identifies alternate cardiac resynchronization therapy techniques
Level 5 *Leads interdisciplinary efforts for patients with arrhythmia and heart failure*	● Leads formation of arrhythmia management plans in conjunction with heart failure specialists and cardiac surgeons
Independently selects and applies innovative treatment protocols	● Leads decision making regarding novel cardiac resynchronization therapy techniques
Applies advanced techniques to overcome challenging anatomy	● Uses snares, venoplasty, or lead management tools to successfully implant cardiac resynchronization therapy system
Assessment Models or Tools	● Direct observation ● Medical record review ● Multisource feedback ● Simulation
Curriculum Mapping	●
Notes or Resources	● Tracy CM, Epstein AE, DiMarco JP, et al.2012 ACCF/AHA/HRS focused update of the 2008 device guidelines for device-based therapy of cardiac rhythm abnormalities. *Circulation*. 2012;126:1784-1800 https://www.ahajournals.org/doi/pdf/10.1161/CIR.0b013e3182618569

Patient Care 8: Procedural Complications **Overall Intent:** To independently manage complications associated with clinical cardiac electrophysiology procedures	
Milestones	**Examples**
Level 1 *Recognizes clinical symptoms and signs of common peri-procedural complications from ablation or CIED implantation* *Identifies symptoms of pericardial tamponade*	● Assess hemodynamics, respiratory measures, and level of consciousness during any procedure ● Identifies post-operative hematoma ● Orders echocardiogram to assess for effusion in patient with post-procedural hypotension
Level 2 *Evaluates routine peri-procedural complications and conditions* *Identifies therapeutic options for hemodynamic compromise*	● Assesses for neurological, hemodynamic, and vascular complications post atrial fibrillation ablation ● Develops monitoring plan for patient with new small post-procedure pericardial effusion
Level 3 *Manages complex peri-procedural complications and conditions* *Manages pericardiocentesis, with assistance*	● Diagnoses and determines need for chest tube for pneumothorax ● Obtains necessary tools and imaging guidance to perform pericardiocentesis with concurrent treatment of reversible factors, such as anticoagulation
Level 4 *Anticipates, mitigates, and manages peri-procedural problems in patients with complex conditions* *Independently manages pericardiocentesis and/or escalates to multidisciplinary rescue interventions, as indicated*	● Assesses benefits and risks of transseptal versus retrograde aortic approach prior to ventricular tachycardia ablation ● Accesses the pericardial space independently to drain a pericardial effusion
Level 5 *Develops a clinical pathway for prevention and management of peri-procedural problems*	● Develops order set or risk stratification tool to manage peri-procedural anticoagulation
Assessment Models or Tools	● Case Log ● Direct observation ● Medical record review ● Multisource feedback ● Simulation
Curriculum Mapping	●

Notes or Resources	● Zipes DP, Calkins H, Daubert JP, et al. 2015 ACC/HRS/AHA Advanced training statement on Clinical Cardiac Electrophysiology. *Circ Arrhythm Electrophysiol*. 2015;8:1522–1551 https://www.ahajournals.org/doi/10.1161/HAE.0000000000000014 ● Heart Rhythm Society. 2017 HRS/EHRA/ECAS/APHRS/SOLAECE expert consensus statement on catheter and surgical ablation of atrial fibrillation. May 2017. https://www.hrsonline.org/clinical-resources/2017-hrsehraecasaphrssolaece-expert-consensus-statement-catheter-and-surgical-ablation-atrial ● January CT, Wann S, Calkins G, et al.2019 AHA/ACC/HRS Focused update of the 2014 AHA/ACC/HRS guideline for the management of patients with atrial fibrillation. *Circ Arrhythm Electrophysiol*. 2019;140:e125–e151 https://www.ahajournals.org/doi/full/10.1161/CIR.0000000000000665 ● Al-Khatib SM, Stevenson WG, Ackerman MJ, et al. 2017 AHA/ACC/HRS guideline for management of patients with ventricular arrhythmias and the prevention of sudden cardiac death. *Circulation*. 2018;138:e272–e391 https://www.ahajournals.org/doi/10.1161/CIR.0000000000000549 ● Cronin EM, Bogun FM, Muary P, et al. 2019 HRS/EHRA/APHRS/LAHRS expert consensus statement on catheter ablation of ventricular arrhythmias. *Heart Rhythm*. 2019;17(1)e2-e154; https://doi.org/10.1016/j.hrthm.2019.03.002 ● Stiles MK, Fauchier L, Morillo CA, Wilkoff BL.2019 HRS/EHRA/APHRS/LAHRS focused update to 2015 expert consensus statement on optimal implantable cardioverter-defibrillator programming and testing. *Heart Rhythm* 2019;17(1)e220-e228. http://dx.doi.org/10.1016/j.hrthm.2019.02.034 ● Page RL, Joglar JA, Caldwell MA, et al. 2015 ACC/AHA/HRS Guideline for the management of adult patients with supraventricular tachycardia. *JACC CardioOncol*. 2016;67(13) http://www.onlinejacc.org/content/67/13/e27

