Supplemental Guide: Aerospace Medicine

ACGME

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Milestones Supplemental Guide

This document provides additional guidance and examples for the Aerospace Medicine 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: Health and Performance Optimization **Overall Intent:** To understand the concepts of well-being and human performance optimization and apply them to help patients function at a new optimal level when facing new challenges	
Milestones	**Examples**
Level 1 *Identifies techniques to improve human performance* *Identifies risks factors for development of disease and injury*	● Lists improved nutrition, better exercise, and sleep hygiene as techniques to improve human performance ● Lists deconditioning, poor nutrition, substance abuse, fatigue, and failure to use protective equipment in high-risk activities as risk factors
Level 2 *Describes techniques to improve human performance* *Describes approach to decrease risk factors for development of disease and injury*	● Identifies a healthy diet and adequate sleep schedule in order to improve human performance ● Discusses the benefits of smoking-cessation programs and resistance training to decrease the risk of disease development
Level 3 *Uses techniques to improve human performance at the individual level* *Develops a plan using primary, secondary, and tertiary approaches for disease and injury prevention for an individual patient*	● Outlines a sleep schedule for an individual on an extended mission ● Provides an exercise prescription to prevent neck injury in high performance aircraft
Level 4 *Directs the evaluation of techniques to improve human performance* *Develops a plan using primary, secondary, and tertiary approaches for disease and injury prevention for the community*	● Assesses response to a new exercise regimen with periodic follow-up ● Creates a program to decrease frequency of gravity-induced loss of consciousness (G-LOC) for high performance aviators
Level 5 *Develops techniques to improve human performance* *Develops and implements a policy to improve community health efforts*	● Develops a new exercise regimen to minimize helmet-related neck injuries in aviators ● Collaborates with stakeholders in the design and application of community-wide lifestyle change initiative
Assessment Models or Tools	● Direct observation ● Multisource feedback ● Presentation ● Written reports
Curriculum Mapping	●

Notes or Resources	● Gradwell D, Rainford D. Aviator fatigue and fatigue countermeasures. In: 5th ed. *Aviation and Space Medicine.* Boca Raton, FL: CRS Press; 2016. ● American Academy of Sleep Medicine. Practice guidelines. https://aasm.org/clinical-resources/practice-standards/practice-guidelines/. Accessed 2020. ● American Society for Nutrition. The American Journal of Clinical Nutrition. https://nutrition.org/publications/the-american-journal-of-clinical-nutrition/. Accessed 2020. ● Astronaut Strength, Conditioning and Rehabilitation Group, NASA. Astronaut rehabilitation. https://www.nasa.gov/content/astronaut-strength-conditioning-and-rehabilitation. Published February 23, 2015. Accessed 2020.

Patient Care 2: Fitness for Duty and Medical Standards **Overall Intent:** To understand the role of medical standards and their application in maintaining the safety of aviation industry personnel in a safe airspace	
Milestones	**Examples**
Level 1 *Acquires a history and performs a basic physical exam to assess for workplace or environmental exposures*	● Performs a history and physical exam relevant to contact exposure
Identifies individuals meeting all physical qualifications	● Performs an aviation history and physical exam, considering different classifications of certification
Level 2 *Assesses work-relatedness of common workplace problems*	● Understands how noise exposure on a flight line impacts hearing
Uses medical standards to identify disqualifying conditions	● Identifies how vision standards differ between pilot and support aviator ● Identifies vision thresholds for disqualification of pilot in command
Level 3 *Formulates a differential diagnosis, assessment, treatment, and plan, including return-to-work accommodations for simple cases*	● Applies hearing threshold standards to identify candidates for a hearing protection program
Selects and interprets medical standards applicable to the operational situation	● Proposes a waiver for a highly qualified pilot with decreased visual acuity
Level 4 *Formulates a differential diagnosis, assessment, treatment, and plan, including return-to-work accommodations for complex cases*	● Identifies carbon monoxide poisoning and recommends treatment including return to work provisions for post-carbon monoxide (CO) syndrome
Applies medical standards to certify or grant exceptions or waivers	● Applies for a Special Issuance for a Class 1 aviator medical certificate following myocardial infarction with stenting
Level 5 *Independently manages complex occupational injury and illness, using system-wide resources*	● In aviator following plane crash with multiple orthopedic and neurological injuries, coordinates rehabilitation and assessment for eventual return to flight ● For a commercial pilot with substance use disorder, coordinates enrollment in human intervention motivation study program to facilitate recertification and ongoing monitoring
Develops medical standards for certification or to grant exceptions or waivers	● Develops an evidence-based proposal for a new or modified standard for hypertension
Assessment Models or Tools	● Direct observation

	● Multisource feedback ● Presentations ● Written reports
Curriculum Mapping	●
Notes or Resources	● Federal Aviation Administration. Aerospace Medical Certification Subsystem. Aviation Medical Examiner guide for aviation medical examiners. https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/. Published July 29, 2020. Accessed 2020 ● US Air Force. Medical examinations and standards. https://static.e-publishing.af.mil/production/1/af_sg/publication/afi48-123/afi48-123.pdf Published November 5, 2013. Accessed 2020.

Patient Care 3: Hazard Recognition, Mitigation, and Management **Overall Intent:** To minimize the extent of harm by recognizing workplace hazards and offering mitigation strategies; to understand emergency preparedness and response concepts	
Milestones	**Examples**
Level 1 *Lists the exposure levels and adverse effects of workplace hazards* *Demonstrates basic skills in emergency medical care*	● Identifies the injury potential of kinetic energy in aircraft and other vehicles ● Identifies toxic levels of lead exposure and lead toxicity ● Recognizes the importance of composure in emergencies ● Performs immediate life-saving first aid
Level 2 *Recommends prevention and mitigation of workplace hazards* *Identifies key aspects of emergency preparedness programs and triage concepts*	● Recommends hearing protection in high-noise areas and installation of dampening materials where applicable ● Lists categories of patient severity ● Lists appropriate equipment for mass-casualty incident
Level 3 *Assesses effectiveness of prevention and mitigation of workplace hazards, and provides treatment to exposed individuals* *Participates in emergency preparedness programs (simulated or actual)*	● Monitors relevant physiologic function periodically and intervenes with appropriate stakeholders when progression or injury is apparent ● Participates in a dirty bomb scenario in the command center
Level 4 *Assesses effectiveness of prevention and mitigation of workplace hazards for at-risk populations* *Develops and evaluates the medical portion of an emergency plan*	● Identifies levels of protection provided by recommended equipment, mitigation initiatives, or hazards in work environment ● Creates medical annex for a pre-mishap plan
Level 5 *Modifies or develops exposure standards* *Develops, implements, and evaluates emergency preparedness programs*	● Develops an evidence-based proposal for a new or modified standard for cadmium exposure ● Designs and assembles emergency medical infrastructure and relationships for remote support of returning space crew considering available resources
Assessment Models or Tools	● Direct observation ● Multisource feedback
Curriculum Mapping	●
Notes or Resources	● LaDou J, Harrison R. *Current Occupational and Environmental Medicine.* 5th Ed. New York, NY: McGraw-Hill Education; 2014.

