Supplemental Guide: Advanced Heart Failure and Transplant Cardiology

ACGME

May 2021

TABLE OF CONTENTS

Milestones Supplemental Guide

This document provides additional guidance and examples for the Advanced Heart Failure and Transplant 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: Transplant **Overall Intent:** To identify, evaluate and manage patients along with the multidisciplinary team before and after heart transplantation	
Milestones	**Examples**
Level 1 *Identifies patients who may benefit from advanced therapies*	● Determines whether and when patients warrant cardiac transplantation ● Recognizes comorbidities that preclude cardiac transplantation ● Recognizes irreversible pulmonary hypertension that precludes isolated heart transplantation
Level 2 *Evaluates patients using program selection criteria* *Participates in the evaluation of donors using program selection criteria and performs ongoing reassessment of the patient for continued eligibility for transplant* *Uses institutional protocol to care for patients post-transplant*	● Recognizes when patients listed for heart transplant need mechanical circulatory support, and the potential benefits and complications of this therapy ● Utilizes the current United Network for Organ Sharing allocation listing policies for heart transplantation ● Recognizes the factors used to assess the suitability of a potential donor heart ● Assesses the suitability of a given heart for transplantation in a potential recipient ● Manages heart transplant recipients in the immediate post-transplant period, including those with complications, in conjunction with a multidisciplinary team
Level 3 *Formulates a plan based on hemodynamics, risk assessment, and comorbidities and benefits of continued medical therapy* *Manages patients peri-operatively and selects immunosuppressive therapy based on institutional protocol* *Identifies complications of immunosuppression and comorbidities post-transplant*	● Manages heart transplant recipients in the immediate post-transplant period, including those with complications, in conjunction with a multidisciplinary team ● Adjusts immunosuppressant therapy to minimize the risk of rejection, while balancing competing risks of infection, malignancy, renal failure, and other toxicities ● Prescribes therapies to prevent opportunistic infections, including *Cytomegalovirus*, *Nocardia*, and *Pneumocystis jiroveci* pneumonia in heart transplant recipients ● Collaborates with invasive and interventional cardiologists in the prevention, recognition, and treatment of transplant vasculopathy ● Interprets non-invasive tests, including echocardiograms, gene expression profiling, and other biomarkers to evaluate for rejection in heart transplant recipients ● Performs endomyocardial biopsy to assess for transplant rejection
Level 4 *Determines whether to list a patient for transplant and selects optimal timing based on a complete evaluation*	● Recognizes the factors used to assess the suitability of a potential donor heart ● Assesses the suitability of a given heart for transplantation into a potential recipient

Manages donor selection prior to transplant and manages early post-transplant complications (e.g., primary graft failure, rejection)	● Collaborates with colleagues in the histocompatibility laboratory to assess a heart transplant recipient's reactive antibody panel, preformed and post-transplant antihuman leukocyte antigen antibodies, and immunological compatibility with a donor heart ● Recognizes the efficacy, risks, and limitations of currently available methods for desensitization of patients awaiting heart transplantation
Manages complications of immunosuppression and comorbidities post-transplant	● Collaborates with other members of a multidisciplinary team in managing common comorbidities and complications following heart transplantation, including hypertension, dyslipidemia, renal insufficiency, infection, and cancer ● Oversees the use of immunizations in patients before and after cardiac transplantation
Level 5 *Optimizes selection of patients to meet the fiduciary responsibility to the patient, the program, and the community*	● Uses appropriate care settings and teams for patients with various profiles and stages of heart failure before or after transplantation ● Incorporates risk/benefit analysis and cost considerations in diagnostic and treatment decisions, including the adoption of new technologies
Manages the interdisciplinary team to formulate a care plan to achieve the best possible outcome	● Uses an interdisciplinary, coordinated team approach for patient management, including care transitions, palliative care, and employment-related issues ● Collaboratively works with all members of the advanced heart failure and transplant cardiology team, including cardiac surgeons, palliative care specialists, other medical consultants, nurses, nurse practitioners, physician assistants, social workers, dietitians, physical and occupational therapists, and pharmacists
Integrates patient and program specific characteristics to estimate and optimize expected outcomes	● Effectively uses an interdisciplinary transitional-care approach to monitor the progress of ambulatory patients with heart failure to maintain stability and avoid preventable hospitalization ● Identifies knowledge and performance gaps and engage in opportunities to achieve focused education and performance improvement
Assessment Models or Tools	● Direct observation ● End-of-rotation evaluations ● Evaluation of conference presentation ● Procedure logs
Curriculum Mapping	●
Notes or Resources	● Jessup M, Drazner MH, Book W, et al. 2017 ACC/AHA/HFSA/ISHLT/ACP advanced training statement on advanced heart failure and transplant cardiology (revision of the ACCF/AHA/ACP/HFSA/ISHLT 2010 clinical competence statement on management of patients with advanced heart failure and cardiac transplant): A report of the ACC Competency Management Committee. *Journal of the American College of Cardiology*.

	2017;69(24):2977-3001. https://reader.elsevier.com/reader/sd/pii/S0735109718336210?token=EF203D3DD300D1818F437ABE659A99689601D2D3FAFF05174BB1D9CCB254D7D87D5E60E840598BADC64A32CD2EAFB740. 2021.

Patient Care 2: Mechanical Circulatory Support (Temporary and Durable) **Overall Intent:** To identify, evaluate and manage patients along with the multidisciplinary team before and after mechanical circulatory support device placement	
Milestones	**Examples**
Level 1 *Identifies patients at various stages of cardiogenic shock in need of temporary mechanical support* *Recognizes the patient with chronic heart failure (Stage D) in need of a durable left ventricular assist device*	● Recognizes when to activate the "shock team" (intensivist, cardiothoracic surgeon, heart failure cardiologist, interventional cardiologist) to evaluate a patient in need of temporary mechanical circulatory support ● Recognizes a patient's clinical condition incorporating laboratory data, end-organ function, hemodynamics assessment, and cardiopulmonary testing in determining the decision to proceed with a formal durable left ventricular assist device (LVAD) evaluation
Level 2 *Demonstrates the ability to evaluate a patient for temporary mechanical support device* *Demonstrates the ability to assess suitability of a patient for durable left ventricular assist device support based on current guidelines and institutional protocols*	● Evaluates a patient's overall clinical status including but not limited to hemodynamic data, cardiac function (left and right ventricular function including valvular disease), end-organ function, nutritional status, and frailty when deciding to employ a temporary mechanical circulatory support device ● Recognizes the important indications and contraindications to durable LVAD candidacy, including anatomic considerations such as the presence of aortic regurgitation, mitral stenosis, an atrial septal defect or ventricular septal defect, redo sternotomy and calcified aorta, and functional considerations such as assessment of right ventricular function and pulmonary hypertension; assesses other barriers to LVAD implantation including psychosocial support, nutritional support, and frailty
Level 3 *Manages patients on temporary mechanical support devices* *Manages patients on durable left ventricular assist device support devices*	● Manages patients on an intra-aortic balloon pump, percutaneous LVAD, percutaneous right ventricular assist device (RVAD), ventricular assist extracorporeal membrane oxygenation (VA ECMO) and temporary surgically implant LVAD, RVAD or biventricular assist device; assesses and interrogates pump parameters and makes changes based on the patients clinical condition ● Manages anticoagulation based on the specific temporary or durable mechanical assist device based on guidelines and institutional protocols ● Can interrogate and manage durable LVADs including review of device history, alarms, and log files
Level 4 *Manages the intra- and early post-operative complications associated with temporary mechanical circulatory support devices*	● Recognizes and manages complications following implantation of temporary devices such as bleeding, thrombosis, device or cannula malposition, hemolysis, infection

