Supplemental Guide: Neurocritical Care

ACGME

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TABLE OF CONTENTS

PATIENT CARE **4**

History and Physical Examination 4
General Critical Care (Systemic) 6
Neurocritical Care 8
Diagnostic Evaluation (General) 10
Neurodiagnostic Evaluation 11
Procedures 12

MEDICAL KNOWLEDGE **13**

Prognosis in Critical Care Conditions 13
Pathophysiology and Therapeutics for General Critical Care 15
Pathophysiology and Therapeutics for Neurocritical Care 16
Determination of Death by Neurologic Criteria 18

SYSTEMS-BASED PRACTICE **19**

Patient Safety 19
Quality Improvement (QI) 21
System Navigation for Patient-Centered Care 22
Physician Role in Health Care Systems 24

PRACTICE-BASED LEARNING AND IMPROVEMENT **26**

Evidence-Based and Informed Practice 26
Reflective Practice and Commitment to Personal Growth 28

PROFESSIONALISM **30**

Professional Behavior and Ethical Principles 30
Accountability/Conscientiousness 32
Well-Being 34

INTERPERSONAL AND COMMUNICATION SKILLS **35**

Patient- and Family-Centered Communication 35
Barrier and Bias Mitigation 37
Complex Communication Around Serious Illness 38
Interprofessional and Team Communication 40
Communication within Health Care Systems 42

MILESTONES RESOURCES **43**

Milestones Supplemental Guide

This document provides additional guidance and examples for the Neurocritical Care 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: History and Physical Examination **Overall Intent:** To obtain a comprehensive specialty specific history and perform a detailed physical examination	
Milestones	**Examples**
Level 1 *Obtains specialty-specific, detailed, and accurate history from patients with common disorders, with substantial guidance* *Performs a specialty-specific, detailed, and accurate physical exam on patients with common disorders, with substantial guidance*	● Requires attending-level advice for obtaining relevant history from other sources when patient's history is incomplete ● Recognizes paradoxical breathing in a patient with respiratory compromise
Level 2 *Obtains specialty-specific, detailed, and accurate history from patients with common disorders* *Performs a specialty-specific, detailed, and accurate physical exam on patients with common disorders*	● Obtains history of prior heparin usage in a patient with thrombocytopenia ● Recognizes locked in syndrome in a comatose or unresponsive patient
Level 3 *Obtains specialty-specific, detailed, and accurate history from multiple sources for patients with complex disorders* *Elicits specialty-specific signs while performing a detailed and accurate physical exam on patients with complex disorders*	● Obtains a detailed history from multiple family members regarding illicit substance use in a comatose intubated patient ● Differentiates central versus peripheral nervous system pathology ● Identifies focal deficits suspicious of stroke in a patient with sepsis and encephalopathy
Level 4 *Independently and efficiently obtains a specialty-specific, detailed, and accurate history from multiple sources for patients with complex disorders* *Independently and efficiently elicits specialty-specific signs while performing a detailed and accurate physical exam on patients with complex disorders*	● Coaches on techniques of how to obtain a detailed and multisource history for multiple new complex intensive care unit (ICU) admissions during their assigned shift ● Supervises the obtainment of detailed and accurate general and neurological exams for multiple new complex ICU admissions during their assigned shift
Level 5 *Serves as role model in obtaining an efficient specialty-specific, detailed, and*	● Queries about tick bites in a patient with septic shock and neuromuscular respiratory failure

accurate history from multiple sources for patients with complex disorders *Independently elicits specialty-specific signs while performing a detailed and accurate physical exam on patients with complex or rare disorders in clinically difficult circumstances*	● Investigates for Wilson's disease after identifying Kayser-Fleischer rings in a comatose patient
Assessment Models or Tools	● Direct observation ● Medical record (chart) review ● Multisource feedback ● Observable structured clinical examination (OSCE) ● Simulation ● Standardized patients
Curriculum Mapping	●
Notes or Resources	● Fink MP, Vincent JL, Moore FA. *Textbook of Critical Care*. 7th ed. Philadelphia, PA: Elsevier; 2017. ● Layon AJ, Gabrielli A, Yu Mihae, Wood KE. *Civetta, Taylor, & Kirby's Critical Care Medicine*. 5th ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2018. ● Parrillo JE, Dellinger RP. *Critical Care Medicine: Principles of Diagnosis and Management in the Adult*. 5th ed. Philadelphia, PA: Elsevier; 2019. ● Substantial guidance implies direct observation and/or real-time oversight/supervision

Patient Care 2: General Critical Care **Overall Intent:** To independently assess and manage patients with critical illness	
Milestones	**Examples**
Level 1 *Recognizes clinical conditions that necessitate escalation to critical care* *Identifies the long-term consequences of critical illness, with substantial guidance*	● Requires attending assistance in recognizing hypotension in a septic patient to determine the appropriate level of care for the patient ● Requires attending physician prompting to identify myopathy as a consequence of sepsis
Level 2 *Manages unstable patients with single-system disease* *Identifies the long-term consequences of critical illness, with minimal guidance*	● Recognizes hypotension and begins fluid resuscitation in a septic patient who needs a higher level of care ● Identifies myopathy as a consequence of sepsis
Level 3 *Manages unstable patients with multisystem disease* *Anticipates long-term consequences of critical illness*	● Manages hypotension and respiratory distress in a septic patient ● Identifies myopathy as a consequence of sepsis, and promotes early mobility in ICU patients
Level 4 *Independently manages unstable patients with multisystem disease and coordinates interdisciplinary care plans* *Anticipates and acts independently to minimize the long-term consequences of critical illness*	● Manages sepsis, acute respiratory distress syndrome (ARDS), and renal failure in a patient, and coordinates respiratory care, hemodynamic management, and dialysis across multiple disciplines ● Identifies myopathy as a consequence of sepsis, and promotes early mobility in ICU patients without attending prompting by reaching out to physical therapy consultants
Level 5 *Serves as a role model for managing unstable patients with multisystem disease and coordinating interdisciplinary care plans* *Independently leads and directs transition to post-intensive care unit care*	● Enrolls patient in ICU survivorship clinic ● Arranges meeting between multiple subspecialty disciplines to coordinate care for a patient with acute liver failure transitioning to a long-term acute care hospital
Assessment Models or Tools	● Direct observation ● Medical record (chart) review ● Multisource feedback ● OSCE ● Simulation ● Standardized patients

Curriculum Mapping	●
Notes or Resources	● Substantial guidance implies direct observation and/or real-time oversight/supervision

