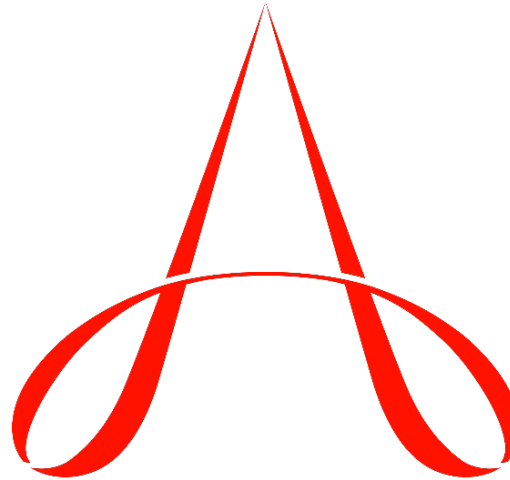




Undersea and Hyperbaric Medicine Milestones

The Accreditation Council for Graduate Medical Education



ACGME

Implementation: July 2022

Second Revision: August 2021

First Revision: February 2014

Undersea and Hyperbaric Medicine Milestones

The Milestones are designed only for use in evaluation of fellows in the context of their participation in ACGME-accredited residency or fellowship programs. The Milestones provide a framework for the assessment of the development of the fellow in key dimensions of the elements of physician competence in a specialty or subspecialty. They neither represent the entirety of the dimensions of the six domains of physician competency, nor are they designed to be relevant in any other context.

Undersea and Hyperbaric Medicine Milestones

Work Group

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American Board of Emergency Medicine

American Board of Preventive Medicine

Review Committee for Emergency Medicine

Review Committee for Preventive Medicine

Understanding Milestone Levels and Reporting

This document presents the Milestones, which programs use in a semi-annual review of fellow performance, and then report to the ACGME. Milestones are knowledge, skills, attitudes, and other attributes for each of the ACGME Competencies organized in a developmental framework. The narrative descriptions are targets for resident/fellow performance throughout their educational program.

Milestones are arranged into levels. Tracking from Level 1 to Level 5 is synonymous with moving from novice to expert fellow in the specialty or subspecialty. For each reporting period, the Clinical Competency Committee will review the completed evaluations to select the milestone levels that best describe each learner's current performance, abilities, and attributes for each subcompetency.

These levels *do not* correspond with post-graduate year of education. Depending on previous experience, a junior fellow may achieve higher levels early in his/her educational program just as a senior fellow may be at a lower level later in his/her educational program. There is no predetermined timing for a resident to attain any particular level. Fellows may also regress in achievement of their milestones. This may happen for many reasons, such as over scoring in a previous review, a disjointed experience in a particular procedure, or a significant act by the fellow.

Selection of a level implies the fellow substantially demonstrates the milestones in that level, as well as those in lower levels (see the diagram on page iv).

Additional Notes

Level 4 is designed as a graduation *goal* but *does not* represent a graduation *requirement*. Making decisions about readiness for graduation and unsupervised practice is the purview of the program director. Furthermore, Milestones 2.0 include revisions and changes that preclude using Milestones as a sole assessment in high-stakes decisions (i.e., determination of eligibility for certification or credentialing). Level 5 is designed to represent an expert fellow whose achievements in a subcompetency are greater than the expectation. Milestones are primarily designed for formative, developmental purposes to support continuous quality improvement for individual learners, education programs, and the specialty. The ACGME and its partners will continue to evaluate and perform research on the Milestones to assess their impact and value.

Some milestone descriptions include statements about performing independently. These activities must occur in conformity to ACGME supervision guidelines as described in the Program Requirements, as well as to institutional and program policies. For example, a fellow who performs a procedure independently must, at a minimum, be supervised through oversight.

Additional resources are available in the [Milestones](#) section of the ACGME website. Follow the links under “What We Do” at www.acgme.org.

The diagram below presents an example set of milestones for one subcompetency in the same format as the ACGME Report Worksheet. For each reporting period, a fellow's performance on the milestones for each subcompetency will be indicated by selecting the level of milestones that best describes that fellow's performance in relation to those milestones.