Manages complications of patients on durable mechanical circulatory devices including, but not limited to, bleeding, pump thrombosis, pump failure, and stroke	● Recognizes and manages complications following implantation of a durable LVAD such as bleeding, thrombosis, device or cannula malposition, hemolysis, infection ● Recognizes that elevations in LVAD power and lactate dehydrogenase should make one suspect LVAD thrombosis; recognizes low perfusion index can be seen in patient with volume depletion and acute bleeding; performs and interprets echocardiogram ramp studies on durable LVAD patients
Level 5 *Optimizes patient care by negotiating the complex care of patients on temporary mechanical support devices during the weaning process and recognizes futility of further treatment* *Manages end-of-life care for patients on durable mechanical circulatory devices*	● Determines, with the multidisciplinary team, when to wean temporary mechanical support or transition patients to more durable support or heart transplant based on anatomic, physiologic, surgical, and/or comorbid conditions ● Navigates difficult conversations with patients and their families
Assessment Models or Tools	● Direct observation ● End-of-rotation evaluations ● Evaluation of imaging conference participation ● Procedure logs
Curriculum Mapping	●
Notes or Resources	● Baran DA, Grines CL, Bailey S, et al. SCAI clinical expert consensus statement on the classification of cardiogenic shock. *Catheter Cardiovasc Interv*. 2019;94(1):29-37. https://onlinelibrary.wiley.com/doi/full/10.1002/ccd.28329. 2021. ● Fang JC, Ewald GA, Allen LA, et al. Advanced (stage D) heart failure: A statement from the Heart Failure Society of America Guidelines Committee. *J Card Fail.* 2015;21(6):519-534. https://linkinghub.elsevier.com/retrieve/pii/S1071-9164(15)00115-3. 2021. ● Feldman D, Pamboukian SV, Teuteberg JJ, et al. The 2013 International Society for Heart and Lung Transplantation Guidelines for mechanical circulatory support: Executive summary. *The Journal of Heart and Lung Transplantation*. 2013;32(2):157-187. https://www.jhltonline.org/article/S1053-2498(12)01294-6/fulltext. 2021. ● Hajjar LA, Teboul JL. Mechanical circulatory support devices for cardiogenic shock: State of the art. *Crit Care*. 2019;23(1):76. https://ccforum.biomedcentral.com/articles/10.1186/s13054-019-2368-y. 2021. ● Kirklin JK, Pagani FD, Goldstein DJ, et al. American Association for Thoracic Surgery/International Society for Heart and Lung Transplantation guidelines on selected topics in mechanical circulatory support. *The Journal of Heart and Lung Transplantation*. 2020;39(3):187-219. https://linkinghub.elsevier.com/retrieve/pii/S0022-5223(19)40862-3. 2021.

	● Pinney SP, Anyanwu AC, Lala A, et al. Left ventricular assist devices for lifelong support. *J Am Coll Cardiol*. 2017;69(23):2845–2861. https://www.sciencedirect.com/science/article/pii/S0735109717371097?via%3Dihub. 2021.

Patient Care 3: Acutely Decompensated Heart Failure **Overall Intent:** To assess, diagnose, and manage acutely decompensated heart failure (heart failure with preserved ejection fraction and heart failure with reduced ejection fraction) and identify/ treat shock in collaboration with multidisciplinary team, implement appropriate transitions of care, and discuss long-term prognoses	
Milestones	**Examples**
Level 1 *Identifies patients with new onset heart failure based on signs, symptoms, and other given variables*	● Classifies heart failure patients based on clinical profile and treat accordingly. (e.g., warm/dry, warm/wet, cold/wet, cold/dry)
Recognizes acutely decompensated heart failure without shock (heart failure profiles)	● Recognizes when to escalate care or the need for inotropic support or hemodynamics
Recognizes acutely decompensated heart failure with shock	
Level 2 *Evaluates differential diagnosis and selects testing necessary for diagnosis according to guidelines*	● Forms differential diagnosis and order testing based on the guidelines for evaluation and management of heart failure
Evaluates the etiology for readmission and works to improve cardiac, medical, or patient-related etiologies	● Evaluates reason for re admission and compensation of heart failure including medical non cardiac, socioeconomic barriers, ischemic, valvular, or arhythmic etiology
Distinguishes various levels of shock based on clinical, lab, and diagnostic variables as described by clinical expert consensus	● Classifies cardiogenic shock based on Society for Cardiovascular Angiography and Interventions (SCAI) clinical expert consensus statement
Level 3 *Formulates plan based on diagnosis for optimizing guideline-directed medical therapy and device therapy*	● Recognizes when to adjust guideline -directed medical therapy based on clinical trajectory during admission
Optimizes inpatient management with diuretic protocols/algorithms and optimization of guideline-directed medical therapy to assure compensation and response to management before discharge	● Recognizes when to escalate diuretics and change algorithm based on diuretic resistance and need for hemodynamic evaluation
Manages each level of shock as indicated by guidelines/consensus and internal protocol	● With indirect supervision, implements treatment algorithms in patients with cardiogenic shock (including appropriate pressor / inotrope therapies)

	● Recognizes when to consider evaluation for home inotropes
Level 4 *Recognizes the significance of heart failure education for newly diagnosed heart failure and educates the patient on self-care, warning signs, and action plans*	● Appropriately engages with pharmacists, social workers, case managers, and other consultants to educate the patient on heart failure
Evaluates barriers, including social determinants, that might lead to high risk of readmission	● Appropriately engages with social workers, case managers, and other consultants to identify barriers to compliance leading to increased readmissions and poor outcomes
Recognizes time and indication for temporary support device and escalation of care	● Recognizes timing of and indications for temporary support and coordinates multidisciplinary care for complex decision making and referral for advanced therapy
Level 5 *Discusses long-term prognosis and outcomes associated with guideline-directed medical therapy, including basic data and risk assessment models to increase patient understanding/awareness*	● Uses risk assessment models such as the Seattle heart failure survival model
Plans for patient-specific transitions of care to maintain outpatient follow up and prevent readmissions using all available resources	● Develops initiatives to improve health care delivery by implementing appropriate transition-of-care algorithms to prevent readmissions and decrease length of stay
Uses multidisciplinary team for early patient assessment; integrates program-specific guidelines to initiate evaluation for advanced therapies	● Knows the indications for referral for advanced therapy evaluation an recognizes the appropriate patient and timing
Assessment Models or Tools	● Direct observation ● End-of-rotation evaluations ● Evaluation of conference discussion during morning report ● Multisource feedback
Curriculum Mapping	●
Notes or Resources	● Baran DA, Grines CL, Bailey S, et al. SCAI clinical expert consensus statement on the classification of cardiogenic shock. *Catheterization and Cardiovascular Interventions*. 2019;94(1). https://onlinelibrary.wiley.com/doi/full/10.1002/ccd.28329. 2021. ● Hollenberg SM, Warner Stevenson L, Ahmad T, et al. *J Am Coll Cardiol*. 2019;74(15):1966-2011. https://www.jacc.org/doi/full/10.1016/j.jacc.2019.08.001. 2021.