Patient Care 9: Ambulatory Care **Overall Intent:** To optimize acute and chronic cardiac arrhythmia and cardiac implantable device management	
Milestones	**Examples**
Level 1 *Identifies requirements for follow-up of patients with arrhythmic conditions, including those with modifiable risk factors, antiarrhythmic drug therapy, anticoagulation, and ambulatory monitoring* *Describes important elements of ambulatory CIED device management*	● Identifies medications on patient list with clinically significant interactions with amiodarone ● Interrogates CIED with attention to patient symptoms, arrhythmic events, lead integrity, and system longevity
Level 2 *Manages routine ambulatory care and incorporates multidisciplinary care, with oversight* *Manages routine CIED follow-up, including remote monitoring and surveillance for arrhythmias, identification of CIED complications, and optimization of cardiac resynchronization therapy, with oversight*	● Screens, counsels, and refers an atrial fibrillation patient for sleep study, as indicated ● Reprograms CIED to improve longevity or cardiac resynchronization therapy response ● Turns tachyarrhythmia therapies off and considers arrhythmic risk while awaiting replacement of a fractured implantable cardioverter defibrillator lead
Level 3 *Manages complex ambulatory care and incorporates multidisciplinary care, with oversight* *Manages complex CIED follow-up, including remote monitoring and surveillance for arrhythmias, identification and management of CIED complications, and optimization of cardiac resynchronization therapy, with oversight*	● Coordinates anti-arrhythmic drug initiation, heart failure management, and hospitalization for ventricular tachycardia storm ● Reviews risks and benefits of and implements medical vs. ablative therapy for ventricular tachycardia with recurrent implantable cardioverter defibrillator shocks
Level 4 *Independently manages ambulatory care of patients with arrhythmia disorders, including those with multiple comorbidities* *Independently manages complex CIED follow-up, including remote monitoring, optimizing cardiac resynchronization therapy, developing*	● Identifies and manages recurrent atrial arrhythmias post atrial fibrillation ablation through ambulatory telemetry ● Engages in shared decision making regarding maintenance of implantable cardioverter defibrillator therapy at the time of routine battery depletion and indicated replacement

treatment plan for arrhythmias, and identification and mitigation for long-term CIED complications	
Level 5 *Advances quality of clinical practice by developing protocols for improved management of patients with arrhythmias and other comorbidities* *Leads interdisciplinary efforts in management of outpatient care of patients with a CIED*	● Develops systems-based tools to identify, manage, or refer atrial fibrillation patients with modifiable conditions that benefit from care of other subspecialists ● Coordinates care program for remote CIED alerts associated with heart failure exacerbation including cardiologist, heart failure specialists and allied professionals
Assessment Models or Tools	● CIED evaluation log ● Direct observation ● Medical record review ● Multisource feedback ● Simulation
Curriculum Mapping	●
Notes or Resources	● Zipes DP, Calkins H, Daubert JP, et al. 2015 ACC/HRS/AHA Advanced training statement on Clinical Cardiac Electrophysiology. *Circ Arrhythm Electrophysiol*. 2015;8:1522–1551 https://www.ahajournals.org/doi/10.1161/HAE.0000000000000014 ● Heart Rhythm Society. 2017 HRS/EHRA/ECAS/APHRS/SOLAECE expert consensus statement on catheter and surgical ablation of atrial fibrillation. May 2017. https://www.hrsonline.org/clinical-resources/2017-hrsehraecasaphrssolaece-expert-consensus-statement-catheter-and-surgical-ablation-atrial ● January CT, Wann S, Calkins G, et al.2019 AHA/ACC/HRS Focused update of the 2014 AHA/ACC/HRS guideline for the management of patients with atrial fibrillation. *Circ Arrhythm Electrophysiol*. 2019;140:e125–e151 https://www.ahajournals.org/doi/full/10.1161/CIR.0000000000000665 ● Al-Khatib SM, Stevenson WG, Ackerman MJ, et al. 2017 AHA/ACC/HRS guideline for management of patients with ventricular arrhythmias and the prevention of sudden cardiac death. *Circulation*. 2018;138:e272–e391 https://www.ahajournals.org/doi/10.1161/CIR.0000000000000549 ● Cronin EM, Bogun FM, Muary P, et al. 2019 HRS/EHRA/APHRS/LAHRS expert consensus statement on catheter ablation of ventricular arrhythmias. *Heart Rhythm*. 2019;17(1)e2-e154; https://doi.org/10.1016/j.hrthm.2019.03.002 ● Stiles MK, Fauchier L, Morillo CA, Wilkoff BL.2019 HRS/EHRA/APHRS/LAHRS focused update to 2015 expert consensus statement on optimal implantable cardioverter-defibrillator programming and testing. *Heart Rhythm* 2019;17(1)e220-e228. http://dx.doi.org/10.1016/j.hrthm.2019.02.034

	● Page RL, Joglar JA, Caldwell MA, et al. 2015 ACC/AHA/HRS Guideline for the management of adult patients with supraventricular tachycardia. *JACC CardioOncol*. 2016;67(13) http://www.onlinejacc.org/content/67/13/e27 ● Textbooks