Systems-Based Practice 1: Patient Safety				
Level 1	Level 2	Level 3	Level 4	Level 5
Demonstrates knowledge of common patient safety events	Identifies system factors that lead to patient safety events	Participates in analysis of patient safety events (simulated or actual)	Conducts analysis of patient safety events and offers error prevention strategies (simulated or actual)	Actively engages teams and processes to modify systems for preventing patient safety events
Demonstrates knowledge of how to report patient safety events	Reports patient safety events through institutional reporting systems (simulated or actual)	Participates in disclosure of patient safety events to patients and families (simulated or actual)	Discloses patient safety events to patients and families (simulated or actual)	Acts as a role model and/or mentor for others in the disclosing of patient safety events
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments: Not Yet Completed Level 1 <input type="checkbox"/>				

Selecting a response box in the middle of a level implies that milestones in that level and in lower levels have been substantially demonstrated.

Selecting a response box on the line in between levels indicates that milestones in lower levels have been substantially demonstrated as well as **some** milestones in the higher level(s).

Patient Care 1: Fitness to Dive				
Level 1	Level 2	Level 3	Level 4	Level 5
Recognizes there are different types of diving requiring varying physical capabilities	Performs a comprehensive diving history and physical examination	Assesses a patient's fitness to dive, with guidance	Independently assesses a patient's fitness to dive and counsels patients on risk mitigation strategies	Develops institutional, regional, or national protocols for diver assessments
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments: <div style="float: right; text-align: right;"> Not Yet Completed Level 1 <input type="checkbox"/> Not Yet Assessable <input type="checkbox"/> </div>				

Patient Care 2: Decompression Illness				
Level 1	Level 2	Level 3	Level 4	Level 5
Identifies types of decompression illness	Performs a comprehensive diving history and physical examination of an injured diver	Formulates a differential diagnosis and manages decompression illness, with guidance	Independently diagnoses and manages decompression illness	Develops institutional, regional, or national protocols or outreach for injured divers or prevention of decompression illness
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:			Not Yet Completed Level 1	<input type="checkbox"/>
			Not Yet Assessable	<input type="checkbox"/>

Patient Care 3: Clinical Hyperbaric Medicine				
Level 1	Level 2	Level 3	Level 4	Level 5
Selects patients for routine hyperbaric oxygen therapy (HBOT) consultation	Performs a comprehensive history and physical examination and obtains informed consent for HBOT	Prescribes and manages HBOT and complications, with guidance	Independently prescribes and manages HBOT and complications	Develops institutional, regional, or national protocols for patient management
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments: <div style="text-align: right;"> Not Yet Completed Level 1 <input type="checkbox"/> Not Yet Assessable <input type="checkbox"/> </div>				

Patient Care 4: Hyperbaric Medicine for Critically Ill Patients				
Level 1	Level 2	Level 3	Level 4	Level 5
Identifies urgent and emergent indications for HBOT	Examines and evaluates critically ill patients referred for HBOT	Manages critically ill patients in the hyperbaric environment, with guidance	Independently manages critically ill patients in the hyperbaric environment	Develops institutional, regional, or national protocols for critically ill patient management
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments: <div style="text-align: right;"> Not Yet Completed Level 1 <input type="checkbox"/> Not Yet Assessable <input type="checkbox"/> </div>				

Medical Knowledge 1: Physics and Physiology of Hyperbaric and Hypobaric Exposure				
Level 1	Level 2	Level 3	Level 4	Level 5
Shows familiarity with gas laws, units of pressure, volume, and temperature	Applies knowledge of gas laws as relates to human physiology under hyper/hypobaric conditions	Demonstrates basic knowledge of human physiology and the pharmacology of metabolic gases	Demonstrates advanced knowledge of human physiology related to the hyper/hypobaric environment	Demonstrates expert knowledge of physics and physiology as related to hyper/hypobaric conditions
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments: <div style="text-align: right;"> Not Yet Completed Level 1 <input type="checkbox"/> Not Yet Assessable <input type="checkbox"/> </div>				