	● Nohria A, Tsang SW, Fang JC, et al. Clinical assessment identifies hemodynamic profiles that predict outcomes in patients admitted with heart failure. *J AM Coll Cardiol*. 2003;41(10):1797-1804. https://www.sciencedirect.com/science/article/pii/S0735109703003097?via%3Dihub. 2021. ● Williams JF Jr, Bristow MR, Fowler MB, et al. Guidelines for the evaluation and management of heart failure. *Circulation*. 1995;92:2764-2784. https://www.ahajournals.org/doi/10.1161/01.CIR.92.9.2764. 2021.

Patient Care 4: Management of Chronic Heart Failure **Overall Intent:** To assess, diagnose, and manage chronic heart failure (heart failure with preserved ejection fraction and heart failure with reduced ejection fraction) in collaboration with outpatient multidisciplinary care team and monitor for signs of progression	
Milestones	**Examples**
Level 1 *Recognizes clinical signs and symptoms of chronic heart failure with reduced ejection fraction*	● Recognizes symptoms, signs, and laboratory findings consistent with stable heart failure with reduced ejection fraction
Recognizes clinical signs and symptoms of chronic heart failure with preserved ejection fraction	● Recognizes symptoms, signs, and laboratory findings consistent with stable heart failure with preserved ejection fraction
Level 2 *Monitors patients for complications or changes related to chronic heart failure with reduced ejection fraction*	● Monitors symptoms, signs, and laboratory findings for evidence of progression of heart failure with reduced ejection fraction, and develops an appropriate differential diagnosis
Monitors patients for complications or changes related to chronic heart failure with preserved ejection fraction	● Monitors symptoms, signs, and laboratory findings for evidence of progression of heart failure with preserved ejection fraction, and develops an appropriate differential diagnosis
With direct supervision, effectively participates in team-based care in management of common chronic heart failure with reduced ejection fraction and heart failure with preserved ejection fraction	● Appropriately engages with pharmacists, social workers, case managers, and other consultants in the management of heart failure patients, with direct supervision
Level 3 *Manages patients with stable chronic heart failure with reduced ejection fraction*	● Develops pharmacologic treatment plans for patients with heart failure with reduced ejection fraction
Manages patients with stable chronic heart failure with preserved ejection fraction	● Develops pharmacologic treatment plans for patients with heart failure with preserved ejection fraction
With indirect supervision, effectively participates in team-based care in management of common chronic heart failure with reduced ejection fraction and heart failure with preserved ejection fraction	● Appropriately engages with pharmacists, social workers, case managers, and other consultants in the management of heart failure patients, with indirect supervision from faculty members

Level 4 *Manages patients with advanced and end-stage chronic heart failure with reduced ejection fraction* *Manages patients with advanced and end-stage chronic heart failure with preserved ejection fraction* *Effectively participates in team-based care, including palliative care, in management of advanced or end-stage chronic heart failure with reduced ejection fraction and heart failure with preserved ejection fraction*	● Develops a plan for assessing barriers to heart transplantation and appropriateness of transplant listing ● Develops a plan for phenotyping the primary drivers of heart failure with preserved ejection fraction and target therapeutic choices ● Appropriately engages with pharmacists, social workers, case managers, and other consultants in the management of heart failure patients
Level 5 *Manages an outpatient chronic heart failure program* *Advances quality of clinical practice in the treatment strategies for chronic heart failure* *Effectively develops and implements team-based care models in management of chronic heart failure*	● Coordinates interdisciplinary care for complex heart failure patients with multiple comorbidities ● Implements programs targeted at improving the use of guideline-directed medical therapies ● Develops initiatives with other health care professionals to improve dietary adherence recommendations in heart failure
Assessment Models or Tools	● Direct observation ● End-of-rotation assessments ● Individual performance metrics from electronic health records (EHR) ● Multisource feedback ● Research/quality assurance project presentations
Curriculum Mapping	●
Notes or Resources	● Jessup M, Drazner MH, Book W, et al. 2017 ACC/AHA/HFSA/ISHLT/ACP advanced training statement on advanced heart failure and transplant cardiology (revision of the ACCF/AHA/ACP/HFSA/ISHLT 2010 clinical competence statement on management of patients with advanced heart failure and cardiac transplant): A report of the ACC Competency Management Committee. *Journal of the American College of Cardiology*. 2017;69(24):2977-3001. https://reader.elsevier.com/reader/sd/pii/S0735109718336210?token=EF203D3DD300D1818F437ABE659A99689601D2D3FAFF05174BB1D9CCB254D7D87D5E60E840598BADC64A32CD2EAFB740. 2021.

Patient Care 5: Pulmonary Hypertension **Overall Intent:** To assess, diagnose, and manage pulmonary hypertension in collaboration with multidisciplinary team; to implement appropriate transitions of care and discuss long-term prognoses	
Milestones	**Examples**
Level 1 *Discusses the clinical features of pulmonary hypertension* *Discusses risk factors, outcomes, and survival of patients with pulmonary hypertension*	● Describes signs and symptoms suggestive of pulmonary hypertension ● Interprets electrocardiogram (EKG) findings suggestive of pulmonary hypertension ● Lists risk factors associated with pulmonary hypertension ● Knows survival rate of patients with pulmonary hypertension ● Lists factors associated with poor prognosis
Level 2 *Identifies the basic evaluation of the patient with pulmonary hypertension, including history and physical, echocardiogram, hemodynamic evaluation, and laboratory evaluation* *Discusses options for therapy for pulmonary hypertension*	● Knows characteristic findings on echocardiogram of pulmonary hypertension ● Knows the indications/contraindications for hemodynamic evaluation ● Determines types of pulmonary hypertension based on hemodynamic interpretation ● Lists treatment options approved for pulmonary hypertension
Level 3 *Selects tests for the evaluation and monitoring of the patient with pulmonary hypertension* *Develops team-based care and treatment strategies for pulmonary hypertension, with supervision*	● Describes available tests for the assessment and monitoring of patients with pulmonary hypertension, including computerized tomography (CT) scans, ventilation–perfusion scans, cardiopulmonary stress testing, genetic testing, right heart catheterization, CT angiogram, six-minute walk ● Consults and coordinates with the multidisciplinary team, including cardiothoracic surgery, interventional cardiology, social work, and pharmacy
Level 4 *Independently interprets testing results to develop individual treatment strategies for pulmonary hypertension* *Independently develops individual treatment strategies for pulmonary hypertension, including lung or heart-lung transplant referral*	● Determines the type of pulmonary hypertension present based on hemodynamic interpretation ● Determines therapies based on hemodynamic findings ● Identifies patients who may benefit from lung or heart-lung transplants
Level 5 *Advances quality of clinical practice in the treatment strategies for pulmonary hypertension*	● Describes the components of a pulmonary hypertension program

Identifies strategies to develop a pulmonary hypertension program	
Assessment Models or Tools	● Direct observation ● Evaluation of case presentation ● In-training exam ● Medical record (chart) audit ● Multisource feedback ● Procedure log
Curriculum Mapping	●
Notes or Resources	● Galiè N, Humbert M, Vachiery JL, et al. 2015 ESC/ERS guidelines for the diagnosis and treatment of pulmonary hypertension: The Joint Task Force for the Diganosis and Treatment of Pulmonary Hypertension of the European Society of Cardiology (ESC) and the European Respiratory Society (ERS): Endorsed by: Association for European Pediatric and Congenital Cardiology (AEPC), International Society for Heart and Lung Transplantation (ISHLT). *Eur Heart J*. 2016;37(1):67-119. https://pubmed.ncbi.nlm.nih.gov/26320113/. 2021.

