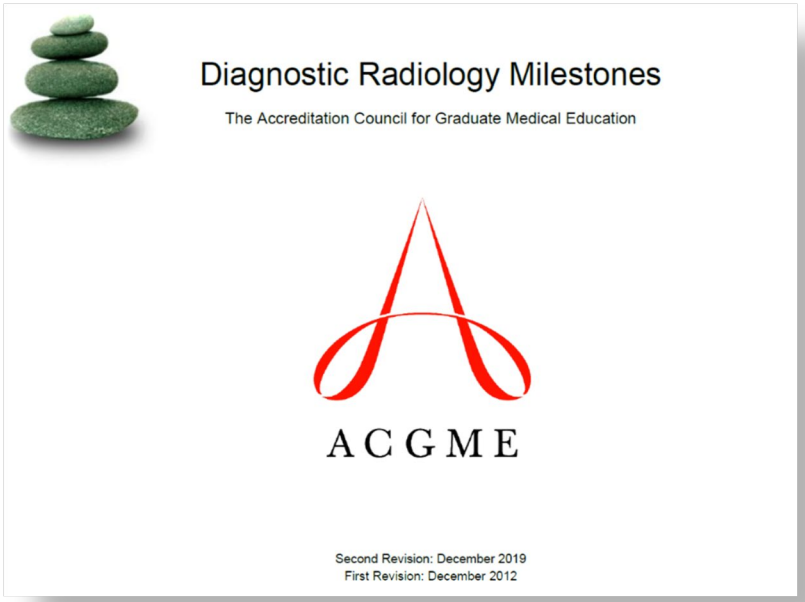
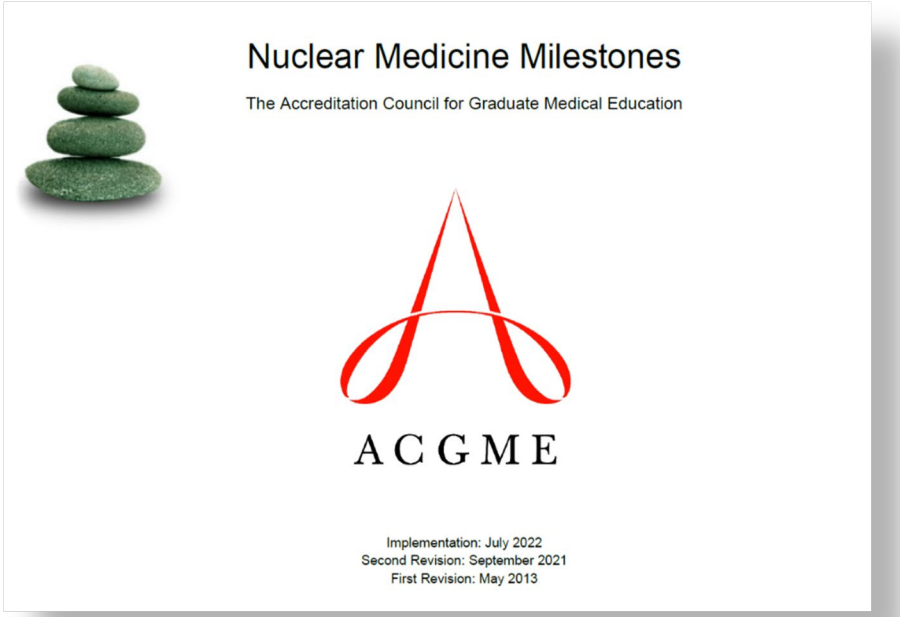
Diagnostic Radiology and Nuclear Medicine (combined) programs must annually report on **each** set of Milestones.





Diagnostic Radiology Milestones

The Accreditation Council for Graduate Medical Education

ACGME

Second Revision: December 2019
First Revision: December 2012

Diagnostic Radiology Milestones

The Milestones are designed only for use in evaluation of residents in the context of their participation in ACGME-accredited residency programs. The Milestones provide a framework for the assessment of the development of the residents in key dimensions of the elements of physician competency 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.

Diagnostic Radiology Milestones

Work Group

James Anderson, MD
Kamran Ali, MD
Amy Bourgeois, Med
Lori Deitte, MD
Laura Edgar, EdD, CAE
Meaghan Magarik, MD, PhD
Marco Molina, MD
Seng Ong, MBBS
Anne Roberts, MD
Rocky Saenz, DO
Mary Scanlon, MD, FACR
Ely Wolin, MD

The ACGME would like to thank the following organizations for their continued support in the development of the Milestones:

American Board of Radiology

Association of Program Directors in Radiology

Review Committee for Radiology

Understanding Milestone Levels and Reporting

This document presents the Milestones, which programs use in a semi-annual review of resident 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 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 resident 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 resident may achieve higher levels early in his/her educational program just as a senior resident 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. Residents 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 resident.