Medical Knowledge 1: Arrhythmia Diagnostic Testing and Interpretation **Overall Intent:** To integrate diagnostic testing and interpretation of results to understands the pathophysiologic mechanisms of arrhythmias	
Milestones	**Examples**
Level 1 *Correlates normal cardiac electrophysiology and anatomy with arrhythmia mechanisms* *Interprets results of common diagnostic testing relevant to CIED/arrhythmia management*	● Identifies EKG characteristics and relevant anatomy for diagnosis of an outflow tract premature ventricular contractions ● Integrates cardiac MRI data to exclude structural heart disease
Level 2 *Correlates both normal and pathological cardiac electrophysiology and anatomy with arrhythmia mechanisms* *Interprets complex diagnostic information relevant to CIED/arrhythmia management*	● Localizes origin of ventricular tachycardia in a patient with prior myocardial infarction using 12 lead EKG ● Identifies Q-waves on baseline EKG as an identifier of prior myocardial infarct explains the etiology of ventricular arrhythmias
Level 3 *Identifies electrophysiologic mechanisms and integrates with diagnostic testing* *Synthesizes complex diagnostic information accurately to reach high-probability diagnoses*	● Identifies a Brugada pattern on baseline EKG to assist in diagnosis of origin of ventricular arrhythmia ● Orders thyroid function tests to rule out the presence of hyperthyroidism in a patient with paroxysmal atrial tachycardia ● Integrates results of electrophysiology study, history of myocardial infarction and syncope, for electrophysiologic assessment and attempts to induce ventricular tachycardia
Level 4 *Applies new scientific advancements to knowledge base* *Anticipates and accounts for errors and biases when interpreting diagnostic tests*	● Applies a recent publication to diagnosis of an arrhythmia ● Recognizes that no therapy is required after induction of a non-specific arrhythmia in an electrophysiology study
Level 5 *Advances knowledge of new and emerging diagnostic tests and interpretation*	● Develops a new diagnostic protocol for risk stratification of a ventricular arrhythmia to predict sudden cardiac death
Assessment Models or Tools	● Direct observation ● End-of-rotation evaluation ● Evaluation of conference participation ● Performance on in-service examination ● Publication/Presentation review
Curriculum Mapping	●

Notes or Resources	● Murgatroyd F, Krahn AD, Yee R, Skanes A, Klein GJ. *Handbook of Cardiac Electrophysiology: A Practical Guide to Invasive EP Studies and Catheter Ablation.* London, UK; Remedica Publishing. 2002. ● Huang S, Miller J. *Catheter Ablation of Cardiac Arrythmias.* 3rd ed. Philadelphia, PA; Saunders Publishing. 2014. ● Josephson ME. *Josephson's Clinical Cardiac Electrophysiology*. 5th ed. Philadelphia, PA; Lippincott Williams & Watkins; 2015.

Medical Knowledge 2: Critical Thinking and Decision Making **Overall Intent:** To diagnose arrhythmic presentations and disorders and appropriately adapt treatment plans	
Milestones	**Examples**
Level 1 *Incorporates key elements of patient history and clinical data into an accurate patient assessment* *Lists therapeutic options for common clinical presentations*	● Lists a differential diagnosis for palpitations ● Lists treatment options for syncope
Level 2 *Develops an analytic, prioritized differential diagnosis for common presentations* *Explains risks, benefits, and alternatives of standard therapeutic options*	● Creates a complete differential for palpitations in several different clinical scenarios ● Discusses risks and benefits of medical versus invasive management of supraventricular tachycardias
Level 3 *Develops a prioritized differential diagnosis for complex presentations* *Justifies optimal therapeutic option based on individual patient presentation and patient preferences*	● Creates a differential diagnosis for syncope in patients with structural heart disease ● Explains rationale for medical management of obstructive sleep apnea in patient with atrial fibrillation
Level 4 *Synthesizes information to reach high probability diagnoses with re-appraisal as needed* *Develops therapeutic plan for patients with complex presentations and uncommon disorders*	● Synthesizes history, physical and diagnostic testing in syncope with mild left ventricular systolic dysfunction and conduction system disease ● Creates therapeutic plan for a patient with unexplained syncope and a family history of sudden cardiac death
Level 5 *Mentors peers and leads clinical team in critical thinking and decision making* *Mentors peers and leads clinical team in optimal therapeutic approaches to patient care*	● Presents medical grand rounds discussion on stroke prevention in patients with atrial fibrillation ● Leads a multidisciplinary team to care for patients with atrial fibrillation and modifiable comorbidities
Assessment Models or Tools	● Direct observation ● End-of-rotation evaluation ● Evaluation of conference participation ● Performance on in-service examination

	● Publication/Presentation review ● Structured case review
Curriculum Mapping	●
Notes or Resources	● Textbooks