Medical Knowledge 1: Transplant **Overall Intent:** To demonstrate comprehensive knowledge of heart transplantation	
Milestones	**Examples**
Level 1 *Demonstrates knowledge of the indications for and contraindications to heart transplantation*	● Knows the indications for and contraindications to heart transplantation ● Knows the expected short- and long-term survival rates following heart transplantation ● Knows the indications for when to refer for multi-organ (e.g., heart-lung, heart-kidney, heart-liver) transplantation
Knows the principles of immunology pertinent to heart transplantation	● Knows the principles of immunology that pertain to heart transplantation, including sensitization and histocompatibility
Level 2 *Knows the intra- and early post-operative complications of heart transplantation*	● Knows the pre-operative considerations applicable to potential heart transplant recipients ● Knows the intra-operative and early post-operative complications of heart transplantation and their management
Knows the mechanism of action, adverse effects, and drug-drug interactions of immunosuppressant therapies	● Knows the anatomic, surgical, and comorbid conditions that may impact transplant surgery planning and outcomes in adult patients with congenital heart disease, necessitating evaluation at a transplant center with expertise in these conditions
Level 3 *Knows the long-term complications of heart transplantation*	● Knows the factors used to assess the suitability of a potential donor heart ● Knows the risk factors for, clinical presentations of, and treatment for hyperacute, acute cellular, and antibody-mediated rejection
Knows the strengths and limitations of strategies used to detect, monitor, and treat transplant rejection	● Knows the grades of acute cellular and antibody-mediated transplant rejection, based on interpretation of an endomyocardial biopsy
Level 4 *Applies knowledge of potential complications after heart transplantation to optimize patient outcomes*	● Knows the risk factors, clinical presentation, International Society for Heart and Lung Transplantation grading system, and strengths and limitations of diagnostic tools for cardiac allograft vasculopathy ● Knows common post-transplant complications and how to monitor them in the outpatient setting, including hypertension, diabetes, malignancy, renal dysfunction, infection, obesity, and endocrinological and neurological sequelae
Applies knowledge of transplant immunology and pharmacology to optimize patient outcomes	● Knows the clinical presentation and timing of common opportunistic infections in cardiac transplant recipients, as well as the potential for donor transmission of infectious organisms

Level 5 *Demonstrates knowledge of the pillars of a successful heart transplant program, including outcomes and resource allocation*	● Knows when to consider cardiac retransplantation ● Knows and understands the efficacy, risks, and limitations of currently available methods for desensitization of patients awaiting heart transplantation
Assessment Models or Tools	● Direct observation ● Evaluation of case presentation ● In-training exam ● Medical record (chart) audit ● Multisource feedback
Curriculum Mapping	●
Notes or Resources	● ACGME Program Requirements for Graduate Medical Education in Advanced Heart Failure and Transplant Cardiology. https://www.acgme.org/Portals/0/PFAssets/ProgramRequirements/159_AdvancedHeartFailureTransplantCardiology_2020.pdf?ver=2020-02-14-153940-843. 2021. ● Jessup M, Drazner MH, Book W, et al. 2017 ACC/AHA/HFSA/ISHLT/ACP advanced training statement on advanced heart failure and transplant cardiology (revision of the ACCF/AHA/ACP/HFSA/ISHLT 2010 clinical competence statement on management of patients with advanced heart failure and cardiac transplant): A report of the ACC Competency Management Committee. *Journal of the American College of Cardiology*. 2017;69(24):2977-3001. https://reader.elsevier.com/reader/sd/pii/S0735109718336210?token=EF203D3DD300D1818F437ABE659A99689601D2D3FAFF05174BB1D9CCB254D7D87D5E60E840598BADC64A32CD2EAFB740. 2021.

Medical Knowledge 2: Mechanical Circulatory Support **Overall Intent:** To demonstrate comprehensive knowledge of the selection and use of temporary and durable mechanical circulatory assistive devices	
Milestones	**Examples**
Level 1 *Demonstrates knowledge of the characteristics of temporary mechanical support devices* *Demonstrates knowledge of the characteristics of durable mechanical support devices*	● Knows the different components associated with temporary support devices including cannula size, vascular configurations, pump components (mechanics) and various monitors employed ● Knows the different components that constitute a durable LVAD including the pump (axial versus centrifugal), inflow and outflow cannula configuration, driveline, system controller, batteries and monitors
Level 2 *Knows the indications for and contraindications for temporary mechanical circulatory support* *Knows the indications for and contraindications for durable mechanical circulatory support*	● Knows the indications and contraindications for temporary support devices including when hemodynamics and other clinical parameters warrant escalation to temporary mechanical support ● Understands when a patient requires only univentricular (either right ventricular or left ventricular support) or require VA ECMO based on their underlying physiology ● Demonstrates knowledge in the anatomic, surgical, and comorbid conditions that may impact mechanical circulatory support strategies in patients with cardiogenic shock ● Knows when a patient cannot be weaned off temporary support and requires evaluation for transplant or LVAD if appropriate ● Knows the indications and contraindications to durable LVAD candidacy including anatomic considerations (the presence of aortic regurgitation, mitral stenosis, an atrial septal defect or ventricular septal defect, redo sternotomy and calcified aorta) and functional considerations (assessment of right ventricular function and pulmonary hypertension; asses other barriers to LVAD implantation including psychosocial support, nutritional support, and frailty
Level 3 *Knows intra- and early post-operative complications of temporary mechanical circulatory support* *Knows the clinical determinants favoring left ventricular assist device versus transplantation as long-term durable strategies*	● Demonstrates knowledge in complications following implantation of temporary devices including bleeding, thrombosis, device or cannula malposition, hemolysis, infection, etc. ● Knows the contraindications for transplant that would favor permanent durable LVAD implantations such as elevated body mass index (BMI), unresponsive pulmonary hypertension, tobacco use, elevated panel-reactive antibodies, etc.
Level 4 *Applies knowledge of selection and use of temporary mechanical circulatory assist devices to optimize patient outcomes*	● Knows patient characteristics that may increase the risk of potential complications (e.g., bleeding, device thrombosis, infection) following implantation of temporary devices and