Patient Care 3: Neurocritical Care **Overall Intent:** To diagnose and manage patients with neurological critical illness and multisystem disease in the critical care unit	
Milestones	**Examples**
Level 1 *Manages neurologically unstable patients requiring a higher intensity of care, with substantial guidance*	● Applies an algorithmic approach to a patient with status epilepticus with attending oversight
Provides neurocritical care consultation, with substantial guidance	● Requires attending oversight in the consultation of a floor patient with acute inflammatory demyelinating polyradiculopathy (AIDP) and respiratory worsening ● Applies a tiered approach to intracranial hypertension management with attending oversight ● Requires attending oversight to recognize delayed cerebral ischemia in an aneurysmal subarachnoid hemorrhage patient
Level 2 *Manages neurologically unstable patients with single-system disease*	● Initiates a timely algorithmic approach for a patient with status epilepticus
Provides neurocritical care consultation for patients with single-system disease	● Initiates consultation on a floor patient with AIDP and worsening respiratory function and recommends initial therapeutics and management ● Initiates a tiered approach to intracranial hypertension management and orders dexamethasone for a patient with a brain tumor, severe vasogenic edema, and midline shift on brain imaging ● Recognizes delayed cerebral ischemia in an aneurysmal subarachnoid hemorrhage patient and initiates hypertensive therapy
Level 3 *Manages neurologically unstable patients with multisystem disease*	● Implements an algorithmic approach to a patient with status epilepticus who does not respond despite initial therapies and escalates therapies in a timely manner while also managing acute hypoxic respiratory failure from aspiration event
Provides neurocritical care consultation for patients with multisystem disease	● Initiates consultation and gives recommendations for a floor patient with AIDP with worsening respiratory function and acute kidney injury ● Implements a tiered approach to intracranial hypertension in a patient with severe traumatic brain injury and polytrauma ● Initiates hypertensive therapy for delayed cerebral ischemia in an aneurysmal subarachnoid hemorrhage patient who also has acute neurogenic cardiomyopathy with decreased ejection fraction

Level 4 *Independently manages neurologically unstable patients with multisystem disease and coordinates interdisciplinary care plans* *Independently provides comprehensive neurocritical care consultation for patients with complex multisystem disease*	● Manages a patient with refractory status epilepticus, acute hypoxic respiratory failure, and sepsis and coordinates care with other health care providers ● Manages consultation for a patient with AIDP, acute respiratory failure, and acute on chronic kidney disease now requiring dialysis and coordinates and implements care with nephrology ● Manages a patient with a tiered approach to severe traumatic brain injury and polytrauma with refractory intracranial hypertension and coordinates care with neurological surgery and other surgical trauma teams ● Manages and coordinates care with cardiology and interventional neuroradiology for treatment of a patient with delayed cerebral ischemia, heart failure with severely reduced systolic ejection fraction, and acute hypoxic respiratory failure
Level 5 *Serves as a role model for managing unstable neurological patients with multisystem disease and coordinating interdisciplinary care plans* *Serves as a role model for providing comprehensive neurocritical care consultation for patients with complex multisystem disease*	● Coaches other team members and learners at a variety of education levels daily on the management of multiple patients with neurological critical illness and multisystem disease ● Completes a research project on the management of a neurological critical illness disease and presents the data at an international conference
Assessment Models or Tools	● Direct observation ● End-of-rotation evaluation ● Multisource feedback
Curriculum Mapping	●
Notes or Resources	● Substantial guidance implies direct observation and/or real-time attending oversight/supervision ● Lee, K. *The NeuroICU Book*. 2nd ed. New York: McGraw-Hill Education, LCC; 2018. ● Venkatasubramanian, C., Lopez, G.A., O'Phelan, K.H. et al. Emergency Neurological Life Support: Fourth Edition, Updates in the Approach to Early Management of a Neurological Emergency. Neurocrit Care 32, 636–640 (2020). https://doi.org/10.1007/s12028-019-00810-8Tan B, Lopez G, Tesoro E, Witherspoon B. *The Practice of Neurocritical Care*. 2nd ed. Chicago: Neurocritical Care Society; 2021. ● Wijdicks EFM. *The Comatose Patient.* 2nd ed. New York: Oxford University Press; 2014.

Patient Care 4: Diagnostic Evaluation (General) **Overall Intent:** To understand and counsel patients on the indications, risks, benefits, and limitations of a diagnostic study and render an interpretation for patient care	
Milestones	**Examples**
Level 1 *Describes indications for radiographic, laboratory, and bedside diagnostic procedures*	● Recognizes that transcranial doppler is a diagnostic study that can be used to assess for delayed cerebral ischemia/cerebral vasospasm ● Recognizes that a transthoracic echo with bubble study should be completed for suspected cardioembolic stroke in a young patient for potential stroke etiology
Level 2 *Selects radiographic, laboratory, and bedside diagnostic procedures*	● Orders and counsels a patient with aneurysmal subarachnoid hemorrhage on the indications, benefits, and risks of daily transcranial doppler ● Orders and counsels a patient on the indications, risk, and benefits of transthoracic echo with bubble study to a young patient with an acute ischemic stroke
Level 3 *Independently interprets and integrates results of radiographic, laboratory, and bedside diagnostic procedures into the patient care plan*	● Interprets transcranial doppler results, makes care plan changes, and counsels patient or family based on the results ● Interprets transthoracic echo results, makes care plans, and counsels patient based on the results
Level 4 *Independently reconciles divergent data from multiple diagnostic modalities*	● Reconciles limitations of transcranial doppler results with the patient's clinical exam and digital subtraction angiography ● Reconciles limitations of transthoracic echo versus transesophageal assessment in management of acute stroke in a young patient
Level 5 *Designs and implements a clinical pathway for utilizing diagnostic evaluation tools*	● Works with an interdisciplinary team to create an efficient and cost-effective care pathway
Assessment Models or Tools	● Direct observation ● End-of-rotation evaluation ● Multisource feedback
Curriculum Mapping	●
Notes or Resources	● Diaz-Gomez JL, Mayo PH, Koenig SJ. Point-of-care ultrasonography. *NEJM* 2021;385(17):1593-1602. ● Schnobrich DJ, Olson APJ, Broccard A, Duran-Nelson A. Feasibility and acceptability of curriculum in teaching procedural and basic diagnostic ultrasound skills to internal medicine residents. *J Grad Med Educ* 2013:5(3)493-49. ● Rubinowitz AN, Siegel MD, Tocino I. Thoracic imaging in the ICU. *Crit Care Clin* 2007;23(3):539-73.

Patient Care 5: Neurodiagnostic Evaluation (Neuromonitoring, Neuroimaging, etc.) **Overall Intent:** To understand and counsel patients on the indications, risks, benefits, and indications of a diagnostic neurological study and render an interpretation for patient care	
Milestones	**Examples**
Level 1 *Describes indications for neurodiagnostic procedures*	● Recognizes need for electroencephalogram (EEG) in a patient with fluctuating level of consciousness
Level 2 S*elects neurodiagnostic procedures*	● Discusses relative risk and benefit to patient of computerized tomography angiogram (CTA) versus magnetic resonance angiogram (MRA) versus angiogram ● Discusses the benefits of different imaging modalities for refining the diagnosis of a lobar intraparenchymal hemorrhage
Level 3 *Independently interprets and integrates the results of neurodiagnostic procedures into the patient care plan*	● Recognizes generalized status epilepticus on continuous EEG ● Identifies neuroimaging criteria based on computerized tomography (CT) perfusion study for thrombectomy in acute ischemic stroke
Level 4 *Independently reconciles divergent data from multiple neurodiagnostic modalities*	● Makes clinical decision about treatment of a patient with subarachnoid hemorrhage and elevated mean flow velocity on transcranial doppler but normal CT perfusion and unchanged examination
Level 5 *Designs and implements a clinical pathway for utilizing neurodiagnostic evaluation tools*	● Creates a clinical protocol for post-procedural imaging after thrombectomy
Assessment Models or Tools	● Direct observation ● Medical record (chart) audit ● Multisource feedback ● Simulation (case conference)
Curriculum Mapping	●
Notes or Resources	● Brophy GM, Bell R, Claassen J, Alldredge B, Bleck TP, Glauser T, Laroche SM, Riviello JJ Jr, Shutter L, Sperling MR, Treiman DM, Vespa PM. (Neurocritical Care Society Status Epilepticus Guideline Writing Committee). Guidelines for the evaluation and management of status epilepticus.. *Neurocrit Care* 2012 Aug;17(1):3-23. doi: 10.1007/s12028-012-9695-z. PMID: 22528274. ● Muehlschlegel S. Subarachnoid hemorrhage. *Continuum (Minneap Minn).* 2018Dec;24(6):1623-1657. PMID: 30516599 Review.