	● American College of Occupational and Environmental Medicine (ACOEM). Occupational medicine practice guidelines. https://acoem.org/Practice-Resources/Practice-Guidelines-Center Accessed 2020. ● Gradwell D, Rainford D. *Aviation and Space Medicine.* 5th ed. Boca Raton, FL: CRS Press; 2016. ● Commander, Navy Installations Command. Mishap reporting. https://www.cnic.navy.mil/regions/cnrma/om/safety/mishap_reporting.html Accessed 2020. ● Department of the Air Force. Safety investigation and hazard reporting. https://static.e-publishing.af.mil/production/1/af_se/publication/afi91-204/afi91-204.pdf. Published July 7, 2020. Accessed 2020. ● FEMA. National Incident Management System and All-Hazards Training. https://training.fema.gov/nims/ Accessed 2020.

Patient Care 4: Clinical Care Skills **Overall Intent:** To apply clinical skills to the specialized practice of aerospace medicine, and to conduct appropriate examinations, initiate emergency care when necessary, and formulate aeromedically appropriate treatment plan	
Milestones	**Examples**
Level 1 *Performs a history and physical examination, identifying significant historical events and findings on physical examination; formulates a broad differential diagnosis and initial assessment and plan*	● Performs full review of systems ● Performs full cardiac and neurological exam ● Lists most common diagnoses in differential list ● Proposes initial diagnosis and further work-up or treatment
Level 2 *Performs an accurate history and physical examination, identifying significant historical events and findings on physical examination; formulates an accurate differential diagnosis, assessment, and plan*	● Performs focused review of systems, including only pertinent positive and negatives ● Performs focused physical exam, oriented to required elements ● Eliminates unlikely diagnoses ● Focuses evaluation on most likely diagnoses
Level 3 *Identifies illness or injury and level of acuity; initiates diagnosis-specific treatment and intervention*	● Identifies immediate life-threatening illnesses/injuries ● Initiates life-saving evaluation/treatment
Level 4 *Manages critical illness or injury within the standard of care for the clinical scenario and available medical resources*	● Accurately distinguishes between life-threatening illness/injury and more routine diagnoses ● Uses available resources to maximize care
Level 5 *Triages and prioritizes use of available medical resources for multiple patients with complex conditions*	● Manages mass casualty event appropriately with available resources and within appropriate standards
Assessment Models or Tools	● Direct observation ● Multisource feedback ● Tabletop scenario
Curriculum Mapping	●
Notes or Resources	● Federal Aviation Administration. Aerospace Medical Certification Subsystem. Aviation Medical Examiner guide for aviation medical examiners. https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/. Published July 29, 2020. Accessed 2020. ● FEMA. National Incident Management System and All-Hazards Training. https://training.fema.gov/nims/ Accessed 2020. ● National Association of Emergency Medical Technicians. Tactical emergency casualty care. https://www.naemt.org/education/tecc Accessed 2020. ● National Association of Emergency Medical Technicians. Tactical combat casualty care. https://www.naemt.org/education/naemt-tccc Accessed 2020.

Patient Care 5: Air and Space Environment **Overall Intent:** To understand concepts related to the unique aspects of the aviation and space environments, including physiologic effects and hazards, life-support systems used, and medical-support operations in support of aviation and space operations	
Milestones	**Examples**
Level 1 *Identifies the hazards of aviation and space flight, including acceleration, radiation, microgravity, hypobaria, hypoxia, and isolation* *Identifies life support systems for air and space flight* *Lists elements of operational medical support for launch, flight, orbital operations, and landing, including air frames, space habitats, and support systems*	● Describes gravity-induced loss of consciousness ● Distinguishes between hypoxia, hypobaria, and hypocapnia ● Describes biologic effects of ionizing radiation ● Lists life-support systems in common air and space vehicles ● Describes mishap response plan
Level 2 *Describes the adverse health risks and mitigation and counter measures of aviation and space flight* *Describes life support systems for air and space flight* *Describes key elements of operational medical support for launch, flight, orbital operations, and landing, including air frames, space habitats, and support systems*	● Explains anti-gravity straining maneuvers ● Lists types of radiation shielding, including advantages/disadvantages ● Describes symptoms of hyperventilation ● Explains on-board oxygen generating system (OBOGS) ● Lists key elements of mishap response planning
Level 3 *Participates in passenger, crew, and physician health education about the adverse health risks and mitigation and counter measures of aviation and space flight* *Operates life support systems for air and space flight* *Participates in planning of operational medical support for launch, flight, orbital operations, and*	● Accurately describes adverse effects of airline travel in lay language ● Applies oxygen mask for aircrew and checks for fit and function ● Develops key elements of mishap response plan

landing, considering air frames, space habitats, and support systems	
Level 4 *Performs passenger, crew, and physician health education about the adverse health risks and mitigation and counter measures of aviation and space flight* *Troubleshoots life support systems for air and space flight* *Provides operational medical support in the field for launch, flight, orbital operations, and landing, considering air frames, space habitats, and support systems*	● Performs one-on-one counseling for high-risk passenger ● Corrects fit of improperly fitting oxygen mask ● Serves as field operative during operational support mission
Level 5 *Designs and advances health education activities to promote flight safety* *Analyzes and recommends life support systems for air and space flight* *Leads, plans, and/or designs operational medical support for launch, flight, orbital operations, and landing, considering air frames, space habitats, and support systems*	● Prepares passenger service agent for aviation health hazard ● Participates in selection of new oxygen mask ● Directs field operations of operational support mission
Assessment Models or Tools	● Direct observation ● Multisource feedback
Curriculum Mapping	●
Notes or Resources	● Gradwell D, Rainford D. *Aviation and Space Medicine.* 5th ed. Boca Raton, FL: CRS Press; 2016. ● Nicogossian A, Williams RS, Huntoon CL, Doarn CR, Polk JD, Schneider VS. *Space Physiology and Medicine: From Evidence to Practice*. 4th ed. New York, NY: Springer Publishing; 2016. ● Jenkins DR. *Dressing for Altitude: U.S. Aviation Pressure Suits, Wiley Post to Space Shuttle: U.S. Aviation Pressure Suits, Wiley Post to Space Shuttle*. Washington, DC: US National Aeronautics and Space Admin; 2012. ● National Association of Emergency Medical Technicians. All hazards disaster response. https://www.naemt.org/education/ahdr Accessed 2020.

Patient Care 6: Aeromedical Transport **Overall Intent:** To understand unique challenges of aeromedical transport, including inclusion and exclusion criteria, prioritization, and use of unusual aspects of biomedical support equipment in these environments	
Milestones	**Examples**
Level 1 *Identifies physiologic and clinical criteria for and contraindications to safe aeromedical transport of patients*	● Identifies how poor oxygen capacity and abnormal pulmonary function are exacerbated during air transport and impact of acuity/severity to patient safety
Describes patient movement categories/priorities	● Understands and uses the correct terms to describe patients within the aeromedical transportation systems for ambulatory status, urgency, and stability and understands difference between stable, stabilized, and unstable patients
Identifies biomedical equipment to support air and space flight	● Identifies differences between traditional and transport ventilators
Level 2 *Describes physiologic and clinical criteria for and contraindications to safe aeromedical transport of patients*	● Describes the impact of anemia (hemorrhage, sickle cell crisis), and levels of acuity/severity for and against aeromedical transportation, among different types of airframes
Assigns patients to movement categories/priorities	● Requests priority movement of stabilized surgical case on ventilator; requests urgent transportation of moderately disturbed suicidal psychiatric patient from a combat zone
Describes biomedical equipment to support air and space flight	● Describes transport ventilators ● Understands process for validating equipment for aeromedical transport
Level 3 *Applies physiologic and clinical criteria for safe aeromedical transport of patients*	● Identifies need for blood transfusion for hemoglobin levels below 7 g/dL prior to safe movement of anemic patient; recommends correct use of supplemental oxygen for chronic obstructive pulmonary disease (COPD) patient with oxygen saturation level of 90 percent at sea level on room air
Participates in planning of aeromedical transport mission	● Requests critical care team for priority stabilized surgical care on ventilator; requests medical attendant for suicidal, mildly disturbed psychiatric patient on routine transport
Participates in the evaluation of biomedical equipment to support air and space flight	● Inspects a pressure mask prior to use
Level 4 *Demonstrates clinical decision-making skills to validate patients for aeromedical transport*	● Describes limitations of different airframes and assigns the correct level and number of patients to be moved is a mission; understands logistics associated with movement of patients among different types of airframes and operational limitations (e.g., fixed versus