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

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 resident 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.

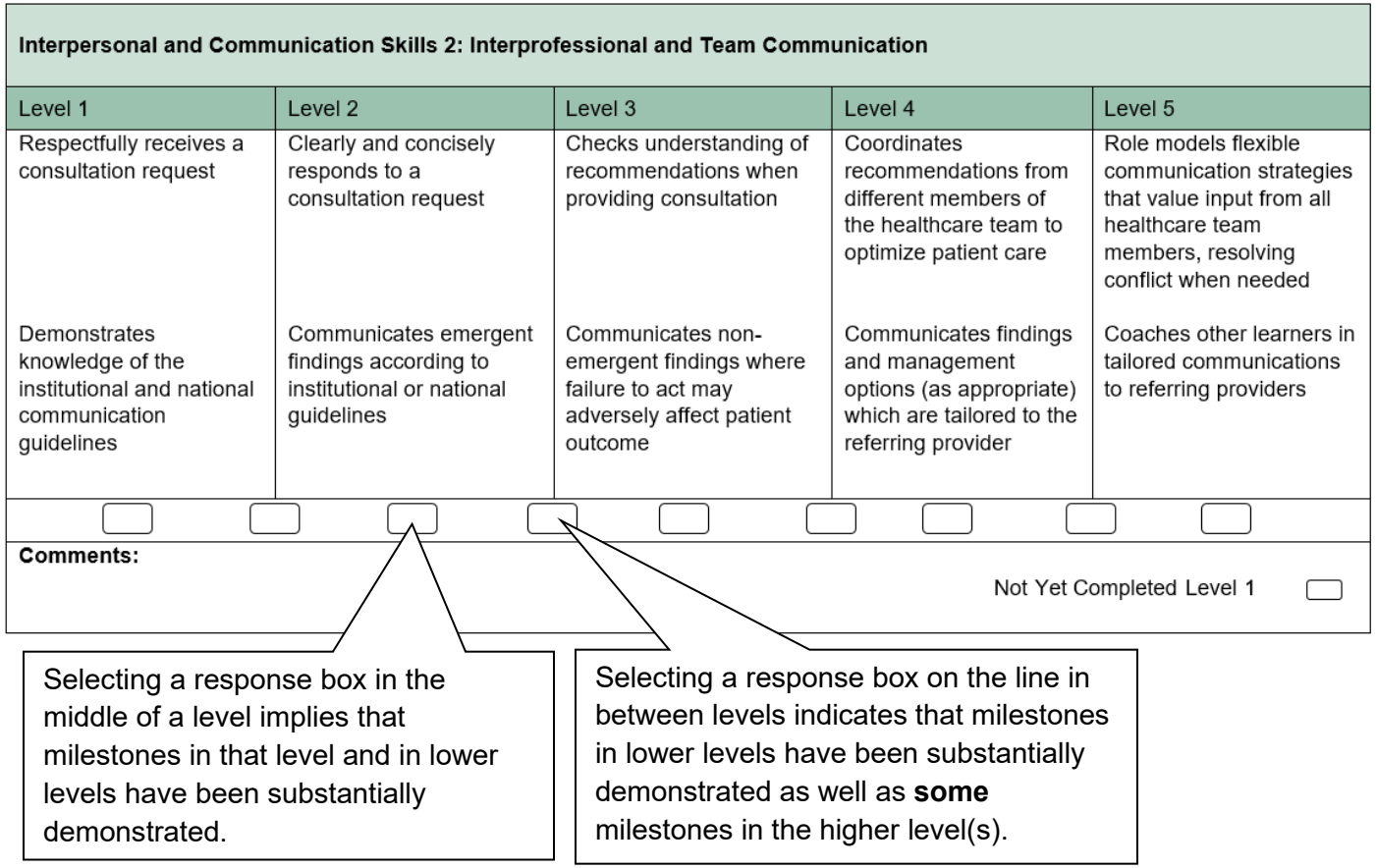
Examples are provided for some milestones within this document. Please note: the examples are not the required element or outcome; they are provided as a way to share the intent of the element.

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 resident who performs a procedure independently must, at a minimum, be supervised through oversight.

A Supplemental Guide is also available to provide the intent of each subcompetency, examples for each level, assessment methods or tools, and other available resources. The Supplemental Guide, like examples contained within the Milestones, is designed only to assist the program director and Clinical Competency Committee, and is not meant to demonstrate any required element or outcome.