Applies knowledge of selection and use of durable mechanical circulatory assist devices to optimize patient outcomes	selects the appropriated device or level of mechanical support necessary to minimize these risks ● Knows issues associated with management of VA ECMO patients including, but not limited to, the development of North-South syndrome and mechanical and chemical venting strategies ● Knows how to comprehensively assess issues associated with increased risk of doing poorly following durable LVAD placement including right ventricle failure, renal function, aortic regurgitations to improve long- and short-term patient outcomes
Level 5 *Demonstrates knowledge of the pillars of a successful mechanical circulatory support program, including outcomes and resource allocation*	● Knows the components of and participates in the multidisciplinary care team and understands the unique role and value of each member ● Understands the role of and knows the value of shared care as a component of a successfully durable LVAD program
Assessment Models or Tools	● Direct observation ● End-of-rotation evaluation ● Evaluation of conference participation
Curriculum Mapping	●
Notes or Resources	● Baran DA, Grines CL, Bailey S, et al. SCAI clinical expert consensus statement on the classification of cardiogenic shock. *Catheterization and Cardiovascular Interventions*. 2019;94(1). https://onlinelibrary.wiley.com/doi/full/10.1002/ccd.28329. 2021. ● Fang JC, Ewald GA, Allen LA, et al. Advanced (stage D) heart failure: A statement from the Heart Failure Society of America Guidelines Committee. *J Card Fail*. 2015;21:519-534. https://pubmed.ncbi.nlm.nih.gov/25953697/. 2021. ● Feldman D, Pamboukian SV, Teuteberg JJ, et al. The 2013 International Society for Heart and Lung Transplantation Guidelines for mechanical circulatory support: Executive summary. *The Journal of Heart and Lung Transplantation*. 2013;32(2):157-187. https://www.jhltonline.org/article/S1053-2498(12)01294-6/fulltext. 2021. ● Hajjar LA, Teboul JL. Mechanical circulatory support devices for cardiogenic shock: State of the art. *Crit Care*. 2019;23(1):76. https://ccforum.biomedcentral.com/articles/10.1186/s13054-019-2368-y. 2021. ● Kirklin JK, Pagani FD, Goldstein DJ, et al. American Association for Thoracic Surgery/International Society for Heart and Lung Transplantation guidelines on selected topics in mechanical circulatory support. *The Journal of Heart and Lung Transplantation*. 2020;39(3):187-219. https://linkinghub.elsevier.com/retrieve/pii/S0022-5223(19)40862-3. 2021. ● Pinney SP, Anyanwu AC, Lala A, et al. Left ventricular assist devices for lifelong support. *J Am Coll Cardiol*. 2017;69(23): 2845–2861.

	https://www.sciencedirect.com/science/article/pii/S0735109717371097?via%3Dihub. 2021.

Medical Knowledge 3: Heart Failure **Overall Intent:** To demonstrate comprehensive knowledge of the diagnosis and treatment options for patient with heart failure	
Milestones	**Examples**
Level 1 *Lists a differential diagnosis for common clinical presentations for heart failure patients* *Lists therapeutic options for common clinical presentations for heart failure patients*	● Lists a differential diagnosis for dyspnea ● Lists a differential diagnosis for lower extremity edema ● Knows the signs and symptoms of low cardiac output versus congestion ● Lists treatment options for acute decompensated heart failure ● Lists treatment options for chronic heart failure with reduced ejection fraction
Level 2 *Provides a comprehensive differential diagnosis for a wide range of clinical heart failure presentations* *Explains risks and benefits of standard therapeutic options for heart failure*	● Creates a complete differential diagnosis for dyspnea in several different clinical scenarios ● Discusses risks and benefits of transitioning from an ace inhibitor to sacubitril/valsartan in patients with chronic heart failure with reduced ejection fraction
Level 3 *Provides a focused differential diagnosis based on individual heart failure patient presentation* *Justifies optimal therapeutic option based on individual heart failure patient presentation*	● Creates a differential diagnosis for dyspnea and edema following chemotherapy and radiation for breast cancer ● Explains the rationale for medical management of chronic heart failure with reduced ejection fraction with associated chronic kidney disease
Level 4 *Diagnoses patients with challenging heart failure presentations and uncommon disorders* *Develops therapeutic plan for patients with challenging heart failure presentations and uncommon disorders*	● Synthesizes history, physical examination, and diagnostic testing in a patient with Fabry's disease ● Creates a therapeutic plan for a patient presenting with newly diagnosed decompensated heart failure in the third trimester of pregnancy
Level 5 *Advances knowledge in pathophysiology and treatment of heart failure* *Disseminates knowledge of challenging heart failure presentations and uncommon disorders*	● Prepares a case report on an unusual presentation of heart failure ● Performs research on an innovative therapy for heart failure with preserved ejection fraction ● Makes a presentation to a community group about heart failure
Assessment Models or Tools	● Direct observation ● End-of-rotation evaluation

	● Evaluation of conference participation
Curriculum Mapping	●
Notes or Resources	● ACGME Program Requirements for Graduate Medical Education in Advanced Heart Failure and Transplant Cardiology. https://www.acgme.org/Portals/0/PFAssets/ProgramRequirements/159_AdvancedHeartFailureTransplantCardiology_2020.pdf?ver=2020-02-14-153940-843. 2021. ● Jessup M, Drazner MH, Book W, et al. 2017 ACC/AHA/HFSA/ISHLT/ACP advanced training statement on advanced heart failure and transplant cardiology (revision of the ACCF/AHA/ACP/HFSA/ISHLT 2010 clinical competence statement on management of patients with advanced heart failure and cardiac transplant): A report of the ACC Competency Management Committee. *Journal of the American College of Cardiology*. 2017;69(24):2977-3001. https://reader.elsevier.com/reader/sd/pii/S0735109718336210?token=EF203D3DD300D1818F437ABE659A99689601D2D3FAFF05174BB1D9CCB254D7D87D5E60E840598BADC64A32CD2EAFB740. 2021.

Medical Knowledge 4: Advanced Heart Failure Diagnostics **Overall Intent:** To identify and interpret relevant cardiovascular tests for the advanced heart failure population	
Milestones	**Examples**
Level 1 *Knows types of advanced heart failure diagnostics*	● Lists the cardiovascular tests used to evaluate for severity of heart failure
Level 2 *Demonstrates knowledge of indications and contraindications of advanced heart failure diagnostics* *Knows the basic measurements and data output from the various advanced heart failure diagnostics*	● Knows the indications, risks, and contraindications of invasive hemodynamic testing in patients with heart failure ● Knows that cardiopulmonary exercise testing measures oxygen consumption
Level 3 *Demonstrates knowledge of appropriate selection and use of diagnostics for the routine advanced heart failure population* *Identifies key diagnostic findings in common advanced heart failure conditions*	● Knows the role endomyocardial biopsy in the diagnostic work-up of suspected myocarditis ● Recognizes different patterns of late gadolinium enhancement in various cardiomyopathies
Level 4 *Applies knowledge of appropriate selection and use of diagnostics for patients with complex advanced heart failure patients* *Identifies key diagnostic findings in complex advanced heart failure conditions*	● Selects that appropriate tests to work up suspected LVAD pump infections ● Knows the features histopathologic features of acute cellular rejection
Level 5 *Advances knowledge in indications, contraindications, and appropriate use for advanced heart failure diagnostics* *Advances knowledge in defining the role of advanced heart failure diagnostics*	● Participates in local or national research efforts surrounding multimodality imaging ● Participate in guidelines development on the role of inflammatory positron emission tomography (PET) imaging in sarcoidosis
Assessment Models or Tools	● Direct observation ● End-of-rotation evaluation ● Evaluation of case presentation ● Evaluation of conference participation ● Medical record (chart) audit ● Multisource feedback

Curriculum Mapping	●
Notes or Resources	● Jessup M, Drazner MH, Book W, et al. 2017 ACC/AHA/HFSA/ISHLT/ACP advanced training statement on advanced heart failure and transplant cardiology (revision of the ACCF/AHA/ACP/HFSA/ISHLT 2010 clinical competence statement on management of patients with advanced heart failure and cardiac transplant): A report of the ACC Competency Management Committee. *Journal of the American College of Cardiology*. 2017;69(24):2977-3001. https://reader.elsevier.com/reader/sd/pii/S0735109718336210?token=EF203D3DD300D1818F437ABE659A99689601D2D3FAFF05174BB1D9CCB254D7D87D5E60E840598BADC64A32CD2EAFB740. 2021.