Leads planning of aeromedical transport mission *Evaluates and troubleshoots biomedical equipment to support air and space flight*	rotary wings, civilian versus military, dedicated versus opportunistic aircraft, medical team composition or equipment availability) ● Troubleshoots malfunction of pressure mask
Level 5 *Oversees treatment plans and restrictions, and supervises clearance of patients for aeromedical transport* *Creates policies or guides for aeromedical transport* *Develops biomedical equipment to support air and space flight*	● Understands, develops, integrates, and oversees plans for MedEvac, CasEvac, tactical and strategic patient movement as well as limitations associated with disaster response involving large populations ● Develops a policy for aeromedical transport for a patient with an infectious disease ● Develops an improved physiologic monitor
Assessment Models or Tools	● Direct observation ● Multisource feedback ● Presentations ● Tabletop scenarios ● Written reports
Curriculum Mapping	●
Notes or Resources	● Thomas SH, Brown KM, Oliver ZJ, et al. An evidence-based guideline for the air medical transportation of prehospital trauma patients. *Prehosp Emerg Care*. 2014;18 Suppl 1:35-44. doi: 10.3109/10903127.2013.844872. Epub 2013 Nov 26 ● Gradwell D, Rainford D. *Aviation and Space Medicine.* 5th ed. Boca Raton, FL: CRS Press; 2016.

Medical Knowledge 1: Biostatistics and Epidemiology **Overall Intent:** To demonstrate understanding and the ability to properly apply biostatistics and epidemiology concepts in the context of aerospace medicine and population health	
Milestones	**Examples**
Level 1 *Recognizes and defines common statistical concepts and tests* *Recognizes and defines basic measures of disease frequency* *Describes commonly used epidemiologic concepts*	● Lists measures of central tendency ● Lists common significance tests ● Defines incidence and prevalence ● Understands outbreaks and outbreak control ● Understands disease transmission, vector, controls
Level 2 *Describes that statistics is a method for making population inferences from sample data* *Recognizes and defines basic measures for comparing risk* *Critically appraises, epidemiologic literature for study designs, identifying purpose, population, design, and biases*	● Describes the difference between a sample and a population ● Describes relative risk and odds ratio ● Performs critical appraisal of classic article
Level 3 *Critically appraises statistical methods in published research* *Describes methods for calculating basic measures of disease frequency and risk* *Selects and applies epidemiologic methods appropriate to the population and risk factors being studied*	● Performs critical appraisal of classic article ● Performs calculations on 2x2 table ● Uses a cross sectional study to understand prevalence of an injury in a population of aviators
Level 4 *Selects and applies statistical tests appropriate to the data being analyzed* *Calculates measures of disease frequency and one or more risk factors for a specified disease or condition*	● Appropriately chooses statistical tests based on types of data and analysis required ● Performs and correctly interprets chi-square analysis

Designs and conducts an epidemiologic study	● Completes aerospace medicine research project
Level 5 *Synthesizes results of statistical analysis to make correct population inferences* *Uses data to characterize and compare the health of populations, and assesses the importance of different risk factors*	● Analyzes epidemiologic data to understand incidence and prevalence of toxic exposure ● Accomplishes publication of an appropriately designed and conducted epidemiologic study in a peer reviewed journal ● Controls for bias and confounding in epidemiologic data to understand prevalence of a risk factor for disease
Assessment Models or Tools	● Direct observation ● Multisource feedback ● Presentations ● Written reports
Curriculum Mapping	●
Notes or Resources	● CDC Division of Scientific Education and Professional Development (DSEPD). Principles of epidemiology in public health practice, https://www.cdc.gov/csels/dsepd/ss1978/lesson1/index.html Accessed 2020.

Medical Knowledge 2: Regulatory **Overall Intent:** To understand of the role of regulatory agencies in the aerospace industry and to correctly apply associated statutes, regulations, procedures, and guidelines to the safe practice of aerospace medicine	
Milestones	**Examples**
Level 1 *Identifies relevant regulatory agencies and their jurisdictions for aeromedical certification, flight safety, mishap and hazard response, and aviation and space operations*	● Describes Federal Aviation Administration (FAA), National Transportation Safety Board (NTSB), and International Association of Aviation and Aerospace Education (ICAO)
Level 2 *Identifies relevant regulations for aeromedical certification, flight safety, mishap and hazard response, and aviation and space operations*	● Describes Federal Aviation Regulations (FAR) and Federal Code
Level 3 *Applies and interprets relevant regulations for aeromedical certification, flight safety, mishap and hazard response, and aviation and space operations based on operational scenarios (simulated or actual)*	● Uses appropriate segment of the FAA Guide for Aviation Medical Examiners
Level 4 *Assesses compliance with relevant regulations for aeromedical certification, flight safety, mishap and hazard response, and aviation and space operations (simulated or actual)*	● Prepares and submits a request for special issuance ● Prepares and submits a request for waiver of military aeromedical standards
Level 5 *Prepares an evidence-based proposal for modifying an existing regulatory standard*	● Prepares and presents to the aeromedical waiver council ● Participates with aeromedical advisory panel to create or modify an aeromedical standard
Assessment Models or Tools	● Direct observation ● Multisource feedback ● Written report
Curriculum Mapping	●
Notes or Resources	● Federal Aviation Administration. Aerospace Medical Certification Subsystem. Aviation Medical Examiner guide for aviation medical examiners. https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/. Published July 29, 2020. Accessed 2020 ● The Electronic Code of Federal Regulations (e-CFR). https://gov.ecfr.io. Accessed 2020. ● National Transportation Safety Board. https://www.ntsb.gov Accessed 2020. ● Military Service Specific Aeromedical Certification Agencies

	● World Health Organization, ICAO. Aviation Medicine Section. https://www.icao.int/safety/aviation-medicine/Pages/default.aspx Accessed 2020.