Medical Knowledge 3: Electrophysiology (Cellular Physiology, Pharmacology, Mechanisms) **Overall Intent:** To understand basic cellular physiology that underlies cardiac arrhythmogenesis and therapy	
Milestones	**Examples**
Level 1 *Identifies key clinical electrophysiology and pathophysiology concepts (e.g., refractory periods, autonomic control, repolarization, arrhythmia mechanism, remodeling)*	● Identifies infra-Hisian block on electrophysiology study in patient with myotonic dystrophy
Identifies key basic science concepts (e.g., cellular electrophysiology, ion channels, anatomy, pharmacology, genetics)	● Recognizes QRS widening as a result of Class IC antiarrhythmic use
Identifies key biophysical principles in ablation and devices (e.g., ablation, pacing, defibrillation, electromagnetic interference)	● Explains the relationship between contact force and radiofrequency ablation lesion formation
Level 2 *Explains key clinical electrophysiology and pathophysiology concepts*	● Describes how long-short sequences impact refractory periods and potentiate arrhythmia induction
Explains key basic science concepts applicable to electrophysiology	● Describes the effect of hyperkalemia on the 12 lead EKG and arrhythmogenesis
Explains key biophysical principles in ablation and devices or other arrhythmia therapies	● Explains the effect of antiarrhythmic drugs on defibrillation threshold
Level 3 *Applies key clinical electrophysiology and pathophysiology concepts*	● Determines accessory pathway effective refractory period during electrophysiology study
Applies key basic science concepts applicable to electrophysiology	● Uses isoproterenol to increase conduction velocities and shorten refractory periods to facilitate arrhythmia induction
Applies key biophysical principles in ablation and devices or other arrhythmia therapies	● Differentiates electromagnetic interference from pathophysiologic findings on CIED interrogation
Level 4 *Integrates key clinical electrophysiology and pathophysiology concepts into care*	● Combines exercise EKG with genetic testing to characterize risk for patients with prolonged QTc interval on EKG
Integrates key basic science concepts applicable to electrophysiology into care	● Identifies the I_{to} channel blocking property of quinidine as the therapeutic mechanism to treat ventricular arrhythmias in a patient with Brugada syndrome

Integrates key biophysical principles in ablation and devices or other arrhythmia therapies into care	● Initiates of sotalol in a patient with elevated defibrillation threshold and failed implantable cardioverter defibrillator shocks
Level 5 *Develops or researches new electrophysiology concepts* *Develops or researches key basic science concepts applicable to electrophysiology* *Develops or researches key biophysical principles in ablation and devices or other arrhythmia therapies*	● Plays an integral role in initiating a clinical trial of a new antiarrhythmic agent ● Validates novel pacing maneuver in electrophysiology lab ● Identifies of a new genetic variant present in a family with hypertrophic cardiomyopathy ● Publishes on new energy sources for cardiac ablation
Assessment Models or Tools	● Direct observation ● End-of-rotation evaluation ● Evaluation of conference participation including Journal Clubs ● Performance on in-service examination ● Publication/Presentation review
Curriculum Mapping	●
Notes or Resources	● Zipes DP, Jalife J, Stevenson WG. *Cardiac Electrophysiology: From Cell to Bedside.* 7th ed. Amsterdam, Netherlands: Elsevier; 2017. ● Ellebogen KA, Kaszala K. *Cardiac Pacing and ICDs.* 6th ed. Hoboken, NJ: Wiley-Blackwell; 2014.

Medical Knowledge 4: Scholarly Activity **Overall Intent:** To identify knowledge gaps, design and implement a plan for investigation, and disseminate the findings of scholarly work	
Milestones	**Examples**
Level 1 *Identifies knowledge gaps open to scholarly investigation*	● After reviewing the literature, identifies lack of evidence to guide care in a specific clinical scenario
Level 2 *Designs a scholarly activity, with assistance*	● With assistance of a mentor, outlines a hypothesis and designs a research protocol to investigate
Level 3 *Implements scholarly work, including critical appraisal and analysis of project data*	● Participates in the implementation of a research protocol and analysis of results ● Publishes case report
Level 4 *Produces scholarly work for dissemination as an abstract or presentation*	● Writes an abstract and presents a poster at a local educational forum
Level 5 *Dissemination or implementation of independent scholarly work that has generated new medical knowledge, educational programs, or process improvement*	● Publishes research in peer-reviewed journal
Assessment Models or Tools	● Direct observation ● Evaluation of conference participation ● Publication/Presentation review
Curriculum Mapping	●
Notes or Resources	● Textbooks