Medical Knowledge 5: Pulmonary Hypertension **Overall Intent:** To understand the pathophysiology, presentation, and treatment strategies of patients with pulmonary hypertension	
Milestones	**Examples**
Level 1 *Discusses the World Health Organization (WHO) classifications of pulmonary hypertension* *Discusses the types of drugs used to treat pulmonary hypertension*	● Gives examples of medical conditions associated with each category of pulmonary hypertension ● Knows the details of the World Health Organization (WHO) classifications, including subgroups ● Discusses the three pathways of pulmonary hypertension therapies, nitric oxide pathway, endothelin pathway, and prostacycline pathway
Level 2 *Discusses physiology of the right ventricle and distinction between and pre- and post-capillary pulmonary hypertension* *Identifies drugs used to treat different classes of pulmonary hypertension*	● Can interpret hemodynamics to determine pre- and post-capillary pulmonary hypertension ● Identifies features of right ventricular failure in pulmonary hypertension ● Describes pathologic findings in pulmonary hypertension ● Describes the indication for use of calcium channel blocker in pulmonary hypertension management and understand role of the nitric oxide challenge ● Identifies specific therapies to target type of pulmonary hypertension
Level 3 *Discusses the pathophysiology of pulmonary hypertension* *Discusses the pharmacology of the drugs used in pulmonary hypertension*	● Describes the underlying physiology behind elevated pulmonary vascular resistance ● Describes the pharmacotherapy of the three pathways
Level 4 *Assesses prognosis in pulmonary hypertension* *Identifies treatment modalities, including investigational agents and multi-drug regimens*	● Identifies determinants of poor prognosis in pulmonary hypertension ● Identifies indications and contraindications for lung transplantation
Level 5 *Demonstrates knowledge of the pillars of a multidisciplinary pulmonary hypertension program* *Integrates all options in the treatment of pulmonary hypertension including drugs, surgical procedures, and lung transplantation*	● Identifies when to transition to palliative care as management of pulmonary hypertension
Assessment Models or Tools	● Direct observation ● End-of-rotation evaluation

	● Evaluation of conference participation
Curriculum Mapping	●
Notes or Resources	● Galiè N, Humbert M, Vachiery JL, et al. 2015 ESC/ERS guidelines for the diagnosis and treatment of pulmonary hypertension: The Joint Task Force for the Diganosis and Treatment of Pulmonary Hypertension of the European Society of Cardiology (ESC) and the European Respiratory Society (ERS): Endorsed by: Association for European Pediatric and Congenital Cardiology (AEPC), International Society for Heart and Lung Transplantation (ISHLT). *Eur Heart J*. 2016;37(1):67-119. https://pubmed.ncbi.nlm.nih.gov/26320113/. 2021.

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 a patient safety issue (e.g., 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 near misses
Level 3 *Participates in analysis of patient safety events (simulated or actual)* *Participates in disclosure of patient safety events to patients and their families (simulated or actual)* *Participates in quality improvement initiatives at the institutional or departmental level*	● Reviews a patient safety event (e.g., preparing for morbidity and mortality presentations, joining a root cause analysis group) and has communicated with patients/families about such an event ● Participates in a QI project, but has not yet designed a QI project
Level 4 *Conducts analysis of patient safety events and offers error prevention strategies (simulated or actual)* *Discloses patient safety events to patients and their 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

Demonstrates the skills required to identify, develop, implement, and analyze a quality improvement project	● Initiates and completes 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 and/or QI initiatives, possibly even being the person to initiate action or call attention to the need for action
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 ● Portfolio ● Reflection ● Simulation
Curriculum Mapping	●
Notes or Resources	● Institute for Healthcare Improvement. http://www.ihi.org/Pages/default.aspx. 2021.

Systems-Based Practice 2: System Navigation for Patient-Centered Care **Overall Intent:** To effectively navigate the health care system, including the interdisciplinary team and other care providers; to adapt care to a specific patient population to ensure high-quality patient outcomes	
Milestones	**Examples**
Level 1 *Demonstrates knowledge of care coordination*	● Identifies the 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 financial, cultural, and social barriers to adherence to 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 patients with chronic congestive heart failure 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 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, LGBTQ status, etc.
Level 4 *Role models effective coordination of patient-centered care among different disciplines and specialties*	● Role models and educates students and more 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 residents 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 ensure patients with lower income 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 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 all cardiology specialists
Assessment Models or Tools	● Case management quality metrics and goals mined from EHRs ● Direct observation ● Interdisciplinary rounds for high-risk patients/cases ● Lectures/workshops on social determinants of health or population health with identification of local resources ● Medical record (chart) review ● Multisource feedback ● Review of sign-out tools, use and review of checklists between pathology services
Curriculum Mapping	●
Notes or Resources	● CDC. Population Health Training. https://www.cdc.gov/pophealthtraining/whatis.html. 2021. ● Kaplan KJ. In pursuit of patient-centered care. 2016. https://tissuepathology.com/2016/03/29/in-pursuit-of-patient-centered-care/#axzz5e7nSsAns. 2021. ● Skochelak SE, Hawkins RE, Lawson LE, Starr SR, Borkan JM, Gonzalo JD. *AMA Education Consortium: Health Systems Science*. 1st ed. Philadelphia, PA: Elsevier; 2016.

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, Veterans Affairs (VA), and commercial third-party payors
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: ○ Transplant and LVAD outcomes using the United Network for Organ Sharing (UNOS) and Intermacs/Society of Thoracic Surgery registries ○ Hospital heart failure 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* *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*	● 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 ● 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 the health care system on decreasing length of stay and readmission rate for heart failure, LVAD and transplant patients. ● Develops processes to decrease opioid prescribing for one or more clinical services ● 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 (AHRQ). Measuring the Quality of Physician Care. https://www.ahrq.gov/professionals/quality-patient-safety/talkingquality/create/physician/challenges.html. 2021. ● AHRQ. Major Physician Performance Sets. https://www.ahrq.gov/professionals/quality-patient-safety/talkingquality/create/physician/measurementsets.html. 2021. ● American Board of Internal Medicine. QI/PI Activities. http://www.abim.org/maintenance-of-certification/earning-points/practice-assessment.aspx. 2021. ● Center for Medicare and Medicaid Services. MACRA. https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/Value-Based-Programs/MACRA-MIPS-and-APMs/MACRA-MIPS-and-APMs.html. 2021. ● The Commonwealth Fund. Health System Data Center. http://datacenter.commonwealthfund.org/?_ga=2.110888517.1505146611.1495417431-1811932185.1495417431#ind=1/sc=1. 2021.

	● 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/. 2021. ● The Kaiser Family Foundation. www.kff.org. 2021. ● The Kaiser Family Foundation. Health Reform. https://www.kff.org/topic/health-reform/. 2021.

Practice-Based Learning and Improvement 1: Evidence-Based and Informed Practice **Overall Intent:** To incorporate evidence and patient values into clinical practice	
Milestones	**Examples**
Level 1 *Demonstrates how to access and use available evidence to manage a patient with cardiac disease*	● Obtains the appropriate evidence-based guidelines for management of heart failure
Level 2 *Articulates clinical questions and elicits patient preferences to guide evidence-based care*	● Asks a patient with heart failure symptom-driven and goals-of-care questions
Level 3 *Locates and applies the best available evidence to the care of patients with complex cardiac disease while integrating patient preference*	● Applies evidence in the care of a patient with symptomatic, advanced heart failure who does not want advanced therapy ● Researches and applies the concept of frailty in the evaluation of a patient with advanced heart failure
Level 4 *Critically appraises and applies available, potentially conflicting evidence to guide care of an individual patient*	● Applies evidence, including new primary literature, in the care of a patient with advanced heart failure status post-heart transplant or post-installation of a mechanical circulatory support
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 advanced heart failure, transplant, and mechanical circulatory support ● Helps write a multiteam policy for the institution to address criteria for evaluation and listing for heart transplant and mechanical circulatory support candidacy
Assessment Models or Tools	● Direct observation ● Evaluation of presentation ● Oral or written examination
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. 2021. ● 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. 2021. ● NEJM Knowledge. Exploring the ACGME Core Competencies: Practice-Based Learning and Improvement. https://knowledgeplus.nejm.org/blog/practice-based-learning-and-improvement/. 2021.