Supplemental Guides and other resources are available on the Milestones page of each specialty section of the ACGME website. On www.acgme.org, choose the applicable specialty under the “Specialties” menu, then select the “Milestones” link in the lower navigation bar.

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 resident's performance on the milestones for each subcompetency will be indicated by selecting the level of milestones that best describes that resident's performance in relation to those milestones.



Interpersonal and Communication Skills 2: Interprofessional and Team Communication				
Level 1	Level 2	Level 3	Level 4	Level 5
Respectfully receives a consultation request	Clearly and concisely responds to a consultation request	Checks understanding of recommendations when providing consultation	Coordinates recommendations from different members of the healthcare team to optimize patient care	Role models flexible communication strategies that value input from all healthcare team members, resolving conflict when needed
Demonstrates knowledge of the institutional and national communication guidelines	Communicates emergent findings according to institutional or national guidelines	Communicates non-emergent findings where failure to act may adversely affect patient outcome	Communicates findings and management options (as appropriate) which are tailored to the referring provider	Coaches other learners in tailored communications to referring providers

Patient Care 1: Reporting				
Level 1	Level 2	Level 3	Level 4	Level 5
Generates reports with appropriate elements for coding Describes lexicons and structured reporting	Efficiently generates clear and concise reports which do not require substantive correction Uses lexicons and structured reporting that do not require substantive correction	Efficiently generates clear and concise reports which rarely require correction Uses lexicons and structured reporting which rarely require correction	Generates tailored reports meeting the needs of the care provider Proficiently uses lexicons and structured reporting to provide accurate and timely reports which do not require correction	Generates tailored reports meeting subspecialty needs
☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐
Comments:				
				Not Yet Completed Level 1 ☐ Not Yet Assessable ☐

Patient Care 2: Clinical Consultation				
Level 1	Level 2	Level 3	Level 4	Level 5
Uses electronic health records (EHRs) to obtain relevant clinical information	For emergent and routine radiology consultations, delineates the clinical question, obtains appropriate clinical information, and uses evidence-based imaging guidelines, recommends next steps, with assistance	For complex radiology consultations, delineates the clinical question, obtains appropriate clinical information, and uses evidence-based imaging guidelines, recommends next steps, with assistance	Manages radiology consultations independently, taking into consideration cost effectiveness and risk benefit analysis	Provides comprehensive radiology consultations at the expected level of a subspecialist
☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐
Comments:				
Not Yet Completed Level 1 ☐ Not Yet Assessable ☐				

Patient Care 3: Image Interpretation				
Level 1	Level 2	Level 3	Level 4	Level 5
Identifies primary imaging findings	Identifies secondary and critical imaging findings and formulates differential diagnoses	Prioritizes differential diagnoses and recommends management options	Provides a single diagnosis with integration of current guidelines to recommend management, when appropriate	Demonstrates expertise and efficiency at a level expected of a subspecialist
☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐
Comments:				
Not Yet Completed Level 1 ☐ Not Yet Assessable ☐				

Patient Care 4: Competence in Procedures				
Level 1	Level 2	Level 3	Level 4	Level 5
Discusses the indications for and assists with procedures	Performs procedures, with direct supervision	Competently performs procedures, with indirect supervision	Proficiently and independently performs procedures as expected of a general radiologist	Proficiently and independently performs procedures expected of a subspecialist
Discusses potential procedural complications	Recognizes complications of procedures and enlists help	Manages complications of procedures, with supervision	Anticipates and independently manages complications of procedures performed by a general radiologist	Proficiently and independently manages complications of procedures performed by a subspecialist
☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐
Comments:				
				Not Yet Completed Level 1 ☐ Not Yet Assessable ☐

Medical Knowledge 1: Diagnostic Knowledge				
Level 1	Level 2	Level 3	Level 4	Level 5
Demonstrates knowledge of imaging anatomy Demonstrates knowledge of pathophysiology of disease processes Demonstrates knowledge of cellular and molecular systems	Applies knowledge of anatomy to make common imaging diagnoses Applies knowledge of pathophysiology to make common imaging diagnoses Applies knowledge of cellular and molecular systems to make common imaging diagnoses	Applies knowledge of anatomy to make uncommon imaging diagnoses Applies knowledge of pathophysiology to make uncommon imaging diagnoses Applies knowledge of cellular and molecular systems to make uncommon imaging diagnoses	Proficiently integrates knowledge of anatomic and molecular imaging with pathophysiology to formulate a diagnosis	Proficiently integrates knowledge of anatomic and molecular imaging with pathophysiology to formulate a diagnosis at the expected level of a subspecialist
☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐

Comments:

Not Yet Completed Level 1 ☐
Not Yet Assessable ☐

Medical Knowledge 2: Physics				
Level 1	Level 2	Level 3	Level 4	Level 5
Discusses the basic physics for diagnostic radiology	Demonstrates knowledge of basic medical physics and radiobiology in diagnostic radiology	Applies knowledge of basic medical physics and radiobiology to imaging	Applies physical principles to optimize image quality, including dose reduction strategies	Teaches physical principles to optimize image quality to other specialties
☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐
Comments:				
Not Yet Completed Level 1 ☐ Not Yet Assessable ☐				

Medical Knowledge 3: Protocol Selection and Contrast Agent Selection/Dosing				
Level 1	Level 2	Level 3	Level 4	Level 5
Discusses the protocols and contrast agent/dose for imaging	Selects appropriate protocols and contrast agent/dose for emergent and routine imaging	Selects appropriate protocols and contrast agent/dose for complex imaging	Modifies protocols and contrast agent/dose as determined by clinical circumstances	Develops imaging protocols
☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐
Comments:				
Not Yet Completed Level 1 ☐ Not Yet Assessable ☐				

Medical Knowledge 4: Imaging Technology and Image Acquisition				
Level 1	Level 2	Level 3	Level 4	Level 5
Discusses imaging technology and image acquisition	Demonstrates knowledge of basic image acquisition and image processing, and recognizes common imaging artifacts and technical problems	Demonstrates knowledge of instrument quality control and image reconstruction and troubleshoots for artifact reduction	Proficiently optimizes image acquisition and processing in collaboration with the technology/imaging team	Presents or publishes research on imaging technology
☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐
Comments:				
				Not Yet Completed Level 1 ☐ Not Yet Assessable ☐

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 to prevent 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)	Role models or mentors others in the disclosure of patient safety events
☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐
Comments:				
				Not Yet Completed Level 1 ☐

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 to identify, develop, implement, and analyze a quality improvement project	Creates, implements, and assesses quality improvement initiatives at the institutional or community level
☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐
Comments: Not Yet Completed Level 1 ☐				

Systems-Based Practice 3: System Navigation for Patient-Centered Care				
Level 1	Level 2	Level 3	Level 4	Level 5
Demonstrates knowledge of care coordination in radiology imaging/procedures	Coordinates care of patients in routine radiology imaging/procedures effectively using the roles of interprofessional teams	Coordinates care of patients in complex radiology imaging/procedures effectively using the roles of interprofessional teams	Role models effective coordination of patient-centered care among different disciplines and specialties	Analyzes the process of care coordination and leads in the design and implementation of improvements
Identifies key elements for safe and effective transitions of care and hand-offs	Performs safe and effective transitions of care/hand-offs in routine clinical situations	Performs safe and effective transitions of care/hand-offs in complex clinical situations	Role models safe and effective transitions of care/hand-offs	Improves quality of transitions of care to optimize patient outcomes
Demonstrates knowledge of population and community health needs	Identifies specific population and community health needs for their local population	Identifies local resources available to meet the needs of a patient population and community	Participates in adapting the practice to provide for the needs of specific populations (actual or simulated)	Leads innovations and advocates for populations and communities with specific health care needs
☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐
Comments:				Not Yet Completed Level 1 ☐

Systems-Based Practice 4: Physician Role in Health Care Systems				
Level 1	Level 2	Level 3	Level 4	Level 5
Identifies key components of the complex healthcare system (e.g., hospital, finance, personnel, technology) Describes the mechanisms for reimbursement, including types of payors	Describes how components of a complex health care system are inter-related, and how this impacts patient care States relative cost of common procedures	Discusses how individual practice affects the broader system (e.g., length of stay, readmission rates, clinical efficiency) Describes the technical and professional components of imaging costs	Manages various components of the complex health care system to provide efficient and effective patient care and transition of care Describes the radiology revenue cycle and measurements of productivity (e.g., relative value units)	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
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐				
Comments: Not Yet Completed Level 1 ☐				

Systems-Based Practice 5: Contrast Agent Safety				
Level 1	Level 2	Level 3	Level 4	Level 5
Demonstrates knowledge of contrast reactions	Recognizes contrast reactions (simulated or actual)	Manages contrast reactions, with supervision (simulated or actual)	Independently manages contrast reactions (simulated or actual)	Leads educational experience in simulation laboratory for contrast reaction
☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐
Comments:				
				Not Yet Completed Level 1 ☐