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*	● Describes an event in which a medication was not given as appropriate
Demonstrates knowledge of how to report patient safety events	● Demonstrates familiarity with the institutional reporting system
Demonstrates knowledge of basic quality improvement methodologies and metrics	● Discusses the steps of a QI protocol
Level 2 *Identifies system factors that lead to patient safety events*	● Identifies that computer order entry and team communication are factors for a missed medication
Reports patient safety events through institutional reporting systems (simulated or actual)	● Reports missed medication in the institutional reporting system
Describes quality improvement initiatives at the institutional or departmental level	● Describes an initiative to develop an order set to avoid medication error
Level 3 *Participates in analysis of patient safety events (simulated or actual)*	● Prepares for morbidity and mortality presentations
Participates in disclosure of patient safety events to patients and families (simulated or actual)	● Participates in communication with patients/families about an adverse event
Participates in quality improvement initiatives at the institutional or departmental level	● Participates in a QI project, but may not have designed a QI project yet
Level 4 *Conducts analysis of patient safety events and offers error prevention strategies (simulated or actual)*	● Collaborates with a team to lead the analysis of a patient safety event
Discloses patient safety events to patients and families (simulated or actual)	● Competently communicates with patients/families about an adverse event

Demonstrates the skills required to identify, develop, implement, and analyze a quality improvement project	● Initiates a QI project within the cardiology division or department
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 ● Leads a simulation exercise to disclose adverse events ● Completes a QI project and implements changes within the institution
Assessment Models or Tools	● Chart or other system documentation by fellow ● Direct observation ● Documentation of QI or patient safety project processes or outcomes ● E-module multiple choice tests ● Multisource feedback ● QI or morbidity and mortality (M and M) conference evaluation ● Simulation
Curriculum Mapping	●
Notes or Resources	● Institute for Healthcare Improvement. http://www.ihi.org/Pages/default.aspx. 2019.

Systems-Based Practice 2: System Navigation for Patient-Centered Care **Overall Intent:** To effectively navigate the health care system, include the interdisciplinary team and other care providers, and 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 health care 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 health care 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 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 their interprofessional teams*	● Uses care coordinators to help prevent patients with paroxysmal atrial fibrillation from frequent admissions
Performs effective transitions of care in complex clinical situations	● Performs safe and effective transitions of care with clinical service at shift change
Identifies 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	● Mentors learners on effective transitions from the inpatient to outpatient setting
Adapts practice to address barriers to adherence of care	● Ensures patients are prescribed medications that can be affordably obtained

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 barriers*	● 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 social determinants of health curriculum to help others learn to identify local resources and barriers to care and laboratory testing ● Helps develop telehealth program to ensure that patients in rural areas can be seen by electrophysiology specialists
Assessment Models or Tools	● Case management quality metrics and goals mined from electronic health records (EHRs) ● Direct observation ● Evaluation of interdisciplinary rounds for high-risk patients/cases ● Evaluation of lectures/workshops on social determinants of health or population health with identification of local resources ● Medical record (chart) review ● Multisource feedback
Curriculum Mapping	●
Notes or Resources	● Adams C. In pursuit of patient-centered care. *MLO*. 2016;48(4):48. https://tissuepathology.com/2016/03/29/in-pursuit-of-patient-centered-care/#axzz5e7nSsAns. 2019. ● CDC. Population Health Training in Place Program (PH-TIPP). https://www.cdc.gov/pophealthtraining/whatis.html. 2019. ● 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. 2019.

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 models, (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, Veterans Affairs (VA), and commercial third-party payers ● Shows understanding of how the differences between payment models influences patient preferences and access
Level 2 *Describes how components of a complex health care system are interrelated, and how this impacts patient care* *Delivers care with consideration of various health care payment models* *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 care and disease management ● Selects anticoagulation medication taking into consideration the options within the specific patient's health insurance plan ● 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 various health care payment models* *Seeks knowledge in non-clinical topics needed for independent practice (e.g., malpractice insurance, government regulation, compliance)*	● Works with the hospital system to minimize turnaround time in the electrophysiology laboratory ● Forms a therapeutic plan taking into consideration the patient's out-of-pocket expenses ● Attends educational programs on accurate medical billing for electrophysiology procedures
Level 4 *Manages various components of the complex health care system to provide efficient and effective patient care and transition of care*	● Uses electronic communication tools for effective transition of care to another health care provider

Advocates for patient care needs (e.g., community resources, patient assistance resources) with consideration of the benefits and limitations of various health care payment models *Applies knowledge in non-clinical topics needed for independent practice*	● Adopts use of patient assistance programs for drug prescriptions by pharmaceutical companies ● Identifies modifier codes to improve the accuracy of documentation for electrophysiology procedures
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*	● Advocates for increased deployment of automatic external defibrillators within strategic places within the hospital and the community ● Participates in activities of the American Heart Association to support government interventions that promote health ● Lectures to division/department on topics such as medical billing/coding, ethics, and risk management
Assessment Models or Tools	● Direct observation ● Medical record (chart) review ● QI project
Curriculum Mapping	●
Notes or Resources	● Agency for Healthcare Research and Quality (AHRQ). The Challenges of Measuring Physician Quality. https://www.ahrq.gov/professionals/quality-patient-safety/talkingquality/create/physician/challenges.html. 2019. ● AHRQ. Major Physician Performance Sets. https://www.ahrq.gov/professionals/quality-patient-safety/talkingquality/create/physician/measurementsets.html. 2019. ● The Kaiser Family Foundation. www.kff.org. 2019. ● The Kaiser Family Foundation. Health Reform. https://www.kff.org/topic/health-reform/. 2019. ● Dzau VJ, McClellan M, Burke S, et al. Vital directions for health and health care: priorities form a national academy of medicine initiative. *JAMA*. 2017;317(14):1461-1470. https://nam.edu/vital-directions-for-health-health-care-priorities-from-a-national-academy-of-medicine-initiative/. 2019. ● American Board of Internal Medicine. QI/PI activities. http://www.abim.org/maintenance-of-certification/earning-points/practice-assessment.aspx. 2019.