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*	● Lists aviation or medical errors as common safety events ● Describes how to report errors in own environment ● Describes the TeamSTEPPS set of teamwork tools
Level 2 *Identifies system factors that lead to patient safety events* *Reports patient safety events through institutional reporting systems (simulated or actual)* *Describes local quality improvement initiatives (e.g., community vaccination rate, infection rate, smoking cessation)*	● Identifies lack of hand sanitizer dispenser at each clinical exam room may lead to increased infection rates ● Reports lack of hand sanitizer dispenser at each clinical exam room to the medical director ● Summarizes protocols resulting in decreased spread of community-acquired diseases
Level 3 *Participates in analysis of patient safety events (simulated or actual)* *Participates in disclosure of patient safety events to patients and families (simulated or actual)* *Participates in local quality improvement initiatives*	● Prepares a review of a historical mishap ● Through simulation, communicates with patients/families about a vaccine administration error ● Analyzes patient feedback for process improvement
Level 4 *Conducts analysis of patient safety events and offers error prevention strategies (simulated or actual)* *Discloses patient safety events to patients and families (simulated or actual)*	● Collaborates with a team to conduct the analysis of aviation mishaps and can effectively communicate with responsible organizations about those events

Demonstrates the skills required to identify, develop, implement, and analyze a quality improvement project	● Participates in the completion of a QI project to improve human papillomavirus (HPV) vaccination rates within the practice, including assessing the problem, articulating a broad goal, developing a SMART (Specific, Measurable, Attainable, Relevant, Time-bound) objective plan, and monitoring progress and challenges
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*	● Assumes a leadership role at the departmental level for patient safety ● Conducts a simulation for disclosing patient safety events ● Initiates and completes a QI project to improve community HPV vaccination rates in collaboration with the county health department and shares results with stakeholders
Assessment Models or Tools	● Direct observation ● E-module multiple choice tests ● Medical record (chart) audit ● Multisource feedback ● Portfolio ● Simulation
Curriculum Mapping	●
Notes or Resources	● Institute of Healthcare Improvement website (http://www.ihi.org/Pages/default.aspx) which includes multiple choice tests, reflective writing samples, and more

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 key elements for safe and effective transitions of care and hand-offs*	● For a patient with persistent low-back pain, identifies need for referral process to physical therapist ● Identifies a physical therapist to treat patient and communicates work restrictions if needed
Level 2 *Coordinates care of patients in routine clinical situations effectively using the roles of the interprofessional teams* *Performs safe and effective transitions of care/hand-offs in routine clinical situations*	● For a patient with lumbar radiculopathy with weakness, identifies magnetic resonance (MR) facility and appropriate specialist such as neurosurgeon ● Facilitates the referral process for magnetic resonance imaging (MRI) scan and specialist as needed
Level 3 *Coordinates care of patients in complex clinical situations effectively using the roles of their interprofessional teams* *Performs safe and effective transitions of care/hand-offs in complex clinical situations*	● Works with a surgeon, physical therapist, case manager, and employer to facilitate gradual return to regular duty in a post-operative low-back surgery patient ● Arranges emergency department transfer or hospital admission for a patient with signs of spinal cord impingement such as urinary incontinence, lower extremity weakness, and saddle anesthesia
Level 4 *Role models effective coordination of patient-centered care among different disciplines and specialties* *Role models and advocates for safe and effective transitions of care/hand-offs*	● Effectively role models care of musculoskeletal injuries to other residents or medical students to optimize medical treatment and return to work ● Prior to going on vacation, proactively informs the covering resident about a plan for continuity of care for a patient
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*	● Develops a protocol for transport potentially infectious patient sample via air transport in compliance Occupational Safety and Health Administration (OSHA) Bloodborne Pathogens requirements ● Performs a quality improvement project to optimize your clinic's return-to-work program
Assessment Models or Tools	● Direct observation ● Medical record (chart) audit

	● Multisource feedback ● Objective structured clinical examination (OSCE) ● Quality metrics and goals mined from electronic health records (EHRs) ● Review of sign-out tools, use and review of checklists
Curriculum Mapping	●
Notes or Resources	● CDC. Population Health Training in Place Program (PH-TIPP) https://www.cdc.gov/pophealthtraining/whatis.html Accessed 2020. ● Kaplan KJ. In pursuit of patient-centered care. March 2016. http://tissuepathology.com/2016/03/29/in-pursuit-of-patient-centered-care/#axzz5e7nSsAns Accessed 2020. ● Skochelak SE, Hawkins RE, Lawson LE, etc. al; AMA Education Consortium: Health Systems Science. 1st ed. Elsevier. 2016. ● Rinker J et al, Disability Management & Prevention, in:Current Diagnosis & Treatment: Occupational & Environmental Medicine, Fifth edition, Ladou J and Harrison R. 2014. McGraw Hill Education, p. 51-61. ● Occupational Safety and Health Administration (OSHA). Medical screening and surveillance requirements in OSHA standards: a guide. 2014 https://www.osha.gov/Publications/osha3162.pdf. Accessed 2020 ● American College of Occupational and Environmental Medicine (ACOEM). Practice guidelines. https://acoem.org/Practice-Resources/Practice-Guidelines-Center Accessed 2020.

Systems-Based Practice 3: Population Health **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 population and community health needs and disparities*	● Identifies that patients in austere settings may have different needs than patients in traditional settings
Level 2 *Identifies specific population and community health needs and inequities for their local population*	● Identifies that limited transportation options may be a factor in care of patients in austere settings
Level 3 *Uses local resources effectively to meet the needs of a patient population and community*	● Connects pilot with routine primary care
Level 4 *Participates in changing and adapting practice to provide for the needs of specific populations*	● Refers patients to human intervention motivation study for management of substance use disorder
Level 5 *Leads innovations and advocates for populations and communities with health care inequities*	● Leads development of telehealth diagnostic services for an austere site
Assessment Models or Tools	● Direct observation ● Medical record (chart) audit ● Multisource feedback ● OSCE ● Quality metrics and goals mined from EHRs ● Review of sign out tools, utilization and review of checklists
Curriculum Mapping	●
Notes or Resources	● CDC. Population Health Training in Place Program (PH-TIPP) https://www.cdc.gov/pophealthtraining/whatis.html ● Kaplan KJ. In pursuit of patient-centered care. March 2016. http://tissuepathology.com/2016/03/29/in-pursuit-of-patient-centered-care/#axzz5e7nSsAns ● Skochelak SE, Hawkins RE, Lawson LE, etc. al; AMA Education Consortium: Health Systems Science. 1st ed. Elsevier. 2016.

Systems-Based Practice 4: Physician Role in Health Care Systems **Overall Intent:** To understand the physician 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 complex health care system (e.g., hospital, skilled nursing facility, finance, personnel, technology)*	● Articulates differing capabilities across echelons of care
Describes basic health payment systems, (e.g., employer, government, private, public, uninsured care) and practice models	● Understands the impact of health plan coverage on prescription drugs for individual patients
Identifies basic knowledge domains for effective transition to practice (e.g., information technology, legal, billing and coding, financial, personnel)	● Identifies use of information technology for effective transmission of patient care data across aeromedevac continuum
Level 2 *Describes how components of a complex health care system are interrelated, and how this impacts patient care*	● Explains that improving patient satisfaction impacts patient adherence and payment to the health system
Delivers care with consideration of each patient's payment model (e.g., insurance type)	● Takes into consideration patient's prescription drug coverage when choosing a statin for treatment of hyperlipidemia
Describes core administrative knowledge needed for transition to practice (e.g., contract negotiations, malpractice insurance, government regulation, compliance)	● Recognizes that appropriate documentation can influence the severity of illness determination upon discharge
Level 3 *Discusses how individual practice affects the broader system*	● Ensures that patient with COPD has a scheduled follow-up appointment at discharge within seven days to reduce risk of readmission
Engages with patients in shared decision making, informed by each patient's payment models	● Discusses risks and benefits of pursuing MRI imaging in the setting of acute low-back pain when a patient has a high out of pocket deductible
Demonstrates use of information technology required for medical practice (e.g., electronic	● Understands the core elements of employment contract negotiation