Medical Knowledge 2: Clinical Hyperbaric Oxygen Therapy				
Level 1	Level 2	Level 3	Level 4	Level 5
Demonstrates awareness of HBOT as a medical therapy	Demonstrates basic knowledge of indications, contraindications, and side effects	Demonstrates basic scientific rationale and mechanisms of HBOT	Demonstrates advanced scientific knowledge of HBOT mechanisms and investigational indications	Demonstrates expert level scientific understanding of HBOT mechanisms
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:			Not Yet Completed Level 1	<input type="checkbox"/>
			Not Yet Assessable	<input type="checkbox"/>

Medical Knowledge 3: Fitness to Dive				
Level 1	Level 2	Level 3	Level 4	Level 5
Recognizes that medical conditions or medications affect fitness to dive	Discusses basic physical requirements and contraindications for diving	Comprehends the implications of acute and chronic medical conditions, including medications, on diving	Comprehends fitness-to-dive criteria and distinctions between commercial and other working diving standards and recreational diving	Participates in evolving research or develops new guidelines impacting fitness to dive
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments: <div style="float: right; text-align: right;"> Not Yet Completed Level 1 <input type="checkbox"/> Not Yet Assessable <input type="checkbox"/> </div>				

Medical Knowledge 4: Undersea Medicine				
Level 1	Level 2	Level 3	Level 4	Level 5
Demonstrates knowledge of the effect of the diving environment on organ systems	Recognizes differences between decompression and barotrauma-related disorders	Describes basic physiologic mechanisms and treatment of decompression illness (e.g., decompression sickness, barotrauma, gas embolism)	Demonstrates comprehensive knowledge of mechanisms and treatment of decompression illness (e.g., decompression sickness, barotrauma, gas embolism)	Develops experimental models of decompression sickness pathophysiology or participates in developing new treatment guidelines
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:				
Not Yet Completed Level 1 <input type="checkbox"/>				
Not Yet Assessable <input type="checkbox"/>				

Systems-Based Practice 1: Patient Safety				
Level 1	Level 2	Level 3	Level 4	Level 5
Demonstrates knowledge of common patient safety events	Identifies system factors that lead to patient safety events	Participates in analysis of patient safety events (simulated or actual)	Conducts analysis of patient safety events and offers error prevention strategies (simulated or actual)	Actively engages teams and processes to modify systems for preventing patient safety events
Demonstrates knowledge of how to report patient safety events	Reports patient safety events through institutional reporting systems (simulated or actual)	Participates in disclosure of patient safety events to patients and families (simulated or actual)	Discloses patient safety events to patients and families (simulated or actual)	Acts as a role model and/or mentor for others in the disclosing of patient safety events
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments: <div style="text-align: right;">Not Yet Completed Level 1 <input type="checkbox"/></div>				

Systems-Based Practice 2: Quality Improvement				
Level 1	Level 2	Level 3	Level 4	Level 5
Demonstrates knowledge of basic quality improvement methodologies and metrics	Describes local quality improvement initiatives	Participates in local quality improvement initiatives	Demonstrates the skills required for identifying, developing, implementing, and analyzing a quality improvement project	Creates, implements, and assesses quality improvement initiatives at the institutional or community level
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments: <div style="text-align: right;">Not Yet Completed Level 1 <input type="checkbox"/></div>				

Systems-Based Practice 3: System Navigation for Patient-Centered Care				
Level 1	Level 2	Level 3	Level 4	Level 5
<p>Demonstrates knowledge of care coordination and Identifies key elements for safe and effective transitions of care and hand-offs</p> <p>Demonstrates knowledge of existence of health care inequities and barriers to care</p>	<p>In routine clinical situations, effectively coordinates patient care and enables safe and effective transitions of care/hand-offs</p> <p>Articulates categories of health care inequities, including racial, gender, and socio-economic inequities, including income and citizenship or residency status</p>	<p>In complex clinical situations, effectively coordinates patient care and enables safe and effective transitions of care/hand-offs</p> <p>Engages in identification of specific barriers to care and health inequities with individual patients</p>	<p>Independently and effectively coordinates patient-centered care and advocates for safe and effective transitions of care/hand-offs within and across health care delivery systems</p> <p>Independently identifies barriers to care and health inequities and formulates a mitigation plan</p>	<p>Develops institutional, regional, or national protocols for patient management care coordination and transitions of care</p> <p>Advocates and participates in correction of health care inequities and barriers to care on an institutional, community or national level</p>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<p>Comments: Not Yet Completed Level 1 <input type="checkbox"/></p>				