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 an arrhythmia disorder*	● Obtains evidence-based guidelines for management of atrial fibrillation
Level 2 *Articulates clinical questions and elicits patient preferences to guide evidence-based care*	● Asks symptom-driven and goals-of-care questions of a patient with atrial fibrillation
Level 3 *Locates and applies the best available evidence to the care of patients with an arrhythmia while integrating patient preference*	● Applies evidence in the care of a patient with symptomatic, atrial fibrillation refractory to antiarrhythmic medications ● Researches and evaluates relevant comorbidities in the evaluation of a patient with atrial fibrillation
Level 4 *Critically appraises and applies available, potentially conflicting evidence to guide care of an individual patient*	● Researches and synthesizes available data for the role of electrophysiology study in Brugada Syndrome
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 ● Participates in the development of practice plans or clinical guidelines on the management of atrial fibrillation ● Helps write a multi-team policy for the institution to address pacemaker implantation following transcatheter aortic valve replacement
Assessment Models or Tools	● Direct observation ● Electrophysiology in-service examination ● QI meetings ● Review of Presentation/Publications
Curriculum Mapping	●
Notes or Resources	● NEJM Knowledge. Exploring the ACGME Core Competencies: Practice-Based Learning and Improvement. https://knowledgeplus.nejm.org/blog/practice-based-learning-and-improvement/. 2019. ● 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. 2019. ● 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. 2019.

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; to reflect on all domains of practice, personal interactions, and behaviors, and their impact on colleagues and patients; to develop clear objectives and goals for improvement in a learning plan	
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 results of an electrophysiology study ● Acknowledges need to improve skills in device interrogation
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*	● Incorporates attending physician suggestion for interpreting results of an electrophysiology study ● Appreciates need to perform a high number of device interrogations to build troubleshooting skills
Level 3 *Occasionally seeks feedback and performance data with adaptability and humility* *Creates and implements a learning plan*	● Presents an ablation case to faculty members for discussion and feedback ● Devises a learning plan to address need to improve device programming skills for optimizing cardiac resynchronization therapy
Level 4 *Systematically seeks feedback and performance data with adaptability and humility* *Uses performance data to assess learning plan and improves it when necessary*	● Routinely asks attending about performance and opportunities for improvement ● Analyzes procedure logs to determine need for tailored procedural experience ● Analyzes individualized device clinic data to identify patients not programmed to guideline standards
Level 5 *Mentors others to seek feedback and performance data* *Facilitates the design and implementation of learning plans for others*	● Mentors a resident in preparation of a clinical conference case presentation in how to successfully obtain feedback from attendings ● Develops a method that all 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. *Acad Med.* 2009;84(8):1066-74. https://insights.ovid.com/crossref?an=00001888-200908000-00021. 2019. ● 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. 2019. ● 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. Acad Med. 2013;88(10):1558-1563. https://insights.ovid.com/article/00001888-201310000-00039. 2019.

Professionalism 1: Professional Behavior and Ethical Principles **Overall Intent:** To recognize and address lapses as well as opportunities to improve ethical and professional behavior	
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 signs of fatigue and impact on appropriate and timely completion of responsibilities ● Discusses the basic principles underlying ethics (beneficence, non-maleficence, justice, autonomy) and professionalism (professional values and commitments), and how they apply in various situations (e.g., informed consent process)
Level 2 *Demonstrates insight into professional behavior in routine situations* *Applies knowledge of ethical principles to routine situations*	● Acknowledges a lapse without becoming defensive, making excuses, or blaming others ● Apologizes for the lapse when appropriate and takes steps to make amends if needed ● Articulates strategies for preventing similar lapses in the future ● Respects patient autonomy in discussion about decision making for a primary prevention implantable cardioverter defibrillator
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 an interaction between the health care team and a distraught or angry family member ● Recognizes own limitations and seeks resources to help manage and resolve complex ethical situations such as cessation of implantable device therapy
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)*	● Models respect for patients and expects the same from others ● Successfully leads a difficult conversation between the health care team and a distraught or angry family member ● Outlines and responds to possible ethical issues when writing and submitting an Institutional Review Board proposal ● Anticipates the need to seek additional resources to prevent ethical dilemmas
Level 5 *Role models exceptional professional behavior* *Identifies and seeks to address system-level factors that induce or exacerbate ethical problems or impede their resolution*	● Seeks opportunities to provide appropriate feedback on professionalism to other members of the health care team ● 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 Medical Association. Ethics. https://www.ama-assn.org/delivering-care/ama-code-medical-ethics. 2019. ● ABIM Foundation. American Board of Internal Medicine. Medical professionalism in the new millennium: a physician charter. *Annals of Internal Medicine*. 2002;136(3):243-246. https://annals.org/aim/fullarticle/474090/medical-professionalism-new-millennium-physician-charter. 2019. ● Domen RE, Johnson K, Conran RM, et al. Professionalism in pathology: a case-based approach as a potential education tool. *Arch Pathol Lab Med.* 2017;141(2):215-219. https://www.archivesofpathology.org/doi/10.5858/arpa.2016-0217-CP?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%3dpubmed. 2019. ● Byyny RL, Papadakis MA, Paauw DS, Pfiel S, Alpha Omega Alpha. *Medical Professionalism Best Practices*. Menlo Park, CA: Alpha Omega Alpha Honor 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. https://accessmedicine.mhmedical.com/book.aspx?bookID=1058. 2019. ● Bynny RL, Paauw DS, Papadakis MA, Pfeil S, Alpha Omega Alpha. *Medical Professionalism Best Practices: Professionalism in the Modern Era.* Menlo Park, CA: Alpha Omega Alpha Honor Medical Society; 2017. http://alphaomegaalpha.org/pdfs/Monograph2018.pdf. 2019.