health record, documentation required for billing and coding)	
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* *Analyzes practice patterns and professional requirements in preparation for practice*	● Ensures proper documentation required for submission of a military waiver or FAA Special Issuance for a complex health problem ● Works collaboratively to improve patient assistance resources for a patient after a recent surgery ● Proactively compiles procedure log in anticipation of applying for hospital privileges
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 to prepare them for transition to practice*	● Works with community or professional organizations to advocate for no smoking ordinances ● Improves informed consent process for non-English-speaking patients requiring interpreter services
Assessment Models or Tools	● Direct observation ● Medical record (chart) audit ● Patient satisfaction data ● Portfolio
Curriculum Mapping	●
Notes or Resources	● Center for Medicare and Medicaid Services. The merit-based incentive payment system: advancing care information and improvement activities performance categories. https://www.cms.gov/Medicare/Quality-Payment-Program/Resource-Library/2018-Advancing-Care-information-Fact-Sheet.pdf 2018. ● Agency for Healthcare Research and Quality (AHRQ): The Challenges of Measuring Physician Quality https://www.ahrq.gov/professionals/quality-patient-safety/talkingquality/create/physician/challenges.html 2016. ● AHRQ. Major physician performance sets: https://www.ahrq.gov/professionals/quality-patient-safety/talkingquality/create/physician/measurementsets.html 2018. ● The Kaiser Family Foundation: www.kff.org, 2019.

	● The Kaiser Family Foundation: Topic: health reform: https://www.kff.org/topic/health-reform/ 2019. ● The National Academy for Medicine, Dzau VJ, McClellan M, Burke S, et al. Vital directions for health and health care: priorities from a National Academy of Medicine Initiative. March 2016. https://nam.edu/vital-directions-for-health-health-care-priorities-from-a-national-academy-of-medicine-initiative/ ● The Commonwealth Fund. Health system data center. 2017. http://datacenter.commonwealthfund.org/?_ga=2.110888517.1505146611.1495417431-1811932185.1495417431#ind=1/sc=1 ● The Commonwealth Fund. Health reform resource center: http://www.commonwealthfund.org/interactives-and-data/health-reform-resource-center#/f:@facasubcategoriesfacet63677=[Individual%20and%20Employer%20Responsibility ● American Board of Internal Medicine. QI/PI activities. Practice Assessment**:** Modules that physicians can use to assess clinical practice. 2019. http://www.abim.org/maintenance-of-certification/earning-points/practice-assessment.aspx

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, and incorporate patient preferences and values in order to take care of a routine patient*	● Identifies evidence-based guidelines for management of hypertension in aviators at American Society of Aerospace Medicine Specialists (ASAMS) website
Level 2 *Articulates clinical questions and elicits patient preferences and values in order to guide evidence-based care*	● In a patient with low-back pain, identifies and discusses potential evidence-based treatment options, with an emphasis on treatments compatible with continued flight duties
Level 3 *Locates and applies the best available evidence, integrated with patient preference, to the care of complex patients*	● Obtains, discusses, and applies evidence for the treatment of an aviator with chronic low-back pain who has failed to respond to conservative treatment ● Understands and appropriately uses clinical practice guidelines in making patient care decisions while eliciting patient preferences and preserving flight status
Level 4 *Critically appraises and applies evidence even in the face of uncertainty and conflicting evidence to guide care, tailored to the individual patient*	● Accesses the primary literature to identify risks and benefits of various surgical approaches to refractory chronic low-back pain
Level 5 *Coaches others to critically appraise and apply evidence for complex patients; and/or participates in the development of guidelines*	● Leads clinical teaching on application of best practices in critical appraisal of chronic low-back pain treatments ● As part of a team, develops low risk chest pain protocol for the emergency department
Assessment Models or Tools	● Direct observation ● Oral or written examinations ● Presentation evaluation ● Research portfolio
Curriculum Mapping	●
Notes or Resources	● National Institutes of Health. Write Your Application. https://grants.nih.gov/grants/how-to-apply-application-guide/format-and-write/write-your-application.htm ● U.S. National Library of Medicine. PubMed Tutorial. 2018. https://www.nlm.nih.gov/bsd/disted/pubmedtutorial/cover.html ● Institutional IRB guidelines ● Various journal submission guidelines

Practice-Based Learning and Improvement 2: Reflective Practice and Commitment to Personal Growth **Overall Intent:** To seek clinical performance information with the intent to improve care; to reflect on all domains of practice, personal interactions, and behaviors, and their impact on colleagues and patients (reflective mindfulness); to develop clear objectives and goals for improvement in some form of a learning plan	
Milestones	**Examples**
Level 1 *Accepts responsibility for personal and professional development by establishing goals* *Identifies the factors which contribute to gap(s) between expectations and actual performance* *Actively seeks opportunities to improve*	● Sets a personal practice goal of documenting use of the appropriate criteria for evaluation of unexplained syncope ● Identifies gaps in knowledge of cardiogenic versus neurogenic syncope ● Asks for feedback from patients, families, and patient care team members
Level 2 *Demonstrates openness to performance data (feedback and other input) in order to inform goals* *Analyzes and reflects on the factors which contribute to gap(s) between expectations and actual performance* *Designs and implements a learning plan, with prompting*	● Integrates feedback to adjust the documentation of the evaluation of unexplained syncope ● Assesses time management skills and how it impacts timely completion of clinic notes and literature reviews ● When prompted, develops individual education plan to improve the evaluation of unexplained syncope
Level 3 *Seeks performance data episodically, with adaptability, and humility* *Analyzes, reflects on, and institutes behavioral change(s) to narrow the gap(s) between expectations and actual performance* *Independently creates and implements a learning plan*	● Does a chart audit to determine the percent of patients evaluated for unexplained syncope and documents all components of the work-up ● Completes a comprehensive literature review prior to patient encounters ● Using web-based resources, creates a personal curriculum to improve their evaluation of unexplained syncope
Level 4 *Intentionally seeks performance data consistently with adaptability, and humility* *Challenges assumptions and considers alternatives in narrowing the gap(s) between expectations and actual performance*	● Completes a quarterly chart audit to ensure documentation of the comprehensive work-up for unexplained syncope ● After patient encounter, debriefs with the attending and other patient care team members to optimize future collaboration in the care of the patient and family

Uses performance data to measure the effectiveness of the learning plan and when necessary, improves it	● Performs a chart audit on personal documentation of their evaluation of unexplained syncope
Level 5 *Role models consistently seeking performance data with adaptability and humility* *Coaches others on reflective practice* *Facilitates the design and implementation of learning plans for others*	● Models practice improvement and adaptability ● Develops educational module for collaboration with other patient care team members ● Assists first-year residents in developing their individualized learning plans
Assessment Models or Tools	● Direct observation ● Review of learning plan
Curriculum Mapping	●
Notes or Resources	● Hojat M, Veloski JJ, Gonnella JS. Measurement and correlates of physicians' lifelong learning. *Acad Med.* 2009 Aug;84(8):1066-74. *Contains a validated questionnaire about physician lifelong learning.* ● Burke AE, Benson B, Englander R, Carraccio C, Hicks PJ. Domain of competence: practice-based learning and improvement. *Acad Pediatr.* 2014;14: S38-S54. ● Lockspeiser TM, Schmitter PA, Lane JL et al. Assessing residents' written learning goals and goal writing skill: validity evidence for the learning goal scoring rubric. *Acad Med.* 2013 Oct;88(10)1558-63.