Systems-Based Practice 4: Physician Role in Health Care/Hyperbaric Administration				
Level 1	Level 2	Level 3	Level 4	Level 5
Describes basic health payment systems, including practice models (e.g., government, private, public, uninsured care)	Delivers care with consideration of each patient's payment model (e.g., insurance type) Identifies basic knowledge domains required for medical practice (e.g., information technology, legal, billing, coding, financial, and personnel aspects)	Engages patients in shared decision making, informed by each patient's payment models Demonstrates efficient integration of information technology required for medical practice (e.g., electronic health record, documentation required for billing and coding, including national coverage determinations)	Advocates for patient care needs with consideration of the limitations of each patient's payment model (e.g., negotiating with third-party payors, including peer to peer reviews, assisting with applications for charity care) Describes core administrative knowledge needed for the transition to practice (e.g., contract negotiation, malpractice insurance, government regulation, compliance)	Participates in health policy advocacy activities Analyzes individual practice patterns and professional requirements
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments: <div style="text-align: right;">Not Yet Completed Level 1 <input type="checkbox"/></div>				

Systems Based Practice 5: Hyperbaric Chamber Operations				
Level 1	Level 2	Level 3	Level 4	Level 5
Identifies the difference between mono and multi-place chamber	Discusses safety requirements, including prohibited items, of the hyperbaric chamber	Independently executes chamber safety and emergency protocols	Independently supervises hyperbaric chamber operations	Develops institutional, regional, or national safety and operations protocols for hyperbaric chambers
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:			Not Yet Completed Level 1	<input type="checkbox"/>
			Not Yet Assessable	<input type="checkbox"/>

Practice-Based Learning and Improvement 1: Evidence-Based and Informed Practice				
Level 1	Level 2	Level 3	Level 4	Level 5
Demonstrates how to access and use available evidence	Articulates the clinical questions necessary to guide evidence-based care	Locates and applies the best available evidence to the care of patients	Locates and applies the best available evidence to the care of complex patients	Coaches others to critically appraise and apply evidence for complex patients, and/or participates in the development of guidelines
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments: <div style="text-align: right;">Not Yet Completed Level 1 <input type="checkbox"/></div>				

Practice-Based Learning and Improvement 2: Scholarly Activity				
Level 1	Level 2	Level 3	Level 4	Level 5
Begins independent study into HBOT mechanisms	Participates in guided HBOT scholarly activity	Generates HBOT scholarly activity ideas	Disseminates HBOT scholarly activity	Leads HBOT research projects
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments: <div style="text-align: right;">Not Yet Completed Level 1 <input type="checkbox"/></div>				

Practice-Based Learning and Improvement 3: Reflective Practice and Commitment to Personal Growth				
Level 1	Level 2	Level 3	Level 4	Level 5
Acknowledges any gap(s) between expectations and actual performances	Identifies the factors that contribute to the gap(s) between expectations and actual performance	Analyzes and reflects upon the factors that contribute to gap(s) between expectations and actual performance	Institutes behavioral change(s) to narrow the gap(s) between expectations and actual performance	Acts as a role model for the development of personal and professional goals and coaches others on reflective practice
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:				Not Yet Completed Level 1 <input type="checkbox"/>

Professionalism 1: Professional Behavior and Ethical Principles				
Level 1	Level 2	Level 3	Level 4	Level 5
<p>Demonstrates professional behavior in routine situations</p> <p>Demonstrates knowledge of the ethical principles underlying patient care</p>	<p>Identifies and describes potential triggers (e.g., fatigue, hunger, prior patient outcome) and takes responsibility for professionalism lapses</p> <p>Analyzes straightforward situations using ethical principles</p>	<p>Exhibits professional behavior in complex and/or stressful situations</p> <p>Analyzes complex situations using ethical principles, and recognizes the need to seek help in managing and resolving them</p>	<p>Uses appropriate resources for managing and resolving professional and ethical dilemmas</p>	<p>Identifies and addresses system-level factors that either induce or exacerbate ethical or professionalism problems</p>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<p>Comments:</p> <p style="text-align: right;">Not Yet Completed Level 1 <input type="checkbox"/></p>				