Systems-Based Practice 6: Radiation Safety				
Level 1	Level 2	Level 3	Level 4	Level 5
Demonstrates knowledge of the mechanisms of radiation injury and the ALARA ("as low as reasonably achievable") concept	Accesses resources to determine exam-specific average radiation dose information	Communicates the relative risk of exam-specific radiation exposure to patients and practitioners	Applies principles of ALARA in daily practice	Creates, implements, and assesses radiation safety initiatives at the institutional level
☐	☐	☐	☐	☐
Comments:				
Not Yet Completed Level 1 ☐				

Systems-Based Practice 7: Magnetic Resonance (MR) Safety				
Level 1	Level 2	Level 3	Level 4	Level 5
Demonstrates knowledge of the risks of magnetic resonance imaging (MRI), including safety zones and pre-MR screening	Accesses resources to determine the safety of implanted devices and retained foreign bodies	Communicates MR safety, including implants and retained foreign bodies, to patients and practitioners	Applies principles of MR safety to daily practice	Creates, implements, and assesses MR safety initiatives at the institutional level
☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐
Comments:				
Not Yet Completed Level 1 ☐				

Systems-Based Practice 8: Informatics				
Level 1	Level 2	Level 3	Level 4	Level 5
Demonstrates familiarity with information systems, including EHR, radiology information system, and picture archiving system	Demonstrates familiarity with information standards in radiology, and describes their roles	Describes approaches to capture and integrate data from radiology examinations into medical decision making	Applies knowledge of information systems, standards, and data to support radiology initiatives, as appropriate	Participates in operational and strategic information systems meetings; applies informatics knowledge to help guide direction and operation of the radiology department
☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐
Comments:				
Not Yet Completed Level 1 ☐				

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 to determine the best imaging examination for a routine patient/diagnosis	Articulates clinical questions and elicits patient preferences and values in order to guide evidence-based imaging	Locates and applies the best available evidence, integrated with patient preferences and values, to the care of complex patients	Critically appraises conflicting evidence to guide care, tailored to the individual patient	Coaches others to critically appraise and apply evidence for complex patients; and/or participates in the development of guidelines
☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐
Comments:				
Not Yet Completed Level 1 ☐				

Practice-Based Learning and Improvement 2: Reflective Practice and Commitment to Professional Growth				
Level 1	Level 2	Level 3	Level 4	Level 5
Accepts responsibility for professional development by establishing goals	Receptive to performance data and feedback in order to adjust goals	Episodically seeks performance data and feedback, with humility and adaptability	Consistently seeks performance data and feedback with humility and adaptability	Coaches other learners to consistently seek performance data and feedback
Identifies factors which contribute to gap(s) between expectations and actual performance	Analyzes and reflects on factors which contribute to gap(s) between expectations and actual performance	Analyzes, reflects on, and institutes behavioral change(s) to narrow the gap(s) between expectations and actual performance	Analyzes effectiveness of behavioral changes where appropriate and considers alternatives in narrowing the gap(s) between expectations and actual performance	Coaches others on reflective practice
Actively seeks opportunities to improve performance	Designs and implements a learning plan, with prompting	Designs and implements a learning plan independently	Uses performance data to measure the effectiveness of the learning plan and when necessary, improves it	Facilitates the design and implements learning plans for others
☐	☐	☐	☐	☐
Comments:				
Not Yet Completed Level 1 ☐				

Professionalism 1: Professional Behavior and Ethical Principles				
Level 1	Level 2	Level 3	Level 4	Level 5
Demonstrates knowledge of expectations for professional behavior and describes how to appropriately report professional lapses	Demonstrates insight into professional behavior in routine situations and takes responsibility for own professionalism lapses	Demonstrates professional behavior in complex or stressful situations	Recognizes situations that may trigger professionalism lapses and intervenes to prevent lapses in self and others	Coaches others when their behavior fails to meet professional expectations
Demonstrates knowledge of the ethical principles underlying informed consent, surrogate decision making, advance directives, confidentiality, error disclosure, and stewardship of limited resources	Analyzes straightforward situations using ethical principles	Recognizes need to seek help in managing and resolving complex ethical situations	Recognizes and uses appropriate resources for managing and resolving ethical dilemmas as needed (e.g., ethics consultations, literature review, risk management/legal consultation)	Identifies and seeks to address system-level factors that induce or exacerbate ethical problems or impede their resolution
☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐ ☐ ☐
Comments:				
Not Yet Completed Level 1 ☐				

Professionalism 2: Accountability/Conscientiousness				
Level 1	Level 2	Level 3	Level 4	Level 5
Responds promptly to requests or reminders to complete tasks and responsibilities	Performs tasks and responsibilities in a timely manner to ensure that the needs of patients, teams, and systems are met in routine situations	Performs tasks and responsibilities in a timely manner to ensure that the needs of patients, teams, and systems are met in complex or stressful situations	Recognizes and raises awareness of situations that may impact others' ability to complete tasks and responsibilities in a timely manner	Takes ownership of system outcomes
☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐
Comments:				
Not Yet Completed Level 1 ☐				