Professionalism 1: Professional Behavior and Ethical Principles **Overall Intent:** To recognize and address lapses in ethical and professional behavior, demonstrate ethical and professional behaviors, and use appropriate resources for managing ethical and professional dilemmas	
Milestones	**Examples**
Level 1 *Identifies basic ethical principles of medicine* *Identifies common lapses in professionalism* *Identifies and describes potential triggers of lapses in professionalism*	● Articulates, in any given clinical care situation, the relative contributions and predominance of autonomy, beneficence, and non-malfeasance and justice ● Understands and manifests those professional behaviors that indicate a command of these ethical principles and convey good faith and elicit trust ● Articulates how the principle of "do no harm" applies to a patient who may not need a central line even though the learning opportunity exists
Level 2 *Demonstrates knowledge of the ethical principles underlying professional practice* *Describes when and how to appropriately report lapses in professionalism, including strategies for addressing common barriers* *Demonstrates professional behavior in routine situations and takes responsibility for own lapses in professionalism*	● Respectfully approaches a resident who is late to sign out about the importance of being on time and to articulate this in terms of non-malfeasance ● Outlines resources within the department for education and mitigation of common professional errors ● Applies ethical principles involved in proper informed patient care
Level 3 *Analyzes straightforward situations using ethical principles* *Recognizes situations that may trigger lapses in professionalism and intervenes to prevent lapses in self and others* *Recognizes need to seek help in managing and resolving complex ethical situations*	● Explains to 75-year-old pilot that the abnormal Holter monitor report cannot be ignored or amended ● Understands that adhering to ethical standards and not breaking rules when asked to so is critical for the preservation of proper care standards and professional standards ● Discusses treatment options for a potentially career-ending illness or condition, free of bias, while recognizing own limitations, and consistently honoring the patient's choice
Level 4 *Analyzes complex situations using ethical principles*	● Discusses with team and family members extent of resource allocation and intervention in persistently vegetative patient with COVID-19 ● Actively considers the perspectives of others and recognizes that they serve as a potential resource for interpretation of ethical principles in a care situation

Demonstrates professional behavior in complex or stressful situations *Recognizes and uses appropriate resources for managing and resolving ethical dilemmas as needed (e.g., ethics consultations, literature review, risk management/legal consultation)*	● Models respect for patients and promotes the same from colleagues, when a patient has been waiting an excessively long time to be seen; understands the factors that led to the patient being late to be being seen in the larger context ● Recognizes and uses ethics consults, literature, risk-management/legal counsel in order to resolve ethical dilemmas
Level 5 *Articulates, models, and teaches ethical behavior from first principles as applied to the working environment* *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 resolution*	● Prioritizes spacecraft seat availability for de-orbiting for crew return in the context of spacecraft vehicle loss ● Coaches others when their behavior fails to meet professional expectations and creates a performance improvement plan based in an ethical framework to prevent recurrence ● Clarifies and reinforces supportive command structures
Assessment Models or Tools	● Direct observation ● Global evaluation ● Multisource feedback ● Oral or written self-reflection ● Simulation
Curriculum Mapping	●
Notes or Resources	● American Medical Association Code of Ethics. https://www.ama-assn.org/delivering-care/ama-code-medical-ethics 2019 ● American Board of Internal Medicine; American College of Physicians-American Society of Internal Medicine; European Federation of Internal Medicine. Medical professionalism in the new millennium: a physician charter. *Ann Intern Med*. 2002;136:243-246. http://abimfoundation.org/wp-content/uploads/2015/12/Medical-Professionalism-in-the-New-Millenium-A-Physician-Charter.pdf ● https://alphaomegaalpha.org/pdfs/2015MedicalProfessionalism.pdf ● Levinson W, Ginsburg S, Hafferty FW, Lucey CR. *Understanding Medical Professionalism*. 1st ed. McGraw-Hill Education; 2014.

	● 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; 141:215-219. doi: 10.5858/arpa.2016-2017-CP ● Bynny RL, Paauw DS, Papadakis MA, Pfeil S. Medical professionalism. Best practices: professionalism in the modern era. 2017. ISBN: 978-1-5323-6516-4

Professionalism 2: Accountability/Conscientiousness **Overall Intent:** To take responsibility for one's own actions and the impact on patients and other members of the health care team	
Milestones	**Examples**
Level 1 *Takes responsibility for task completion and identifies factors, behaviors, and strategies that ensure timely task completion*	● Responds promptly to reminders from program administrator to complete work hour logs ● Timely attendance at conferences ● Completes end of rotation evaluations
Level 2 *Performs tasks and responsibilities in a timely manner with appropriate attention to detail in routine situations*	● Completes administrative tasks, documents safety modules, procedure review, and licensing requirements by specified due date ● Before going out of town, completes tasks in anticipation of lack of computer access while traveling
Level 3 *Performs tasks and responsibilities in a timely manner with appropriate attention to priority and detail in complex or stressful situations*	● Notifies attending of multiple competing demands on call, appropriately triages tasks, and asks for assistance from other residents or faculty members as needed ● In preparation for being out of the office, arranges coverage for assigned clinical tasks and ensures appropriate continuity of care
Level 4 *Recognizes situations that may impact others' ability to complete tasks and responsibilities in a timely manner and proposes alternate paths to task completion*	● Takes responsibility for inadvertently omitting key patient information during sign-out and professionally discusses with the patient, family and interprofessional team ● Assists colleagues by taking on patient care responsibilities when colleagues are unable to do so
Level 5 *Proactively works with others to develop and implement strategies to ensure that the needs of patients, teams, and systems are met*	● Coordinates with all team members requirements for testing and documentation to maintain continuity of certification for FAA Class 1 pilots under Special Issuance
Assessment Models or Tools	● Compliance with deadlines and timelines ● Direct observation ● Global evaluations ● Multisource feedback ● Self-evaluations and reflective tools ● Simulation
Curriculum Mapping	●
Notes or Resources	● AMA and institutional ethics panels ● Code of conduct from fellow/resident institutional manual ● Expectations of residency program regarding accountability and professionalism