Patient Care 6: Procedures **Overall Intent:** To demonstrate competence in technical aspects of procedures, complication avoidance, and management of adverse events	
Milestones	**Examples**
Level 1 Assists in performing common intensive care unit (ICU) procedures and recognizes complications	● Places central venous catheter under direct supervision ● Requires faculty member assistance to identify lung sliding on thoracic ultrasound ● Recognizes hypoxemia following flexible bronchoscopy
Level 2 *Performs common and assists with advanced ICU procedures*	● Requires faculty member assistance to perform comprehensive thoracic ultrasound exam ● Recognizes pneumothorax following subclavian central venous catheter placement ● Intubates patients with direct supervision
Level 3 *Performs advanced ICU procedures and troubleshoots common complications*	● Interprets lung sliding on thoracic ultrasound ● Recognizes pneumothorax following subclavian central venous catheter placement and places chest tube with direct assistance from supervisor ● Recognizes a difficult airway prior to independent attempt at intubation
Level 4 *Performs common and advanced ICU procedures and troubleshoots complex complications in patients with complex multisystem illness*	● Independently identifies a complex pleural effusion on thoracic ultrasound ● Recognizes pneumothorax following subclavian central venous catheter placement and emergently performs tube thoracostomy
Level 5 *Serves as a role model for performing difficult procedures*	● Is asked to place central venous catheter by peers after multiple failed attempts
Assessment Models or Tools	● Direct observation ● Multisource feedback ● Simulation
Curriculum Mapping	●
Notes or Resources	● New England Journal of Medicine. NEJM videos in clinical medicine.Created April 2020. https://libraryhub.nejm.org/wp-content/uploads/2020/04/covid-19-videos-in-clinical-medicine.pdf. Accessed 2021. ● “Common” refers to procedures such as central venous cannulation, radial arterial cannulation, therapeutic bronchoscopy, and uncomplicated airway management ● “Advanced” refers to complicated airway management, chest tube placement, and advanced vascular procedures such as femoral or brachial artery cannulation

Medical Knowledge 1: Prognosis in Critical Care Conditions **Overall Intent:** To use clinical, laboratory, and radiologic data along with knowledge of current literature to develop appropriate prognoses for critically ill patients, allowing for appropriate treatment, goals of care, and communication	
Milestones	**Examples**
Level 1 *Recognizes clinical course and natural history, including prognosis of common critical care conditions*	● Recognizes the application of scoring systems for outcomes of a patient with, for example, traumatic brain injury, aneurysmal subarachnoid hemorrhage, or intracerebral hemorrhage ●
Level 2 *Identifies clinical course for patients with complex critical care conditions, including prognostic uncertainty*	● Recognizes the increased risk of mortality for a patient with severe traumatic brain injury or a patient with an aneurysmal subarachnoid hemorrhage with a high Hunt and Hess score ● Recognizes limitations to prognostic tools ●
Level 3 *Formulates anticipated clinical course for patients with complex critical care conditions by integrating prognostic factors, tools, and models*	● Uses recognized and validated tools to help the clinical team evaluate the patient's chance of survival with multi-organ system failure ●
Level 4 *Facilitates consensus of prognosis for patients with complex critical care conditions in collaboration with other care providers*	● Uses clinical data and published literature to help a multidisciplinary team formulate a clinical care plan for a comatose patient with traumatic brain injury and respiratory and renal failure ●
Level 5 *Advances knowledge of application of tools for prognostication in complex critical care conditions*	● Publishes a review article on the prognosis of patients with severe traumatic brain injury ● Gives a lecture on prognostication at the local or regional level ● Completes a research project related to prognostication ● Establishes triage criteria based on prognostic models
Assessment Models or Tools	● Direct observation ● End-of-rotation evaluation ● Multisource feedback
Curriculum Mapping	●
Notes or Resources	● "Substantial guidance" implies direct observation and/or real-time oversight/supervision ● American College of Surgeons. *Surgical Palliative Care: A Residents Guide*. Chicago, IL: American College of Surgeons; 2009. https://www.facs.org/~/media/files/education/palliativecare/surgicalpalliativecareresidents.ashx..

	● Goettler CE, Waibel BH, Goodwin J, et al. Trauma intensive care unit survival: How good is an educated guess? *J Trauma*. 2010;68(6):1279-87. https://pubmed.ncbi.nlm.nih.gov/20539170/. ● Raith EP, Udy AA, Bailey M, et al. Prognostic accuracy of the SOFA Score, SIRS Criteria, and qSOFA Score for in-hospital mortality among adults with suspected infection admitted to the intensive care unit. *JAMA*. 2017;317(3):290-300. https://jamanetwork.com/journals/jama/fullarticle/2598267. ● Raj R, Skrifvars M, Bendel S, et al. Predicting six-month mortality of patients with traumatic brain injury: Usefulness of common intensive care severity scores. *Crit Care*. 2014;18(2):R60. https://ccforum.biomedcentral.com/articles/10.1186/cc13814.

Medical Knowledge 2: Pathophysiology and Therapeutics for General Critical Care **Overall Intent:** To develop a hypothesis-driven and individualized approach to management of critical illness	
Milestones	**Examples**
Level 1 *Demonstrates knowledge of pathophysiology, pharmacology, and therapeutics for common diseases*	● Identifies causes of acute respiratory failure ● Compares different types of shock in a hypotensive patient ● Differentiates the types of tachydysrhythmias and bradydysrhythmias
Level 2 *Applies knowledge of pathophysiology, pharmacology, and therapeutics for common diseases*	● Manages the ventilator settings for a patient who was intubated for acute respiratory failure ● Discusses pathophysiology of undifferentiated septic shock and initiates early source control ● Initiates pharmacologic treatment of atrial fibrillation with rapid ventricular response
Level 3 *Demonstrates knowledge of pathophysiology, pharmacology, and therapeutics for complex diseases*	● Identifies causes of persistent hypoxemia in a patient who is on ventilatory support ● Identifies factors that would predict a patient needs extracorporeal membrane oxygenation ● Identifies indications for continuous renal replacement therapy (CRRT)
Level 4 *Applies knowledge of pathophysiology, pharmacology, and therapeutics for complex diseases*	● Manages ventilator settings in patients with refractory hypoxemia (severe ARDS) ● Discerns whether the patient needs CRRT versus hemodialysis
Level 5 *Advances knowledge of pathophysiology, pharmacology, and therapeutics*	● Participates in a trial on management of respiratory failure ● Publishes a metanalysis on noninvasive ventilation versus early intubation for acute respiratory failure
Assessment Models or Tools	● Direct observation ● In-service examination ● Medical record (chart) review ● Multisource feedback ● Simulation ● Standardized patients
Curriculum Mapping	●
Notes or Resources	● Murugan R, et al. Ultrafiltration in critically ill patients treated with kidney replacement therapy. *Nature Reviews Nephrology* 2021;17:262-276. ● Pham T, Brochard LJ, Slutsky AS. Mechanical Ventilation: State of the Art. *Mayo Clin Proc* 2017;92(9):1382-1400.