Professionalism 3: Self-Awareness and Help Seeking				
Level 1	Level 2	Level 3	Level 4	Level 5
Recognizes status of personal and professional well-being, with assistance, and is aware of available resources Recognizes limits in the knowledge/skills of self or team, with assistance	Independently recognizes status of personal and professional well-being using available resources when appropriate Independently recognizes limits in the knowledge/skills of self or team and demonstrates appropriate help-seeking behaviors	With assistance, proposes a plan to optimize personal and professional well-being With assistance, proposes a plan to remediate or improve limits in the knowledge/ skills of self or team	Independently develops a plan to optimize personal and professional well-being Independently develops a plan to remediate or improve limits in the knowledge/skills of self or team	Coaches others when emotional responses or limitations in knowledge/skills do not meet professional expectations
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐				
Comments: Not Yet Completed Level 1 ☐				

This subcompetency is not intended to evaluate a resident's well-being. Rather, the intent is to ensure that each resident has the fundamental knowledge of factors that 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
Accurately communicates own role within the health care system Identifies the need to adjust communication strategies based on assessment of patient/family expectations and understanding of their health status and treatment options	Identifies barriers to effective communication (e.g., language, health literacy) Organizes and initiates communication with patient/family by clarifying expectations and verifying understanding of the clinical situation	Identifies biases that hinder effective communication With guidance, sensitively and compassionately delivers medical information, elicits patient goals and preferences, and acknowledges uncertainty and conflict	Actively minimizes communication barriers Independently, uses shared decision making to align patient goals, and preferences with treatment options to make a personalized care plan	Coaches other learners to minimize communication barriers Coaches other learners in shared decision making
☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐
Comments: Not Yet Completed Level 1 ☐				

Interpersonal and Communication Skills 2: Interprofessional and Team Communication				
Level 1	Level 2	Level 3	Level 4	Level 5
Respectfully receives a consultation request	Clearly and concisely responds to a consultation request	Checks understanding of recommendations when providing consultation	Coordinates recommendations from different members of the health care team to optimize patient care	Role models flexible communication strategies that value input from all health care team members, resolving conflict when needed
Demonstrates knowledge of the institutional and national communication guidelines	Communicates emergent findings according to institutional or national guidelines	Communicates non-emergent findings where failure to act may adversely affect patient outcome	Communicates findings and management options (as appropriate) which are tailored to the referring provider	Coaches other learners in tailored communications to referring providers
☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐
Comments:				
				Not Yet Completed Level 1 ☐

Interpersonal and Communication Skills 3: Communication within Health Care Systems				
Level 1	Level 2	Level 3	Level 4	Level 5
Demonstrates knowledge of institutional communications policies	Communicates appropriately as required by institutional policy	Communicates systems concerns in a respectful manner	Communicates clear and constructive suggestions to improve systems	Facilitates dialogue regarding systems issues among larger community stakeholders (institution, health care system, field)
☐	☐	☐	☐	☐ ☐ ☐ ☐
Comments:				
Not Yet Completed Level 1 ☐				

Nuclear Medicine Milestones

The Accreditation Council for Graduate Medical Education

ACGME

Implementation: July 2022
Second Revision: September 2021
First Revision: May 2013

Nuclear Medicine Milestones

The Milestones are designed only for use in evaluation of residents in the context of their participation in ACGME-accredited residency programs. The Milestones provide a framework for the assessment of the development of the resident 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.

Nuclear Medicine Milestones Work Group

Yaser Baghdadi, MD, MSc

Jon Baldwin, DO

Bruce Barron, MD

Patrick Colletti, MD

Laura Edgar, EdD, CAE

Mary Beth Farrell, MD

Leonie Gordon, MD

Hyewon Hyun, MD

Thomas Ng, MD, PhD

The ACGME would like to thank the following organizations for their continued support in the development of the Milestones:

American Board of Nuclear Medicine

Review Committee for Nuclear Medicine

Understanding Milestone Levels and Reporting

This document presents the Milestones, which programs use in a semi-annual review of resident 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 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 resident 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 resident may achieve higher levels early in his/her educational program just as a senior resident 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. Residents 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 resident.

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

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 resident 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.