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*	● Responds promptly to reminders from program administrator to complete procedure and work hour logs, and sets calendar reminders to submit
Recognizes the principles of conflict of interest in relationships with industry and other entities	● 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*	● Completes procedure notes and post-procedure orders before leaving the electrophysiology lab
Recognizes personal potential conflicts with industry	● Understands that receiving books and other educational resources from pharmaceutical and device companies may lead to a conflict of interest
Level 3 *Performs tasks and responsibilities in a timely manner with appropriate attention to detail in complex or stressful situations*	● Appropriately communicates events and recommendations for care following an emergent procedure
Seeks assistance in managing personal relationships with industry and other entities to minimize bias and undue influence in practice	● In collaboration with peers and supervisors, reviews and critiques promotional materials provided by pharmaceutical and device representatives ● Follows institutional policies regarding relationships with industry
Level 4 *Recognizes situations that may impact others' ability to complete tasks and responsibilities in a timely manner*	● Takes responsibility for timely coordination of all parties involved in a complex electrophysiology procedure
Identifies, discloses, and manages relationships with industry and other entities to minimize bias and undue influence in practice	● Independently reviews and critiques promotional materials provided by pharmaceutical and device representatives
Level 5 *Mentors others to complete tasks and responsibilities in a timely manner*	● Identifies and addresses team/system issues that impede efficient completion of patient care tasks (e.g., setting up a meeting with the nurse manager to streamline patient discharges)
Assessment Models or Tools	● Compliance with deadlines and timelines ● Direct observation

	● Multisource feedback ● Self-evaluations and reflective tools
Curriculum Mapping	●
Notes or Resources	● O'Gara PT, Ness DL, Harold JG. Medical professionalism and the American College of Cardiology. *JACC CardioOnco*l. 2015; 65(5) https://www.onlinejacc.org/content/65/5/503 ● Code of conduct from fellow/resident institutional manual ● Expectations of residency 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*	● Schedules time for self-care
Level 2 *Independently recognizes status of personal and professional well-being*	● Identifies signs of burnout and recognizes that institutional resources are available
Level 3 *With assistance, proposes a plan to optimize personal and professional well-being*	● Uses digital tools to address sources of burnout
Level 4 *Independently develops a plan to optimize personal and professional well-being*	● Independently uses institutional resources to develop action plans for continued personal and professional growth and limit stress and burnout
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. ● Local resources, including Employee Assistance Plan (EAP) ● 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://www.academicpedsjnl.net/article/S1876-2859(13)00332-X/fulltext. 2019. ● ACGME. "Well-Being Tools and Resources." https://dl.acgme.org/pages/well-being-tools-resources. 2019.

Interpersonal and Communication Skills 1: Patient- and Family-Centered Communication **Overall Intent:** To deliberately use language and behaviors to form constructive relationships with patients, identify and mitigate communication barriers; engage in effective 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)* *Identifies the need to adjust communication strategies to achieve shared decision making*	● Self-monitors and controls tone, non-verbal responses, and language ● Asks questions to invite patient/family participation ● Lists health literacy as a common communication barrier ● 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 ● Schedules interpreter to be present during patient and family meeting when English is not the patient's preferred language ● 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
Level 3 *Establishes a therapeutic relationship in challenging patient encounters, with assistance* *Attempts to minimize communication barriers, including reflection on any biases* *Uses shared decision making to implement a personalized care plan, with assistance*	● Identifies how biases may impact the patient-doctor relationship ● Defuses anger of unhappy patient with some attending assistance ● Reflects on biases when prompted ● 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 biases*	● Navigates a challenging therapeutic relationship when patient and family have conflicting priorities ● Identifies a bias against patients who do not address their modifiable risk factors