Professionalism 3: Self-Awareness and Help-Seeking **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 addressing personal and professional well-being of self and others*	● Aware of one's own biases and emotional state ● Discusses navigating the interface between one's own personal and family medical experience with those of patients
Level 2 *Recognizes institutional resources that are meant to promote well-being of self and others*	● Discusses with peers and supervisors identifies and communicates impact of a personal family tragedy, uses training and classes and simulations for modeling these situations ● Recognizes tools for emotional intelligence development and refinement
Level 3 *Describes institutional factors that affect the well-being of self and others*	● With the multi-disciplinary team, develops a reflective response to deal with personal impact of difficult patient encounters and disclosures ● Integrates feedback from the multidisciplinary team to develop a plan for identifying and responding to emotional cues during the next family meeting
Level 4 *Describes institutional factors and programs that positively or negatively affect well-being of self and others*	● Independently identifies ways the institution can improve stressors in the work environment ● Develop guidelines for education in emotional intelligence
Level 5 *Creates institutional level interventions that promote well-being of self and others*	● Assists in organizational efforts to address clinician well-being after patient diagnosis/prognosis/death ● Works with multidisciplinary team to develop a feedback framework for learners around family meetings
Assessment Models or Tools	● Direct observation ● Group interview or discussions for team activities ● Individual interview ● Institutional online training modules ● Self-assessment and personal learning plan
Curriculum Mapping	●
Notes or Resources	● Local resources, including Employee Assistance ● Hicks PJ, Schumacher D, Guralnick S, Carraccio C, Burke AE. Domain of competence: personal and professional development. *Acad Pediatr*. 2014 Mar-Apr;14(2 Suppl):S80-97. ● ACGME Tools and Resources on Physician Well-Being https://www.acgme.org/What-We-Do/Initiatives/Physician-Well-Being/Resources

Interpersonal and Communication Skills 1: Patient- and Family-Centered Communication **Overall Intent:** To deliberately use language and behaviors to form constructive relationships with patients, to identify communication barriers including self-reflection on personal biases, and minimize them in the doctor-patient relationships; organize and lead communication around shared decision making	
Milestones	**Examples**
Level 1 *Uses language and nonverbal behavior to demonstrate respect and establish rapport* *Identifies common barriers to effective communication (e.g., language, disability) while accurately communicating own role within the health care system*	● Introduces self and faculty member, identifies patient and others in the room, and engages all parties in health care discussion ● Identifies need for trained interpreter with non-English-speaking patients ● Uses occupation-appropriate language based on patient's crew position or aviation role
Level 2 *Establishes a therapeutic relationship in straightforward encounters using active listening and clear language* *Identifies complex barriers to effective communication (e.g., health literacy, cultural)*	● Avoids medical jargon and restates patient perspective when discussing fitness for aviation duty ● Prioritizes and sets agenda at the beginning of the appointment for a new patient with chronic back pain
Level 3 *Establishes a therapeutic relationship in challenging patient encounters* *When prompted, reflects on personal biases while attempting to minimize communication barriers*	● Acknowledges patient's request for an MRI for new onset back pain without red flags and arranges timely follow-up visit to align diagnostic plan with goals of care ● In a discussion with the faculty member, acknowledges discomfort in caring for a patient with COPD who continues to smoke
Level 4 *Independently, uses shared decision making to align patient/family values, and health/occupational goals with aeromedically acceptable treatment options to make a personalized care plan* *Independently recognizes personal biases while attempting to proactively minimize communication barriers*	● Appropriately engages patient to balance medical treatment goals with fitness for aviation duty ● Reflects on personal bias related to substance abuse in aircrew member seeking return-to-flying following a driving under the influence (DUI) violation
Level 5 *Mentors others in situational awareness and critical self-reflection to consistently develop positive therapeutic relationships*	● Leads a discussion group on personal experience of moral distress ● Diffuses situation where a disgruntled pilot is yelling at another physician after being informed that he was not qualified for flying duty ● Serves on a corporate, government, or academic bioethics committee

Role models self-awareness while identifying a contextual approach to minimize communication barriers	
Assessment Models or Tools	● Direct observation ● Kalamazoo Essential Elements Communication Checklist (Adapted) ● OSCE ● 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
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. ● Makoul G. Essential elements of communication in medical encounters: The Kalamazoo consensus statement. *Acad Med*. 2001;76:390-393. ● Makoul G. The SEGUE Framework for teaching and assessing communication skills. *Patient Educ Couns*. 2001;45(1):23-34. ● Symons AB, Swanson A, McGuigan D, Orrange S, Akl EA. A tool for self-assessment of communication skills and professionalism in fellows. *BMC Med Educ*. 2009; 9:1.

Interpersonal and Communication Skills 2: Interprofessional and Team Communication **Overall Intent:** To effectively communicate with the health care team, including consultants, in both straightforward and complex situations	
Milestones	**Examples**
Level 1 *Respectfully requests a consultation* *Respectfully receives a consultation request* *Uses language that values all members of the team*	● When asking for a cardiology consultation for a patient with Marfan syndrome, respectfully relays the diagnosis and need to assess the aortic root diameter ● Receives consult request for a patient with diabetes, asks clarifying questions politely, and expresses gratitude for the consult ● Acknowledges the contribution of each member of the aeromedical team to the patient ● Respectfully receives unsolicited feedback on performance as a member of the team
Level 2 *Clearly and concisely requests a consultation* *Clearly and concisely responds to a consultation request* *Communicates information effectively with all team members* *Solicits feedback on performance as a member of the team*	● Communicates diagnostic evaluation recommendations clearly and concisely in an organized and timely manner ● Provides clear guidance to clinic support staff when a patient requires additional coordination of medical evaluations
Level 3 *Checks own understanding of consultant recommendations* *Checks recipient's understanding of recommendations when providing consultation* *Uses active listening to adapt communication style to fit team needs* *Communicates concerns and provides feedback to peers and learners*	● After a consultation has been completed, reviews consultation and asks additional questions of the consultant, if necessary ● When receiving treatment recommendations from an attending physician, repeats back the plan to ensure understanding
Level 4 *Coordinates recommendations from different members of the team and stakeholders*	● Initiates a multidisciplinary meeting between the psychiatrist and neuropsychologist on a patient with depression

to optimize patient care and return to flying duties *Discusses consultation with multidisciplinary team, including external stakeholders; determines aeromedical disposition* *Facilitates regular team-based feedback in complex situations*	● When evaluating a patient for aeromedical transport, discusses case with treating physician and summarizes patient's significant medical issues before rendering an aeromedical clearance decision ● Asks other members of the health care team to repeat back recommendations to ensure understanding ● Provides effective communication guidance/coaching to team members
Level 5 *Educates consultants on aeromedical significance of certain medical conditions* *Role models flexible communication strategies that value input from all team members, resolving conflict when needed* *Communicates feedback and constructive criticism to superiors*	● Discusses the interaction between G-forces and congestive heart failure with the cardiologist ● Discusses the impediment of emergency oxygen use when wearing an antiviral mask ● Drafts and submits a unit or clinic self-inspection report for review by superiors ● Mediates a conflict resolution between different members of the health care team ● Develops and implements course material on effective communication skills
Assessment Models or Tools	● Direct observation ● Global assessment ● Medical record (chart) audit ● Multi-source feedback ● Simulation
Curriculum Mapping	●
Notes or Resources	● Roth CG, Eldin KW, Padmanabhan V, Freidman EM. Twelve tips for the introduction of emotional intelligence in medical education. Med Teach. 2018 Jul 21:1-4. doi: 10.1080/0142159X.2018.1481499. [Epub ahead of print] ● Green M, Parrott T, Cook G., Improving your communication skills. BMJ 2012;344:e357 doi: https://doi.org/10.1136/bmj.e357 ● Henry SG, Holmboe ES, Frankel RM. Evidence-based competencies for improving communication skills in graduate medical education: a review with suggestions for implementation. Med Teach. 2013 May; 35(5):395-403. doi: 10.3109/0142159X.2013.769677. ● François, J. Tool to assess the quality of consultation and referral request letters in family medicine. Can Fam Physician. 2011 May;57(5), 574–575.