Professionalism 2: Accountability/Conscientiousness				
Level 1	Level 2	Level 3	Level 4	Level 5
In routine situations, performs tasks and responsibilities with appropriate attention to detail	Takes responsibility for failure to complete tasks and responsibilities	In complex or stressful situations, performs tasks and responsibilities with appropriate attention to detail	Proactively implements strategies to ensure that the needs of patients, teams, and systems are met	Works within system to improve outcomes
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments: <div style="text-align: right;">Not Yet Completed Level 1 <input type="checkbox"/></div>				

Professionalism 3: Self-Awareness and Well-Being				
Level 1	Level 2	Level 3	Level 4	Level 5
Independently recognizes the status of one's personal and professional well-being	With assistance, proposes a plan to optimize one's personal and professional well-being	Independently develops a plan to optimize one's personal and professional well-being	Implements a plan to optimize one's personal and professional well-being	Works at systems level to optimize personal and professional well-being for others
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments: <div style="text-align: right;">Not Yet Completed Level 1 <input type="checkbox"/></div>				

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 affect well-being, the mechanisms by which those factors affect well-being, and available resources and tools to improve well-being.

Interpersonal and Communication Skills 1: Patient- and Family-Centered Communication				
Level 1	Level 2	Level 3	Level 4	Level 5
<p>Uses language and non-verbal behavior to reflect respect and establish rapport</p> <p>Identifies common barriers to effective communication (e.g., language, disability)</p>	<p>Establishes a therapeutic relationship in straightforward encounters with patients by clarifying expectations using active listening and clear language</p> <p>Identifies complex barriers to effective communication (e.g., health literacy, cultural differences, technology)</p>	<p>Establishes a therapeutic relationship in challenging patient encounters</p> <p>When prompted, reflects on one's personal biases, while attempting to minimize communication barriers</p>	<p>Easily establishes therapeutic relationships with patients, regardless of the complexity of cases</p> <p>Independently recognizes personal biases of patients, while attempting to proactively minimize communication barriers</p>	<p>Acts as a mentor to others in situational awareness and critical self-reflection with the aim of consistently developing positive therapeutic relationships</p> <p>Role models self-awareness while identifying a contextual approach to minimize communication barriers</p>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<p>Comments:</p> <p style="text-align: right;">Not Yet Completed Level 1 <input type="checkbox"/></p>				

Interpersonal and Communication Skills 2: Interprofessional and Team Communication				
Level 1	Level 2	Level 3	Level 4	Level 5
Uses language that reflects the values all members of the health care team	Communicates information effectively with all health care team members	Engages in active listening to adapt to the communication styles of the team	Uses effective communication to lead or manage health care teams	Role models complex communication strategies that value input from all team members, resolving conflict when needed
Receives feedback in a respectful manner	Solicits feedback on performance as a member of the health care team	Communicates feedback and constructive criticism to peers and learners	Communicates feedback and constructive criticism to superiors	In complex situations, facilitates regular health care team-based feedback
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments: <div style="text-align: right;">Not Yet Completed Level 1 <input type="checkbox"/></div>				

Interpersonal and Communication Skills 3: Communication within Health Care Systems				
Level 1	Level 2	Level 3	Level 4	Level 5
Accurately documents information in the patient's record and safeguards patient personal health information	Documents required data in formats specified by institutional policy	Documents clearly, concisely and in an organized written form with guidance	Independently documents clearly, concisely and in an organized written form, including anticipatory guidance	Guides departmental or institutional policies and procedures concerning communication
Communicates through appropriate channels as required by institutional policy (e.g., patient safety reports, cell phone/pager usage)	Respectfully communicates concerns about the system	Uses appropriate channels to offer clear and constructive suggestions for improving the system	Initiates difficult conversations with appropriate stakeholders to improve the system	Facilitates dialogue regarding systems issues among larger community stakeholders (e.g., institution, the health care system, and/or the field)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments: <div style="text-align: right;">Not Yet Completed Level 1 <input type="checkbox"/></div>				