Medical Knowledge 3: Pathophysiology and Therapeutics for Neurocritical Care **Overall Intent:** To develop a hypothesis-driven and individualized approach to management of critically ill patients with acute neurologic diagnoses	
Milestones	**Examples**
Level 1 *Demonstrates knowledge of pathophysiology, pharmacology, and therapeutics for common neurocritical care diseases*	● Lists the treatment options to treat status epilepticus ● Identifies diagnoses that require monitoring of intracranial pressure ● Verbalizes the risks of rebleeding in patients with an acute subarachnoid hemorrhage ● Verbalizes the mechanism of action of pyridostigmine for the management of myasthenia gravis
Level 2 *Applies knowledge of pathophysiology, pharmacology, and therapeutics for common neurocritical care diseases*	● Determines when an antifibrinolytic should be administered to a patient with an acute subarachnoid hemorrhage ● Uses an accepted guideline to treat acute status epilepticus ● Modifies the antibiotic regimen for an acute myasthenic crisis ● Predicts the arteriographic findings on an acute stroke victim based on the neurologic examination ● Manages transient intracranial hypertension
Level 3 *Demonstrates knowledge of pathophysiology, pharmacology, and therapeutics for complex neurocritical care diseases*	● Identifies the patient who needs continuous EEG to monitor for nonconvulsive status epilepticus ● Interprets a positive troponin in a patient who has neurogenic stress cardiomyopathy after a subarachnoid hemorrhage ● Explains the complex respiratory dysfunction in a patient with acute spinal cord injury
Level 4 *Applies knowledge of pathophysiology, pharmacology, and therapeutics for complex neurocritical care diseases*	● Independently interprets an MRI in a patient with posterior reversible encephalopathy syndrome ● Manages refractory intracranial hypertension ● Independently provides medical and ventilator management of a patient with an acute spinal cord injury
Level 5 *Performs research on the pathophysiology, pharmacology, or therapeutics for neurocritical care disease*	● Participates in a clinical trial for a new pharmacologic therapy for status epilepticus ● Performs a randomized, noninferiority trial between two therapies ● Participates in a trial of medical versus interventional therapy of cerebral vasospasm post-subarachnoid hemorrhage
Assessment Models or Tools	● Direct observation ● In-service examination ● Medical record (chart) review ● Multisource feedback ● Simulation ● Standardized patients
Curriculum Mapping	●

Notes or Resources	● Brophy GM, et al. Guidelines for the evaluation and management of status epilepticus. *Neurocrit Care* 2012:3-23. ● Diringer MN, et al. Critical Care management of patients following aneursymal subarachnoid hemorrhage: Recommendations from the Neurocritical Care Society's Multidisciplinary Consensus Conference *Neurocrit Care* 2011;15:211-240.

Medical Knowledge 4: Determination of Death by Neurologic Criteria **Overall Intent:** To perform examination to determine death by neurologic criteria and discuss its medical, legal, and cultural significance	
Milestones	**Examples**
Level 1 *Lists the components for determining death by neurologic criteria and performs bedside neurologic maneuvers*	● Evaluates for confounders that need correction, such as hypothermia, prior to performance of brain death examination ● Describes how to perform all exam components ● Performs bedside maneuvers, including oculovestibular testing and apnea test
Level 2 *Demonstrates knowledge of medical and legal significance of death by neurologic criteria*	● Describes death by neurologic criteria as the complete and permanent loss of brain function ● Identifies how to access relevant state legal requirements, hospital protocols, and relevant published guidelines
Level 3 *Accurately performs determination of death by neurologic criteria*	● Correctly performs all aspects and maneuvers of the brain death examination, including interpretation of supplemental testing
Level 4 *Describes supplemental testing used to determine death by neurologic criteria*	● Identifies the need for supplemental testing for patients with severe hypoxia, orbital fractures, or other confounders ● Knows which clinical situation requires supplemental testing modalities, such as nuclear medicine perfusion scan, catheter angiography, or transcranial doppler ultrasound
Level 5 *Educates others in the determination of death by neurologic criteria, including appropriate use of supplemental testing, as well as controversies*	● Designs a simulation course for brain death examination
Assessment Models or Tools	● Case-based discussion ● Direct observation ● Medical record (chart) review ● Simulation
Curriculum Mapping	●
Notes or Resources	● Greer DM, Shamie SD, Lewis A, et al. Determination of brain death/death by neurologic criteria: The World Brain Death Project. *JAMA*. 2020;324(11):1078-1097. doi:10.1001/jama.2020.11586 ● Widjicks EFM, Varelas PN, Gronseth GS, Greer DM. Evidence-based guideline update: Determining brain death in adults; Report of the Quality Standards Subcommittee of the American Academy of Neurology. *Neurology*. 2010; 74(23):1911-1918. DOI: https://doi.org/10.1212/WNL.0b013e3181e242a8

Systems-Based Practice 1: Patient Safety **Overall Intent:** To engage in the analysis and management of patient safety events, including relevant communication with patients, families, and health care professionals	
Milestones	**Examples**
Level 1 *Demonstrates knowledge of commonly reported patient safety events* *Demonstrates knowledge of how to report patient safety events*	● Lists patient misidentification or medication errors as common patient safety events ● Describes how to report errors in the ICU environment
Level 2 *Identifies system factors that lead to patient safety events* *Reports patient safety events through institutional reporting systems*	● Identifies ventriculostomy over-drainage due to incorrect leveling of the drainage chamber ● Reports a medication error caused by an inadequate hand-off
Level 3 *Participates in analysis of patient safety events* *Participates in disclosure of patient safety events to patients and patients' families*	● Prepares and presents a morbidity and mortality presentation ● Through simulation, communicates with patients/families about an anticoagulation dose administration error
Level 4 *Conducts analysis of patient safety events and offers error prevention strategies* *Discloses patient safety events to patients and patients' families*	● Collaborates in the analysis of a medication error due to ordering in electronic health record (EHR) ● Discloses a medication error to patients/families
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*	● Engages appropriate stakeholders to improve early detection of inpatient neurological emergencies and provide training in the hospital ● Leads a simulation for residents in error disclosure
Assessment Models or Tools	● Direct observation ● Documentation of patient safety project ● E-module multiple choice tests ● Medical record (chart) audit ● Multisource feedback ● Portfolio ● Simulation

Curriculum Mapping	●
Notes or Resources	● Institute of Healthcare Improvement. http://www.ihi.org/Pages/default.aspx. Accessed 2020. ● Agency for Healthcare Research and Quality. Detection of Safety Hazards Prime. https://psnet.ahrq.gov/primer/detection-safety-hazards. Accessed 2020. ● AHRQ. Measurement of Patient Safety. https://psnet.ahrq.gov/primer/measurement-patient-safety. Accessed 2020.