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 hemodynamic data ● Acknowledges need to improve skills in obtaining hemodynamic data and biopsies
Level 2 *Demonstrates openness to feedback and performance data to form goals* *Analyzes the factors which contribute to limits and gaps; demonstrates appropriate help-seeking behaviors*	● Shows appreciation when receiving feedback from a supervising attending on quality of hemodynamics obtained and biopsies, and sets goals for improving techniques based on that feedback
Level 3 *Occasionally seeks feedback and performance data with adaptability and humility* *Creates and implements a learning plan*	● Documents goals in a more specific and achievable manner, so attaining them is reasonable and measurable
Level 4 *Systematically seeks feedback and performance data with adaptability and humility* *Uses performance data to assess learning plan and improves it when necessary*	● At the end of each week, asks an attending to review the resident's performance and offer opportunities for improvement ● 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*	● Encourages other learners on the team to develop a learning plan ● Develops a form all fellows can use to document and implement a learning plan based on experience in the catheter lab or rounding on the heart failure service
Assessment Models or Tools	● Direct observation ● End-of-rotation evaluations ● Review of learning plan
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. 2021.

	● 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. 2021. ● 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. 2021.

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)*	● Identifies and describes potential personal or group triggers for professionalism lapses, describes when and how to appropriately report professionalism lapses, and outlines strategies for addressing common barriers to reporting ● Discusses the basic principles underlying ethics (beneficence, nonmaleficence, 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 ● 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 the 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: ○ consulting with a genetic counselor about the implications of genetic testing ○ requesting an ethics consult (e.g., Jehovah's Witness patient with potential transfusion needs)
Level 4 *Recognizes situations that may trigger professionalism lapses and intervenes to prevent lapses in oneself and others* *Uses appropriate resources for managing and resolving ethical dilemmas (e.g., ethics consultations, risk management)*	● Anticipates the need to seek additional resources to prevent ethical dilemmas ● 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 (IRB) review for a research project
Level 5 *Coaches others when their behavior fails to meet professional expectations*	● Coaches a resident in the cardiovascular intensive care unit (ICU) after a difficult interaction with a nurse led to a heated discussion in front of a patient family ● Seeks opportunities to provide appropriate feedback on professionalism to other members of the health care team

Identifies and seeks to address system-level factors that induce or exacerbate ethical problems or impede their resolution	● Engages in system-wide efforts to improve professionalism through participation in a work group, committee, or task force
Assessment Models or Tools	● Direct observation ● Global evaluation ● 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. 2021. ● 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. 2021. ● 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. 2021. ● 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. 2021. ● 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. 2021.

Professionalism 2: Accountability **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 work hour logs ● Timely attendance at conferences
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 tasks in a timely manner and with attention to detail, and recognizes when task completion may be an issue (e.g., going out of town) ● Completes and documents safety modules, procedure review, and licensing requirements (e.g., administrative duties and tasks)
Recognizes personal potential conflicts with industry	● 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*	● Appropriately notifies residents and fellows on day service about overnight call events during transition of care or hand-off to avoid patient safety issues and compromise of patient care ● Completes tasks in stressful situations and preempts issues that would impede completion of tasks (e.g., notifies attending of multiple competing demands on call, appropriately triages tasks, and asks for assistance from other residents or faculty members, if needed) ● Reviews case logs, evaluations, and portfolio and develops a learning plan to address gaps/weakness in knowledge, case exposure, and skills
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*	● Identifies issues that could impede other residents and fellows from completing tasks and provides leadership to address those issues (e.g., more senior fellows advise more junior fellows how to manage their time in completing patient care tasks)

Identifies, discloses, and manages relationships with industry and other entities to minimize bias and undue influence in practice	● 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*	● Identifies and addresses team/system issues that impede efficient completion of patient care tasks (setting 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 ● Simulation
Curriculum Mapping	●
Notes or Resources	● American Society of Anesthesiologists. Standards and Guidelines. https://www.asahq.org/standards-and-guidelines. 2021. ● 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*	● Accepts responsibility of monitoring 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 fellow's well-being, but to ensure each fellow has the fundamental knowledge of factors that impact well-being, the mechanisms by which those factors impact well-being, and available resources and tools to improve well-being. ● ACGME. Tools and Resources. https://www.acgme.org/What-We-Do/Initiatives/Physician-Well-Being/Resources. 2021. ● 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. 2021. ● 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/patient's 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 *With guidance, establishes a therapeutic relationship in challenging patient encounters* *Attempts to minimize communication barriers, including reflection on any personal biases* *With guidance, uses shared decision making to implement a personalized care plan*	● Establishes and maintains a therapeutic relationship with a challenging patient and can articulate personal challenges in the relationship, how personal biases may impact the relationship, and strategies to use going forward ● Attempts to mitigate identified communication barriers, including reflection on implicit 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 personal biases*	● Independently establishes a therapeutic relationship with the most challenging or complex patients/families with extra sensitivity to their specific concerns ● 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 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 and supports colleagues in self-awareness and reflection to improve therapeutic relationships with patients
Role models self-awareness to minimize communication barriers	● Role models proactive self-awareness and reflection around explicit and implicit biases with a context specific approach to mitigate communication barriers
Role models shared decision making	● Is an example to others of leading shared decision making with clear recommendations to patients and families even in more complex clinical situations
Assessment Models or Tools	● Direct observation ● Kalamazoo Essential Elements Communication Checklist (Adapted) ● Multisource feedback ● Self-assessment including self-reflection exercises ● Skills needed to Set the state, Elicit information, Give information, Understand the patient, and End the encounter (SEGUE) ● Standardized patients or structured case discussions
Curriculum Mapping	●
Notes or Resources	● 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. 2021. ● 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. 2021. ● 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. 2021. ● 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. 2021.

	● 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. 2021. ● 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. 2021.

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* *Uses language that values all members of the health care team*	● Shows respect through words and actions when receiving calls for assistance from members of the health care team ● Uses respectful communication to clerical and technical staff members ● Listens to and considers others' points of view, is nonjudgmental and actively engaged, and demonstrates humility
Level 2 *With direct supervision, respectfully and thoroughly completes consultations with effective documentation and communication in common cases* *Communicates information effectively with all health care team members* *Participates in team-based discussions to optimize team performance*	● Demonstrates active listening by fully focusing on the speaker (other health care provider, patient), actively showing verbal and non-verbal signs (eye contact, posture, reflection, questioning, summarization) ● 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 multidisciplinary discussions regarding treatment for patients
Level 3 *With indirect supervision, completes consultations with effective documentation and communication in common cases* *Adapts communication style to fit team needs* *Initiates team-based discussions to optimize team performance*	● Respectfully provides feedback to more junior members of the medical team for the purposes of improvement or reinforcement of correct knowledge, skills, and attitudes ● Uses teach-back or other strategies to assess and receive understanding during consultations ● Arranges and facilitates multidisciplinary discussions regarding treatment for patients, under supervision
Level 4 *Completes consultations with effective documentation and communication in complex cases* *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 ● Arranges and leads multidisciplinary discussions regarding treatment for complex cases

Facilitates team-based discussions to optimize team performance	
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
Assessment Models or Tools	● Direct observation ● Global assessment ● Multisource feedback ● Medical record (chart) review ● Simulation encounters
Curriculum Mapping	●
Notes or Resources	● 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. 2021. ● Dehon E, Simpson K, Fowler D, Jones A. Development of the faculty 360. *MedEdPORTAL*. 2015;11:10174. https://www.mededportal.org/publication/10174/. 2021. ● 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/. 2021.. ● 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/. 2021. ● Green M, Parrott T, Cook G. Improving your communication skills. *BMJ*. 2012;344:e357. https://www.bmj.com/content/344/bmj.e357. 2021. ● 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. 2021. ● 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. 2021. ● 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. 2021.