Independently, uses shared decision making to implement a personalized care plan	● Engages in a shared-decision-making process with the patient and family, in an elderly patient who declines a pacemaker
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*	● Develops a workshop for colleagues in self-awareness and reflection to improve therapeutic relationships with patients ● Role models proactive self-awareness and reflection around biases with a context specific approach to mitigate communication barriers ● Is an example to others of leading shared decision making to arrive at consensus
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	● 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://www.ncbi.nlm.nih.gov/pubmed/10742358. 2019. ● Braddock CH III, 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. 2019. ● 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.researchgate.net/publication/49706184_Communication_skills_An_essential_component_of_medical_curricula_Part_I_Assessment_of_clinical_communication_AMEE_Guide_No_511. 2019. ● Makoul G. Essential elements of communication in medical encounters: The Kalamazoo consensus statement. *Acad Med*. 2001;76(4):390-393. https://www.researchgate.net/publication/264544600_Essential_elements_of_communication_in_medical_encounters_The_Kalamazoo_Consensus_Statement. 2019. ● Makoul G. The SEGUE Framework for teaching and assessing communication skills. *Patient Educ Couns*. 2001;45(1):23-34. https://www.researchgate.net/publication/11748796_The_SEGUE_Framework_for_teaching_and_assessing_communication_skills. 2019.

	● 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. 2019.

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**
Level 1 *Respectfully receives a consultation request*	● Shows respect through words and actions when receiving calls for assistance
Uses language that values all members of the health care team	● Uses respectful communication in all interactions ● 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 assistance*	● Communicates clearly and concisely in an organized and timely manner during consultant encounters, as well as with the health care team in general
Communicates information effectively with all health care team members	● Uses clear, concise, organized and timely oral and written communication
Participates in team-based discussions to optimize team performance	● Participates in multidisciplinary discussions to advance patient care plans
Level 3 *Completes consultations with effective documentation and communication in common cases, with assistance*	● Performs consult for a patient with atrial fibrillation and rapid ventricular rates and communicates recommendations to the team with oversight
Adapts communication style to fit team needs	● Uses respectful strategies to assess understanding of the consultation question
Initiates team-based discussions to optimize team performance	● Arranges and facilitates multidisciplinary discussions regarding treatment
Level 4 *Completes consultations with effective documentation and communication in complex cases*	● Performs detailed consult and ensures management for a patient with ventricular tachycardia storm in the critical care unit
Coordinates recommendations from different members of the health care team to optimize patient care	● Communicates recommendations effectively and in a timely manner with primary care and other referring or collaborating members of the health care team, coordinates with electrophysiology lab on procedural timing

Facilitates team-based discussions to optimize team performance	● Arranges and contributes to multidisciplinary discussions regarding treatment for complex cases
Level 5 *Uses consultations as educational opportunities to improve clinical care* *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*	● Includes evidence-based references when completing consultation notes ● Guides others in organizing effective team meetings to resolve conflict ● Organizes debrief after an unexpected patient death ● Respectfully provides feedback to more junior members of the medical team for the purposes of improvement or reinforcement of correct knowledge, skills, and attitude
Assessment Models or Tools	● Direct observation ● Medical record (chart) review ● Multisource feedback ● Simulation
Curriculum Mapping	●
Notes or Resources	● 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. 2019. ● Green M, Parrott T, Cook G. Improving your communication skills. *BMJ*. 2012;344:e357. https://www.bmj.com/content/344/bmj.e357. 2019. ● 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. 2019. ● François J. Tool to assess the quality of consultation and referral request letters in family medicine. *Can Fam Physician*. 2011;57(5):574–575. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3093595/. 2019. ● Fay D, Mazzone M, Douglas L, Ambuel B. A validated, behavior-based evaluation instrument for family medicine residents. *MedEdPORTAL*. 2007. https://www.mededportal.org/publication/622/. 2019. ● Dehon E, Simpson K, Fowler D, Jones A. Development of the faculty 360. *MedEdPORTAL*. 2015;11:10174. https://www.mededportal.org/publication/10174/. 2019. ● 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://www.ncbi.nlm.nih.gov/pubmed/10742358. 2019.

	● Braddock CH III, 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. 2019.

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 ● Shreds patient notes after rounding as one method of maintaining HIPAA compliance
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 proper methods for sharing results needing urgent attention
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 anticipatory guidance ● Communicates opportunities for EHR interface improvement
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 that includes anticipatory guidance and verbally transmits critical information to a colleague ● Knows when to call the treating team about unexpected or critical findings of clinical significance ● Participates in house staff QI committee to update policy for anticoagulation for cardioversion ● Recognizes when a communication breakdown has happened and respectfully brings the issue to the attention of the attending
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 house staff hand-offs ● Teaches colleagues how to improve discharge summaries
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. 2019. ● Starmer AJ, Spector ND, Srivastava R, et al. I-PASS, a mnemonic to standardize verbal handoffs. *Pediatrics*. 2012;129(2):201-204. https://ipassinstitute.com/wp-content/uploads/2016/06/I-PASS-mnemonic.pdf. 2019. ● 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.ncbi.nlm.nih.gov/pubmed/16617948. 2019.

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/