Systems-Based Practice 2: Quality Improvement (QI) **Overall Intent:** To demonstrate the ability to conduct a QI project	
Milestones	**Examples**
Level 1 *Demonstrates knowledge of basic quality improvement methodologies*	● Identifies use of fishbone diagram to delineate factors involved in patient safety event
Level 2 *Describes local quality improvement initiatives*	● Describes initiatives to improve identification of status epilepticus ● Describes initiatives to decrease rates of urinary tract infections in ICU patients
Level 3 *Participates in local quality improvement initiatives*	● Participates in a QI project to decrease central line infections
Level 4 *Demonstrates the skills required to identify, develop, implement, and analyze a quality improvement project*	● Designs a QI project that reviews the results of a protocol designed to decrease urinary tract infections in ICU patients ● Evaluates data to determine if new protocol improves compliance with stroke metric guidelines
Level 5 *Creates, implements, and assesses quality improvement initiatives at the institutional or community level*	● Initiates a multidisciplinary QI project to update a protocol to improve post-surgical neurocritical care for patients with traumatic brain injury
Assessment Models or Tools	● Direct observation ● Documentation of QI project ● E-module multiple choice tests ● Medical record (chart) audit ● Multisource feedback
Curriculum Mapping	●
Notes or Resources	● Institute of Healthcare Improvement (IHI). http://www.ihi.org/Pages/default.aspx. Accessed 2020. ● IHI Open School Online Courses. http://app.ihi.org/lmsspa/#/6cb1c614-884b-43ef-9abd-d90849f183d4. Accessed 2020. ● IHI. QI 102: How to Improve with the Model for Improvement. http://app.ihi.org/lmsspa/#/1431fa43-38e4-4e40-ab3b-7887d3254f72/41b3d74d-f418-4193-86a4-ac29c9565ff1. Accessed 2020.

Systems-Based Practice 3: 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 interprofessional team, including the nurse, respiratory therapist, registered dietician, physical therapist, occupational therapist, speech therapists, and social workers
Performs safe and effective transitions of care/hand-offs in routine clinical situations	● Lists the essential components of an effective sign-out and care transition, including sharing information necessary for successful transitions
Demonstrates knowledge of population and community health needs and inequities	● Identifies components of social determinants of health and how they impact the delivery of patient care
Level 2 *Coordinates care of patients in routine clinical situations effectively using the roles of interprofessional team members*	● Contacts social worker and pharmacist to obtain assistance for obtaining antiepileptic medication at the time of discharge from the hospital
Performs safe and effective transitions of care/hand-offs in complex clinical situations	● Provides anticipatory guidance to night float team about a patient with new onset Guillain-Barre syndrome with fluctuating blood pressure
Identifies specific population and community health needs and inequities for the local population and community	● Identifies patients at risk for specific health outcomes related to malnutrition and/or alcohol use admitted with acute stroke
Level 3 *Coordinates care of patients in complex clinical situations effectively using the roles of interprofessional team members*	● Coordinates care of a patient with myasthenic crisis with other health care professionals including respiratory therapy, nursing, pharmacy, and transfusion/apheresis services
Supervises transitions of care by other team members	● Effectively supervises residents in shift-to-shift hand-off and when patients are transitioned from ICU to a step-down unit
Effectively uses local resources to meet the needs of a patient population and community	● Works with palliative care and hospice teams for uninsured patients desiring to die at home
Level 4 *Role models effective coordination of patient-centered care among different disciplines and specialties*	● Leads a multidisciplinary team meeting for a patient with infectious endocarditis and multiple strokes to determine treatment course

Role models safe and effective transitions of care/hand-offs within and across health care delivery systems *Adapts practice to provide for the needs of specific populations*	● Leads a multidisciplinary discharge conference for the transition of a patient from the ICU to a long-term acute care hospital (LTACH) facility ● Works with palliative care and hospice teams to facilitate the resources needed for an uninsured patient desiring to die at home ● Works with the interprofessional teams to arrange family meetings virtually or in the evening after the family member finishes a shift at work
Level 5 *Develops projects to improve quality of transitions of care into and out of the neurocritical care setting to optimize patient outcomes* *Leads innovations in adapting practice and systems for populations and communities with health care inequities*	● Designs neurocritical care consult system and admission order set for patients admitted from the emergency department ● Develops a telehealth program for outlying hospitals in need of neurocritical care consultation
Assessment Models or Tools	● Direct observation ● Medical record (chart) audit ● Multisource feedback ● Simulation
Curriculum Mapping	●
Notes or Resources	● Centers for Disease Control and Prevention. Population Health Training. https://www.cdc.gov/pophealthtraining/whatis.html. Accessed 2020. ● American Medical Association (AMA). AMA Health Systems Science Learning Series. https://edhub.ama-assn.org/health-systems-science/.

Systems-Based Practice 4: Physician Role in Health Care Systems **Overall Intent:** To understand the physician's role in impacting health care system to improve patient care	
Milestones	**Examples**
Level 1 *Describes basic health care delivery systems*	● Identifies that medical documentation must meet coding and billing requirements
Level 2 *Describes how components of a complex health care delivery system are interrelated, and how this impacts patient care*	● Recognizes that medical documentation can influence the severity of illness determination upon discharge, and hence hospital reimbursement, and ranking amongst peer institutions
Level 3 *Discusses how individual practice affects the broader system*	● Discusses the impact of daily chest x-rays of intubated patients with pneumonia on the broader health care system
Level 4 *Advocates for patient care needs (e.g., community resources, patient assistance resources) with consideration of the limitations of each patient's payment model*	● Works collaboratively to improve patient assistance resources for a patient with a recent ICU admission and limited resources who will need inpatient rehabilitation ● Recognizes that the lack of an ICU patient care coordinator is resulting in longer ICU stays and works with the ICU nursing manager and medical director to request resources from hospital administration
Level 5 *Advocates for or leads systems change that enhances high-value, efficient, and effective patient care*	● Improves informed consent process for non-English-speaking patients requiring interpreter services ● Performs a quality improvement project to assess the utility of screening lower extremity doppler ultrasound to identify deep venous thrombosis
Assessment Models or Tools	● Direct observation ● Medical record (chart) audit ● Portfolio ● QI project ● Reflection
Curriculum Mapping	●
Notes or Resources	● AHRQ. Measuring the Quality of Physician Care. https://www.ahrq.gov/professionals/quality-patient-safety/talkingquality/create/physician/challenges.html. Accessed 2020. ● AHRQ. Major Physician Measurement Sets. https://www.ahrq.gov/professionals/quality-patient-safety/talkingquality/create/physician/measurementsets.html. Accessed 2020. ● Commonwealth Fund. Health System Data Center. https://datacenter.commonwealthfund.org/#ind=1/sc=1. Accessed 2020. ● Commonwealth Fund. Health Reform Resource Center. http://www.commonwealthfund.org/interactives-and-data/health-reform-resource-center#/f:@facasubcategoriesfacet63677=[Individual%20and%20Employer%20Responsibility. Accessed 2020.

	● Dzau VJ, McClellan MB, McGinnis JM, et al. Vital directions for health and health care: priorities from 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/. ● Kaiser Family Foundation. Health Reform. https://www.kff.org/topic/health-reform/. Accessed 2020.