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 Health Insurance Portability and Accountability Act (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 chief resident or 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 anticipatory (if/then) guidance ● 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 verbally critical information to a colleague ● Knows when to call the treating 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 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. 2021. ● 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. 2021. ● 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. 2021.

To help programs transition to the new version of the Milestones, the original Milestones 1.0 have been mapped to the new Milestones 2.0; it is indicated if subcompetencies are similar between versions. These are not exact matches but include some of the same elements. Not all subcompetencies map between versions. Inclusion or exclusion of any subcompetency does not change the educational value or impact on curriculum or assessment.

Milestones 1.0	Milestones 2.0
PC1: Gathers and synthesizes essential and accurate information to define each patient's clinical problem(s)	PC1: Transplant PC2: Mechanical Circulatory Support (Temporary and Durable) PC3: Acutely Decompensated Heart Failure PC4: Management of Chronic Heart Failure PC5: Pulmonary Hypertension
PC2: Develops and achieves comprehensive management plan for each patient	PC1: Transplant PC2: Mechanical Circulatory Support (Temporary and Durable) PC3: Acutely Decompensated Heart Failure PC4: Management of Chronic Heart Failure PC5: Pulmonary Hypertension
PC3: Manages patients with progressive responsibility and independence	PC1: Transplant PC2: Mechanical Circulatory Support (Temporary and Durable) PC3: Acutely Decompensated Heart Failure PC4: Management of Chronic Heart Failure PC5: Pulmonary Hypertension
PC4a: Demonstrates skill in performing and interpreting invasive procedures	PC2: Mechanical Circulatory Support (Temporary and Durable)
PC4b: Demonstrates skill in performing and interpreting non-invasive procedures and/or testing	
PC5: Requests and provides consultative care	PC1: Transplant PC2: Mechanical Circulatory Support (Temporary and Durable) PC3: Acutely Decompensated Heart Failure PC4: Management of Chronic Heart Failure PC5: Pulmonary Hypertension
MK1: Possesses clinical knowledge	MK1: Transplant MK2: Mechanical Circulatory Support MK3: Heart Failure MK5: Pulmonary Hypertension
MK2: Knowledge of diagnostic testing and procedures	MK4: Advanced Heart Failure Diagnostics
MK3: Scholarship	

SBP1: Works effectively within an interprofessional team (e.g., with peers, consultants, nursing, ancillary professionals, and other support personnel)	ICS2: Interprofessional and Team Communication Management of Chronic Heart Failure
SBP2: Recognizes system error and advocates for system improvement	SBP1: Patient Safety SBP2: Quality Improvement
SBP3: Identifies forces that impact the cost of health care, and advocates for and practices cost-effective care	SBP4: System Navigation for Patient-Centered Care: Population Health SBP5: Physician Role in Health Care Systems
SBP4: Transitions patients effectively within and across health delivery systems	SBP3: System Navigation for Patient-Centered Care: Coordination and Transitions of Care SBP4: System Navigation for Patient-Centered Care: Population Health
PBLI1: Monitors practice with a goal for improvement	PBLI2: Reflective Practice and Commitment to Personal Growth
PBLI2: Learns and improves via performance audit	PBLI2: Reflective Practice and Commitment to Personal Growth
PBLI3: Learns and improves via feedback	PBLI2: Reflective Practice and Commitment to Personal Growth
PBLI4: Learns and improves at the point of care	PBLI1: Evidence-Based and Informed Practice
PROF1: Has professional and respectful interactions with patients, caregivers, and members of the interprofessional team (e.g., peers, consultants, nursing, ancillary professionals, and support personnel)	PROF1: Professional Behavior and Ethical Principles PROF3: Fellow Well-Being ICS1: Patient and Family-Centered Communication ICS2: Interprofessional and Team Communication
PROF2: Accepts responsibility and follows through on tasks	PROF2: Accountability/ Conscientiousness
PROF3: Responds to each patient's unique characteristics and needs	ICS1: Patient and Family-Centered Communication
PROF4: Exhibits integrity and ethical behavior in professional conduct	PROF1: Professional Behavior and Ethical Principles
ICS1: Communicates effectively with patients and caregivers	ICS1: Patient and Family-Centered Communication
ICS2: Communicates effectively in interprofessional teams (e.g., with peers, consultants, nursing, ancillary professionals, and other support personnel)	ICS2: Interprofessional and Team Communication
ICS3: Appropriate utilization and completion of health records	ICS3: Communication within Health Care Systems

Available Milestones Resources

Clinical Competency Committee Guidebook, updated 2020 - https://www.acgme.org/Portals/0/ACGMEClinicalCompetencyCommitteeGuidebook.pdf?ver=2020-04-16-121941-380

Clinical Competency Committee Guidebook Executive Summaries, New 2020 - https://www.acgme.org/What-We-Do/Accreditation/Milestones/Resources - Guidebooks - Clinical Competency Committee Guidebook Executive Summaries

Milestones Guidebook, updated 2020 - https://www.acgme.org/Portals/0/MilestonesGuidebook.pdf?ver=2020-06-11-100958-330

Milestones Guidebook for Residents and Fellows, updated 2020 - https://www.acgme.org/Portals/0/PDFs/Milestones/MilestonesGuidebookforResidentsFellows.pdf?ver=2020-05-08-150234-750

Milestones for Residents and Fellows PowerPoint, new 2020 -https://www.acgme.org/Residents-and-Fellows/The-ACGME-for-Residents-and-Fellows

Milestones for Residents and Fellows Flyer, new 2020 https://www.acgme.org/Portals/0/PDFs/Milestones/ResidentFlyer.pdf

Implementation Guidebook, new 2020 - https://www.acgme.org/Portals/0/Milestones%20Implementation%202020.pdf?ver=2020-05-20-152402-013

Assessment Guidebook, new 2020 - https://www.acgme.org/Portals/0/PDFs/Milestones/Guidebooks/AssessmentGuidebook.pdf?ver=2020-11-18-155141-527

Milestones National Report, updated each Fall - https://www.acgme.org/Portals/0/PDFs/Milestones/2019MilestonesNationalReportFinal.pdf?ver=2019-09-30-110837-587 (2019)

Milestones Bibliography, updated twice each year - https://www.acgme.org/Portals/0/PDFs/Milestones/MilestonesBibliography.pdf?ver=2020-08-19-153536-447

Developing Faculty Competencies in Assessment courses - https://www.acgme.org/Meetings-and-Educational-Activities/Other-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://dl.acgme.org/pages/assessment

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