	● Fay D, Mazzone M, Douglas L, Ambuel B. A validated, behavior-based evaluation instrument for family medicine residents. MedEdPORTAL Publications. 2007 May; 10.15766/mep_2374-8265.622 ● Dehon E, Simpson K, Fowler D, Jones A. Development of the faculty 360. MedEdPORTAL. 2015;11:10174 http://doi.org/10.15766/mep_2374-8265.10174 ● Lane JL, Gottlieb RP. Pediatrics.2000;105:973-7. Makoul GT. SEGUE. ©1993/1999 ● Braddock CH, Edwards KA, Hasenberg NM, Laidley TL, Levinson W. JAMA 1999;282:2313-2320

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*	● Documentation is accurate but may include extraneous information
Safeguards patient personal health information	● Promptly picks up patient-related documentation from shared printers; avoids talking about patients in the elevator
Communicates through appropriate channels as required by institutional policy (e.g., patient safety reports, cell phone/pager usage)	● Identifies institutional and departmental communication hierarchy for concerns and safety issues
Level 2 *Demonstrates organized diagnostic and therapeutic reasoning through notes in the patient record*	● Organized and accurate documentation outlines clinical reasoning that supports the treatment plan
Documents required data in formats specified by institutional policy	● Develops documentation templates for clinical aeromedical evaluations in the electronic health record
Respectfully communicates concerns about the system	● 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 and aeromedical waiver or Special Issuance narrative*	● Complex clinical thinking is documented concisely but may not contain anticipatory guidance
Appropriately selects direct (e.g., telephone, in-person, telemedicine) and indirect (e.g., progress notes, text messages) forms of communication based on context	● Calls patient immediately about potentially critical test result
Uses appropriate channels to offer clear and constructive suggestions to improve the system	● Knows when to direct concerns locally, departmentally, or institutionally; i.e., appropriate escalation
Level 4 *Communicates clearly, concisely, timely, and in an organized written form, including anticipatory guidance*	● Documentation is consistently accurate, organized, and concise, and frequently incorporates anticipatory guidance

Achieves written or verbal communication (e.g., patient notes, email) that serves as an example for others to follow *Initiates difficult conversations with appropriate stakeholders to improve the system*	● Complex aeromedical case narratives are exemplary, thorough and timely ● Talks directly to an employer representative about an appropriate return-to-work schedule for a pilot
Level 5 *Creates local, regional or national medical documentation standards* *Guides departmental or institutional policies and procedures around communication* *Facilitates dialogue regarding systems issues among larger community stakeholders (institution, health care system, field)*	● Leads a task force established by the hospital QI committee to develop a plan to improve aeromedical waiver/special issuance documentation ● Meaningfully participates in a committee to examine community emergency response systems
Assessment Models or Tools	● Direct observation ● Medical record (chart) audit ● 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 Oct-Dec;29(4):420-432. ● Federal Aviation Administration. Aerospace Medical Certification Subsystem. Aviation Medical Examiner guide for aviation medical examiners. https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/. Published July 29, 2020. Accessed 2020 ● Haig, K.M., Sutton, S., Whittington, J. SBAR: a shares mental model for improving communications between clinicians. *Jt Comm J Qual Patient Saf.* 2006 Mar;32(3):167-75.

In an effort to aid programs in the transition to using the new version of the Milestones, the original Milestones 1.0 have been mapped to the new Milestones 2.0. Also indicated below are where the subcompetencies are similar between versions. These are not necessarily exact matches but are areas that include some of the same elements. Note that 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: Emergency Preparedness and Response	PC3: Hazard Recognition, Mitigation, and Management
PC2: Community Health	PC4: Clinical Care Skills
PC3: Inform and Educate	PC4: Clinical Care Skills
PC4: Policies and Plans	PC4: Clinical Care Skills
PC5: Evaluating Health Services	SBP3: Population Health
PC6: Managing aerospace and general medical problems in aerospace personnel	PC1: Health and Performance Optimization
PC7: Develop and applying medical standards, grant exceptions	PC2: Fitness for Duty and Medical Standards
PC8: Educate passengers and physicians about the hazards of flight with certain medical conditions and serve as passenger advocates to promote flight safety	PC5: Air and Space Environment
PC9: Identifying appropriate patients for aeromedical transport and provide guidance for safe aeromedical transport of patients with common medical problems	PC5: Air and Space Environment PC6: Aeromedical Transport
PC10: Advise in the operational use of aerospace biomedical equipment	PC5: Air and Space Environment PC6: Aeromedical Transport
PC11: Advise in techniques for sustaining and enhancing human performance	PC1: Health and Performance Optimization
PC12: Appropriate safety information and education and conducting the medical aspects of any accident/mishap investigation, including making recommendations to prevent recurrences	MK2: Regulatory
PC13: Conduct aeromedical research	
PC14: Space medicine knowledge	
PC15: For space-based programs only: Apply medical care standards and programs, evaluating the physiologic effects of spaceflight	
MK1: Behavioral Health	
MK2: Environmental Health	

MK3: Biostatistics	MK1: Biostatics and Epidemiology
MK4: Epidemiology	MK1: Biostatics and Epidemiology
SBP1: Work and coordinate patient care effectively in various health care delivery settings and systems	SBP2: System Navigation for Patient-Centered Care
SBP2: Incorporate considerations of cost awareness and risk-benefit analysis in patient and/or population-based care, as appropriate	SBP2: System Navigation for Patient-Centered Care SBP4: Physician Role in the Health Care Systems
SBP3: Work in inter-professional teams to enhance patient safety and improve patient care quality; advocate for quality patient care and optimal patient care systems; participate in identifying system errors and implementing potential systems solutions	SBP1: Patient Safety and Quality Improvement SBP2: System Navigation for Patient-Centered Care
PBLI1: Identify strengths, deficiencies, and limits in one's knowledge and expertise; set learning and improvement goals and identify and perform appropriate learning activities utilizing information technology, evidence from scientific studies, and evaluation feedback; systematically analyze practice using quality improvement methods, and implement changes with the goal of practice improvement	PBLI1: Evidence-Based and Informed Practice PBLI2: Reflective Practice and Commitment to Personal Growth
PROF1: Compassion, integrity, and respect for others as well as sensitivity and responsiveness to diverse patient populations including diversity in gender, age, culture, race, religion, disabilities, and sexual orientation; knowledge about, respect for and adherence to the ethical principles relevant to the practice of medicine, remembering in particular that responsiveness to patients that supersedes self-interest is an essential aspect of medical practice	PROF1: Professional Behavior and Ethical Principles PROF2: Accountability/Conscientiousness PROF3: Self-Awareness and Help-Seeking ICS1: Patient- and Family-Centered Communication
PROF2: Accountability to patients, society and the profession	PROF2: Accountability/Conscientiousness
ICS1: Communicate effectively with patients, families, and the public, as appropriate, across a broad range of socioeconomic and cultural backgrounds; communicate effectively with physicians, other health care professionals and health related agencies; work effectively as a member or leader of a health care team or other professional	ICS1: Patient- and Family-Centered Communication ICS2: Interprofessional and Team Communication

group; act in a consultative role to other physicians and health professionals	
ICS2: Maintain comprehensive, timely and legible medical records, including electronic health records	PROF2: Accountability/Conscientiousness ICS3: Communication within Health Care Systems

Available Milestones Resources

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

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

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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/