Practice-Based Learning and Improvement 1: Evidence-Based and Informed Practice **Overall Intent:** To incorporate evidence from varied sources to optimize patient care, and to critically appraise the sources and analyze conflicting evidence	
Milestones	**Examples**
Level 1 *Demonstrates how to access and use available evidence and incorporate patient preferences and values to the care of a routine patient*	● Searches for appropriate evidence-based guidelines for a patient with status epilepticus
Level 2 *Articulates clinical questions and elicits patient preferences and values to guide evidence-based care*	● Asks a patient with amyotrophic lateral sclerosis (ALS) their preferences for ventilatory support and creates search criteria for options ● Performs a literature search on ventilator management for a patient with traumatic brain injury
Level 3 *Locates and applies the best available evidence, integrated with patient preference, to the care of complex patients*	● Applies evidence for alternate rescue therapy in a patient with myasthenia gravis who declines blood products
Level 4 *Critically appraises and applies evidence, even in the face of uncertainty, and interprets conflicting evidence to guide care tailored to the individual patient*	● Accesses the primary literature to address a unique clinical situation when the evidence is unclear or emerging ● Identifies new evidence that challenges current practice and applies given the context of the individual patient
Level 5 *Coaches others to critically appraise and apply evidence for complex patients, and/or participates in the development of guidelines*	● Coaches a resident on the interpretation of randomized control trials
Assessment Models or Tools	● Direct observation ● Journal club assessment ● Presentation
Curriculum Mapping	●
Notes or Resources	● US National Library of Medicine. PubMed Tutorial. https://www.nlm.nih.gov/bsd/disted/pubmedtutorial/cover.html. Accessed 2020. ● Glasser SP, Howard G. Clinical trial design issues: at least 10 things you should look for in clinical trials. *J Clin Pharmacol*. 2006;46(10):1106-1115. https://accp1.onlinelibrary.wiley.com/doi/abs/10.1177/0091270006290336. ● Institutional Review Board (IRB) guidelines ● Krogh CL. A checklist system for critical review of medical literature. *Med Educ*. 1985;19(5):392-395. https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1365-2923.1985.tb01343.x?sid=nlm%3Apubmed. ● National Institutes of Health. Write Your Application. https://grants.nih.gov/grants/how-to-apply-application-guide/format-and-write/write-your-application.htm. Accessed 2020.

	● Neely JG, Karni RJ, Wang EW, et al. Practical guide to efficient analysis and diagramming articles. *Otolaryngol Head Neck Surg.* 2009;140(1):4-8. https://journals.sagepub.com/doi/abs/10.1016/j.otohns.2008.10.013?rfr_dat=cr_pub%3Dpubmed&url_ver=Z39.88-2003&rfr_id=ori%3Arid%3Acrossref.org&journalCode=otoj.

Practice-Based Learning and Improvement 2: Reflective Practice and Commitment to Personal Growth **Overall Intent:** To seek performance data and develop a learning plan	
Milestones	**Examples**
Level 1 *Demonstrates an openness to performance data (feedback and other input)*	● Seeks feedback from other team members
Level 2 *Demonstrates an openness to performance data and uses it to develop personal and professional goals* *Identifies the factors that contribute to the gap(s) between expectations and actual performance*	● Identifies gaps in diagnostic skills using feedback from others ● Seeks opportunities to improve communication skills ● Meets with a mentor to select elective experiences to remedy performance gaps
Level 3 *Seeks and accepts performance data for developing personal and professional goals* *Analyzes and reflects on the factors that contribute to gap(s) between expectations and actual performance*	● Takes input from peers/colleagues and supervisors to gain complex insight into personal strengths and weaknesses ● Accepts feedback in an appreciative and non-defensive manner ● Implements a structured reading plan for performance gaps ● Independently selects elective experiences to remedy performance gaps
Level 4 *Using performance data, continually improves and measures the effectiveness of one's personal and professional goals* *Analyzes, reflects on, and institutes behavioral change(s) to narrow the gap(s) between expectations and actual performance*	● Reviews clinical performance data in anticipation of meeting with mentor ● Proposes study sessions with colleagues on specific topics ● Reviews in-service training exam and revises learning plan accordingly
Level 5 *Acts as a role model for the development of personal and professional goals* *Coaches others on reflective practice*	● Discusses personal successes and challenges in performance gaps with more junior colleagues ● Counsels others in effective team dynamics ● Mentors residents in review of performance data and advises on design of learning plan
Assessment Models or Tools	● Direct observation ● End-of-rotation evaluation ● Multisource feedback ● Portfolios ● Review of individual learning plans and rotation schedule
Curriculum Mapping	●

Notes or Resources	● Hojat M, Veloski JJ, Gonnella JS. Measurement and correlates of physicians' lifelong learning. *Academic Medicine.* 2009;84(8):1066-1074. https://journals.lww.com/academicmedicine/fulltext/2009/08000/Measurement_and_Correlates_of_Physicians__Lifelong.21.aspx. ● Lockspeiser TM, Schmitter PA, Lane JL, Hanson JL, Rosenberg AA, Park YS. Assessing residents' written learning goals and goal writing skill: validity evidence for the learning goal scoring rubric. *Academic Medicine*. 2013;88(10):1558-1563. https://journals.lww.com/academicmedicine/fulltext/2013/10000/Assessing_Residents__Written_Learning_Goals_and.39.aspx.

Professionalism 1: Professional Behavior and Ethical Principles **Overall Intent:** To demonstrate ethical/professional behaviors and use resources to address ethical/professional conflicts	
Milestones	**Examples**
Level 1 *Identifies and describes potential triggers for professionalism lapses* *Demonstrates knowledge of ethical principles related to patient care*	● Identifies that sleep deprivation can be a trigger for a lapse in professionalism ● Demonstrates knowledge of system to report breaches of professionalism in own institution ● Discusses the basic principles underlying ethics and professionalism and how they apply in various situations
Level 2 *Demonstrates insight into professional behavior in routine situations and takes responsibility for personal lapses* *Analyzes straightforward situations using ethical principles*	● Acts professionally in daily interactions ● Acknowledges lapses without becoming defensive, making excuses, or blaming others, and takes steps to make amends ● Monitors and responds to fatigue, hunger, stress, etc. in self and team members ● Applies ethical principles to straightforward informed consent
Level 3 *Demonstrates professional behavior in complex or stressful situations* *Analyzes complex situations using ethical principles*	● Navigates situations while under stress or when there are system barriers ● Applies ethical principles to end-of-life situations, including organ donation
Level 4 *Intervenes to prevent professionalism lapses in oneself and others* *Recognizes and uses appropriate resources for managing and resolving ethical dilemmas as needed*	● Assumes positive intent in evaluating others' perspective ● Refers a colleague who is distressed or using substances to appropriate resources ● Requests ethics consult for patients for whom there is disagreement on proposed plan of care between patient's family members
Level 5 *Coaches others when their behavior fails to meet professional expectations* *Identifies and seeks to address system-level factors that induce or exacerbate ethical problems or impede their resolution*	● Serves as peer advisor about professional expectations and behavior ● Serves as the fellow member of the IRB, Ethics, or Peer-Review Committee ● Identifies and works to resolve institutional policies that contribute to clinician stress
Assessment Models or Tools	● Case-based assessment ● Direct observation ● Multisource feedback ● Simulation

Curriculum Mapping	●
Notes or Resources	● American Medical Association. Ethics. https://www.ama-assn.org/delivering-care/ama-code-medical-ethics. Accessed 2020. ● Bernat JL. *Ethical Issues in Neurology*. 3rd ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2008. ● Bynny RL, Paauw DS, Papadakis MA, Pfeil S. *Medical Professionalism Best Practices: Professionalism in the Modern Era*. Aurora, CO: Alpha Omega Alpha Medical Society; 2017. *Medical Professionalism Best Practices: Professionalism in the Modern Era*. Aurora, CO: Alpha Omega Alpha Medical Society; 2017. http://alphaomegaalpha.org/pdfs/Monograph2018.pdf. ● Levinson W, Ginsburg S, Hafferty FW, Lucey CR. *Understanding Medical Professionalism*. 1st ed. New York, NY: McGraw-Hill Education; 2014.