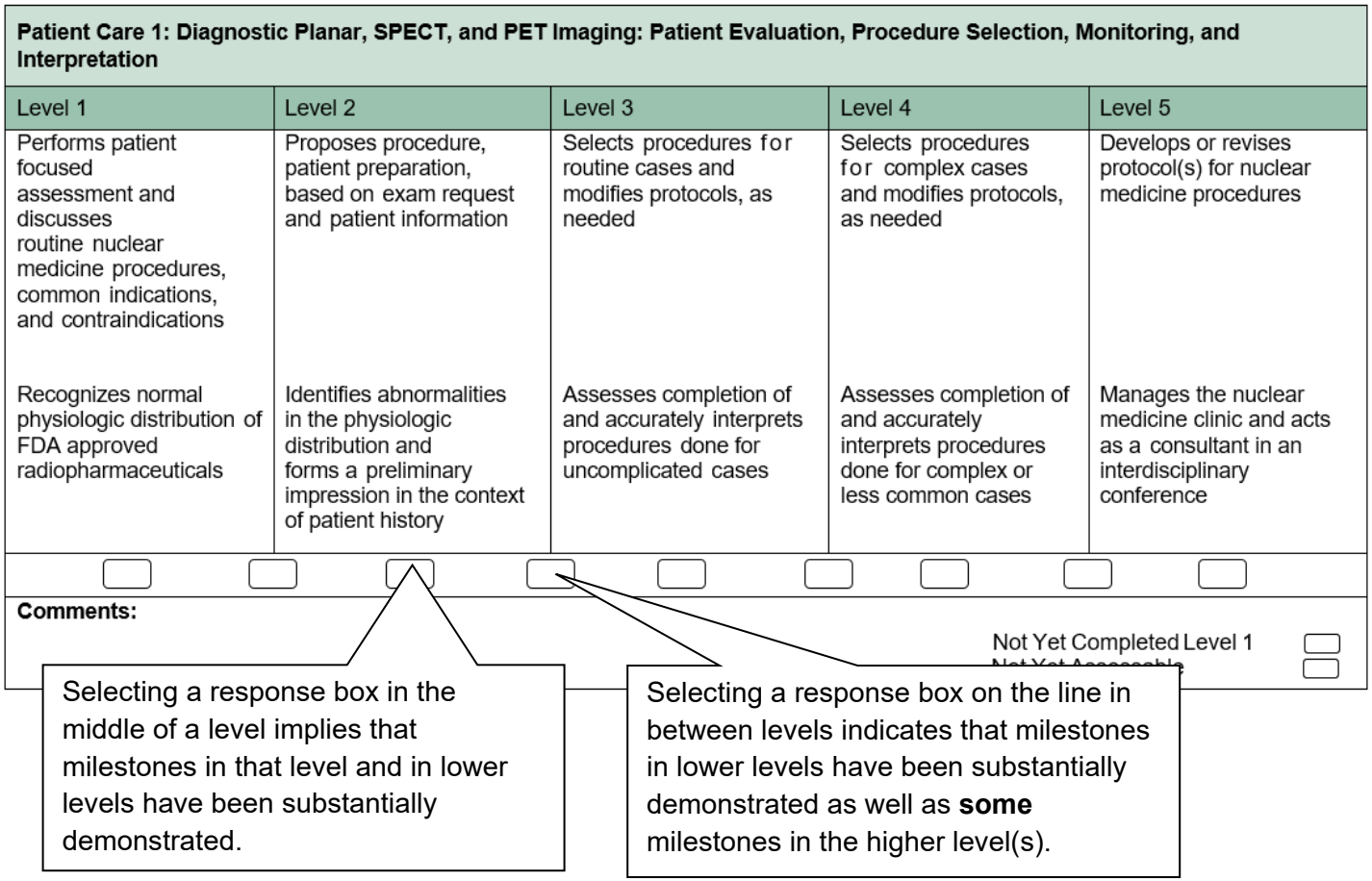
Examples are provided for some milestones within this document. Please note: the examples are not the required element or outcome; they are provided as a way to share the intent of the element.

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 resident who performs a procedure independently must, at a minimum, be supervised through oversight.

A Supplemental Guide is also available to provide the intent of each subcompetency, examples for each level, assessment methods or tools, and other available resources. The Supplemental Guide, like examples contained within the Milestones, is designed only to assist the program director and Clinical Competency Committee, and is not meant to demonstrate any required element or outcome.

Supplemental Guides and other resources are available on the Milestones page of each specialty section of the ACGME website. On www.acgme.org, choose the applicable specialty under the “Specialties” menu, then select the “Milestones” link in the lower navigation bar.