Professionalism 2: Accountability/Conscientiousness **Overall Intent:** To take responsibility for one's actions and the impact of one's behavior on patients and members of the team	
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*	● Adapts workflow to improve timeliness of note completion
Responds promptly to requests or reminders to complete tasks and responsibilities	● Has timely attendance at conferences ● Responds promptly to reminders from program administrator to complete work hour logs
Level 2 *Performs tasks and responsibilities in a timely manner with appropriate attention to detail in routine situations*	● Completes and documents safety modules on time ● Completes accurate documentation without copy/paste errors
Recognizes situations that may impact one's own ability to complete tasks and responsibilities in a timely manner	● Proactively recognizes it may be difficult to complete a task before going out of town and makes plans accordingly
Level 3 *Performs tasks and responsibilities in a timely manner with appropriate attention to detail in complex or stressful situations*	● Triages multiple consults, texts, and phone calls to provide timely, safe, and comprehensive care
Proactively implements strategies to ensure that the needs of patients, teams, and systems are met	● Asks for assistance from other fellows or faculty members when needed ● Adopts solutions developed through QI projects
Level 4 *Recognizes situations in which one's own behavior may impact others' ability to complete tasks and responsibilities in a timely manner*	● Demonstrates awareness of others' interdependence upon them in team-based activities ● Addresses team issues that impede efficient completion of patient care tasks ● Redistributes team workload to ensure equitable balance
Level 5 *Develops or implements strategies to improve system-wide problems to improve ability for oneself and others to complete tasks and responsibilities in a timely fashion*	● Establishes daily nurse manager meetings to streamline patient discharges
Assessment Models or Tools	● Compliance with deadlines and timelines ● Direct observation ● Multisource feedback

	● Self-evaluations and reflective tools
Curriculum Mapping	●
Notes or Resources	● AMA. Ethics. https://www.ama-assn.org/sites/ama-assn.org/files/corp/media-browser/principles-of-medical-ethics.pdf. Accessed 2020. ● Code of conduct from fellow/resident institutional manual ● Expectations of fellowship program regarding accountability and professionalism

Professionalism 3: Well-Being **Overall Intent:** To develop a plan for personal and professional well-being	
Milestones	**Examples**
Level 1 *Recognizes importance of personal and professional well-being*	● Discusses the impact of burnout on well-being
Level 2 *Independently recognizes status of personal and professional well-being*	● Knows how to access local mental health resources ● Attends institutional lecture on available resources
Level 3 *With assistance, proposes a plan to optimize personal and professional well-being*	● Works with a mentor to optimize work-life integration
Level 4 *Independently develops a plan to optimize personal and professional well-being*	● Organizes group outing for co-fellows
Level 5 *Coaches others when emotional responses, behaviors, or interpersonal interactions raise concerns about personal and professional well-being*	● Develops a departmental or institutional wellness program
Assessment Models or Tools	● Direct observation ● Group interview or discussions for team activities ● Individual interview ● Institutional online training modules
Curriculum Mapping	●
Notes or Resources	● This subcompetency is not intended to evaluate a fellow's well-being. Rather, the intent is to ensure that each fellow has the fundamental knowledge of factors that impact well-being, the mechanism by which those factors impact well-being, and available resources and tools to improve well-being. ● Accreditation Council for Graduate Medical Education. "Well-Being Tools and Resources." https://dl.acgme.org/pages/well-being-tools-resources. Accessed 2022. ● Local resources, including Employee Assistance Programs

Interpersonal and Communication Skills 1: Patient- and Family-Centered Communication **Overall Intent:** To deliberately use language and behaviors to form constructive relationships with patients and families	
Milestones	**Examples**
Level 1 *Uses language and non-verbal behavior to demonstrate respect and establish rapport* *Identifies the need to individualize communication strategies based on the patient's/patient's family's expectations and understanding*	● Monitors and controls tone, non-verbal responses, and language to encourage dialogue ● Accurately communicates role in the health care system to patients/families ● Ensures communication is at the appropriate level, for example, a layperson
Level 2 *Establishes a therapeutic relationship in straightforward encounters using active listening and clear language* *Communicates compassionately with the patient/patient's family to clarify expectations and verify understanding of the clinical situation*	● Restates patient perspective when discussing diagnosis and management ● Counsels patient with new onset epilepsy about driving restrictions ● Participates in a family meeting to discuss patient care goals
Level 3 *Establishes a therapeutic relationship in challenging patient encounters* *Communicates medical information in the context of the patient's/patient's family's values, uncertainty, and conflict*	● Effectively counsels a patient with opioid use disorder on pain management strategies ● Organizes a family meeting to address caregiver expectations for a stroke patient transition to home; reassesses patient and family understanding and anxiety
Level 4 *Easily establishes therapeutic relationships, with attention to the patient's/patient's family's concerns and context, regardless of complexity* *Uses shared decision making to align the patient's/patient's family's values, goals, and preferences with treatment options*	● Continues to engage family members with disparate goals in the care of a patient with anoxic encephalopathy ● Recommends a plan for a patient with ALS to align patient and family goals for patient to remain at home
Level 5 *Mentors others in situational awareness and critical self-reflection to consistently develop positive therapeutic relationships*	● Leads debriefing after a difficult family meeting ● Leads teaching session on conflict resolution

Role models shared decision making in the context of the patient's/patient's family's values, uncertainty, and conflict	● Establishes effective relationships with families after a grievance
Assessment Models or Tools	● Direct observation ● Self-assessment including self-reflection exercises ● Standardized patients ● Structured case discussions
Curriculum Mapping	●
Notes or Resources	● Laidlaw A, Hart J. Communication skills: an essential component of medical curricula. Part I: Assessment of clinical communication: AMEE Guide No. 51. *Med Teach*. 2011;33(1):6-8. https://www.tandfonline.com/doi/full/10.3109/0142159X.2011.531170. ● 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.

Interpersonal and Communication Skills 2: Barrier and Bias Mitigation **Overall Intent:** To recognize barriers and biases in communication and develop approaches to mitigate them	
Milestones	**Examples**
Level 1 *Identifies common barriers to effective patient care and has knowledge regarding common human biases*	● Demonstrates awareness of interpretation services
Level 2 *Identifies complex barriers to effective patient care*	● Demonstrates respect for different cultural practices ● Provides alternate patient education materials for patients with low health literacy
Level 3 *Recognizes personal biases and mitigates barriers to optimize patient care, when prompted*	● Reflects on assumptions about a patient's sexuality or gender identity
Level 4 *Recognizes personal biases and proactively mitigates barriers to optimize patient care*	● Identifies socioeconomic factors for patients labeled as "non-compliant" and adapts regimens to improve accessibility
Level 5 *Mentors others on recognition of bias and mitigation of barriers to optimize patient care*	● Role models self-awareness and reflection around explicit and implicit biases ● Develops programs that mitigate barriers to patient education
Assessment Models or Tools	● Direct observation ● Self-assessment ● Standardized patients ● Structured case discussions
Curriculum Mapping	●
Notes or Resources	● Laidlaw A, Hart J. Communication skills: an essential component of medical curricula. Part I: Assessment of clinical communication: AMEE Guide No. 51. *Med Teach*. 2011;33(1):6-8. https://www.tandfonline.com/doi/full/10.3109/0142159X.2011.531170. ● 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.

Interpersonal and Communication Skills 3: Complex Communication around Serious Illness **Overall Intent:** To sensitively and effectively communicate about serious illness with patients and their families/caregivers, promoting shared decision making and assessing the evolving impact on all involved	
Milestones	**Examples**
Level 1 *Identifies prognostic communication as a key element for shared decision-making*	● Recognizes importance of communicating prognosis to permit shared decision making but unable to do so independently
Level 2 *Assesses a patient's family's/caregiver's prognostic awareness and identifies preferences for receiving prognostic information*	● Using open-ended questions, can determine a patient's/family's prognostic awareness and discuss patient/family preferences for how communication about prognosis should occur
Level 3 *Delivers basic prognostic information and attends to emotional responses of a patient and patient's family/caregiver(s)*	● Consistently responds to emotion in conversations by using evidence-based communication strategies
Level 4 *Tailors communication of prognosis according to disease characteristics and trajectory, patient consent/preference, patient's family's needs, and medical uncertainty, and is able to address intense emotional response*	● Adjusts communication with family/caregivers to address uncertainty and conflicting prognostic estimates after an acute brain injury
Level 5 *es others in the communication of prognostic information*	● Develops a simulation module to teach communication of prognosis
Assessment Models or Tools	● Direct observation ● OSCE
Curriculum Mapping	●
Notes or Resources	● Back AL, Arnold RM, Tulsky JA. *Mastering Communication with Seriously Ill Patients: Balancing Honesty with Empathy and Hope*. 1st ed. New York, NY: Cambridge University Press; 2009. ● Back AL, Arnold RM, Baile WF, Tulsky JA, Fryer-Edwards K. Approaching difficult communication tasks in oncology. *CA Cancer J Clin*. 2005;55(3):164-77. https://acsjournals.onlinelibrary.wiley.com/doi/full/10.3322/canjclin.55.3.164?sid=nlm%3Apubmed. ● Center to Advance Palliative Care. https://www.capc.org/. Accessed 2020. ● Childers JW, Back AL, Tulsky JA, Arnold RM. REMAP: a framework for goals of care conversations. *J Oncol Pract*. 2017;13(10):e844-e850. https://ascopubs.org/doi/10.1200/JOP.2016.018796. ● Levetown M, American Academy of Pediatrics Committee on Bioethics. Communicating with children and families: from everyday interactions to skill in conveying distressing information. *Pediatrics*. 2008;121(5):e1441-1460. https://pediatrics.aappublications.org/content/121/5/e1441.long.

	● Shaw DJ, Davidson JE, Smilde RI, Sondoozi T, Agan D. Multidisciplinary team training to enhance family communication in the ICU. *Crit Care Med*. 2014;42(2):265-271. https://journals.lww.com/ccmjournal/Abstract/2014/02000/Multidisciplinary_Team_Training_to_Enhance_Family.4.aspx. ● VITALtalk. https://www.vitaltalk.org/. Accessed 2020. ● White D, et al. A Randomized Trial of a Family-Support Intervention in Intensive Care Units. *N Engl J Med* 2018; 378:2365-2375.

Interpersonal and Communication Skills 4: Interprofessional and Team Communication **Overall Intent:** To effectively communicate with the health care team, including consultants, in both straightforward and complex situations	
Milestones	**Examples**
Level 1 *Uses language that reflects the values all members of the health care team* *Receives feedback in a respectful manner*	● Shows respect in health care team communications through words and actions ● Listens to and considers others' points of view, is nonjudgmental, and is actively engaged
Level 2 *Communicates information effectively with all health care team members* *Solicits feedback on performance as a member of the health care team*	● Verifies rationale for recommendations given ● Accepts all consult requests graciously ● Uses teach-back strategies to confirm understanding
Level 3 *Engages in active listening to adapt to the communication styles of the team* *Communicates concerns and provides feedback to peers and learners*	● Clarifies the rationale for ordering a sleep medicine consultation in a patient with a neuromuscular disorder ● Provides recommendations in the chart to clearly communicate rationale and plan ● Uses verbal and written communication strategies to improve understanding during consultations
Level 4 *Uses effective communication to lead or manage health care teams* *Communicates feedback and constructive criticism to superiors*	● Reconciles conflicting recommendations from multiple consulting teams ● Respectfully provides end of rotation feedback to other members of the team
Level 5 *Acts as a role model for communication skills necessary to lead or manage health care teams* *In complex situations, facilitates regular health care team-based feedback*	● Organizes and leads a multidisciplinary team meeting to discuss and resolve potentially conflicting points of view on a plan of care ● Solicits 360-degree feedback on the team performance after a complex case that had an unanticipated outcome.
Assessment Models or Tools	● Direct observation ● Medical record (chart) review ● Multisource feedback ● Simulation
Curriculum Mapping	●

Notes or Resources	● Green M, Parrott T, Crook G. Improving your communication skills. *BMJ.* 2012;344:e357. https://www.bmj.com/content/344/bmj.e357. ● Haig KM, Sutton S, Whittington J. SBAR: a shared mental model for improving communication between clinicians. *Jt Comm J Qual Patient Saf*. 2006;32(3):167-175. https://www.jointcommissionjournal.com/article/S1553-7250(06)32022-3/fulltext. ● 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. ● 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.

Interpersonal and Communication Skills 5: Communication within Health Care Systems **Overall Intent:** To effectively and appropriately communicate using a variety of methods	
Milestones	**Examples**
Level 1 *Documents accurate and up-to-date patient information* *Communicates in a way that safeguards patient information*	● Performs medication reconciliation ● Recognizes that not all family members have access to patient information without expressed patient permission
Level 2 *Demonstrates diagnostic reasoning through organized and timely notes* *Communicates through appropriate channels as required by institutional policy*	● Documents in the medical record rationale for choice of blood pressure goals in an ischemic stroke patient after thrombectomy ● Communicates patient information through secured electronic devices
Level 3 *Communicates diagnostic and therapeutic reasoning in a clear manner* *Selects optimal mode of communication based on clinical context*	● Documents in the medical record rationale for choice of blood pressure goals in a patient with high-grade subarachnoid hemorrhage complicated by vasospasm and HFrEF ● Discloses medical errors and/or near misses to patients and families in a sensitive and appropriate manner
Level 4 *Demonstrates concise, organized written and verbal communication, including anticipatory guidance*	● Incorporates anticipatory guidance during multidisciplinary rounds to provide families with prognostic information to guide decision making
Level 5 *Guides departmental or institutional communication policies and procedures*	● Creates EHR templates that summarize the intensive care unit admission and other communications for transitions of care ● Creates guidelines that optimize the transition of care to rehabilitation hospital
Assessment Models or Tools	● Direct observation ● Medical record (chart) review ● Multisource feedback ● Simulation
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. ● Haig KM, Sutton S, Whittington J. SBAR: a shared mental model for improving communication between clinicians. *Jt Comm J Qual Patient Saf*. 2006;32(3):167-175. https://www.jointcommissionjournal.com/article/S1553-7250(06)32022-3/fulltext.

Available Milestones Resources

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

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

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

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

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

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

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

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

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

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

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

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

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