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



Patient Care 1: Diagnostic Planar, SPECT, and PET Imaging: Patient Evaluation, Procedure Selection, Monitoring, and Interpretation				
Level 1	Level 2	Level 3	Level 4	Level 5
Performs patient focused assessment and discusses routine nuclear medicine procedures, common indications, and contraindications	Proposes procedure, patient preparation, based on exam request and patient information	Selects procedures for routine cases and modifies protocols, as needed	Selects procedures for complex cases and modifies protocols, as needed	Develops or revises protocol(s) for nuclear medicine procedures
Recognizes normal physiologic distribution of FDA approved radiopharmaceuticals	Identifies abnormalities in the physiologic distribution and forms a preliminary impression in the context of patient history	Assesses completion of and accurately interprets procedures done for uncomplicated cases	Assesses completion of and accurately interprets procedures done for complex or less common cases	Manages the nuclear medicine clinic and acts as a consultant in an interdisciplinary conference

Patient Care 1: Diagnostic Planar, SPECT, and PET Imaging: Patient Evaluation, Procedure Selection, Monitoring, and Interpretation				
Level 1	Level 2	Level 3	Level 4	Level 5
Performs patient-focused assessment and discusses routine nuclear medicine procedures, common indications, and contraindications	Proposes procedure and patient preparation based on exam request and patient information	Selects procedures for routine cases and modifies protocols, as needed	Selects procedures for complex cases and modifies protocols, as needed	Develops or revises protocol(s) for nuclear medicine procedures
Recognizes normal physiologic distribution of FDA-approved radiopharmaceuticals	Identifies abnormalities in the physiologic distribution and forms a preliminary impression in the context of a patient's history	Assesses completion of and accurately interprets procedures done for uncomplicated cases	Assesses completion of and accurately interprets procedures done for complex or less common cases	Manages the nuclear medicine clinic and acts as a consultant in an interdisciplinary conference
☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐
Comments:				
				Not Yet Completed Level 1 ☐ Not Yet Assessable ☐

Patient Care 2: Cardiovascular Nuclear Medicine-Stress Testing: Patient Evaluation and Procedure Monitoring				
Level 1	Level 2	Level 3	Level 4	Level 5
Performs targeted patient evaluation for a range of cardiac stress protocols	Interprets electrocardiogram and monitors stress procedure, and applies criteria for procedure completion or termination	Recognizes and manages common procedure complications and contraindications	Recognizes and manages complex or less common procedure complications	Manages the nuclear cardiology clinic and acts as a consultant in an interdisciplinary conference
☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐
Comments:				
				Not Yet Completed Level 1 ☐ Not Yet Assessable ☐

Patient Care 3: Theranostics: Radioiodine for Benign Thyroid Disease – Patient Evaluation, Procedure Selection, Procedure Performance, and Follow-Up				
Level 1	Level 2	Level 3	Level 4	Level 5
Performs initial patient evaluation and discusses patient preparation, indications, contraindications, guidelines, and radiation safety precautions	Analyzes relevant patient information and confirms patient preparation, pertinent imaging, and therapeutic procedure set-up and technique	Formulates the therapeutic plan, performs the procedure, and recommends follow-up strategies for routine clinical situations	Formulates the therapeutic plan, performs the procedure, and recommends follow-up strategies for complicated or less common situations	Acts as an expert consultant for radioiodine theranostics for benign thyroid disease
☐	☐	☐	☐	☐ ☐ ☐ ☐
Comments:				
Not Yet Completed Level 1 ☐ Not Yet Assessable ☐				

Patient Care 4: Theranostics: Radioiodine for Thyroid Malignancy – Patient Evaluation, Procedure Selection, Procedure Performance, and Follow-Up				
Level 1	Level 2	Level 3	Level 4	Level 5
Performs initial patient evaluation and discusses patient preparation, indications, contraindications, and radiation safety precautions	Analyzes relevant patient information and confirms patient preparation, pertinent imaging, and therapeutic procedure set-up and technique	Formulates the therapeutic plan, performs the procedure, and recommends follow-up strategies for routine clinical situations	Formulates the therapeutic plan, performs the procedure, and recommends follow-up strategies for complicated or less common situations	Acts as an expert consultant for radioiodine theranostics for thyroid malignancies and acts as a consultant for multidisciplinary conferences
☐	☐	☐	☐	☐ ☐ ☐ ☐
Comments:				
Not Yet Completed Level 1 ☐ Not Yet Assessable ☐				

Patient Care 5: Theranostics: Parenteral – Patient Evaluation, Procedure Selection, Procedure Performance, and Follow-Up				
Level 1	Level 2	Level 3	Level 4	Level 5
Performs initial patient evaluation and discusses patient preparation, indications, contraindications, and radiation safety precautions	Analyzes relevant patient information and confirms patient preparation, pertinent imaging, therapeutic procedure set-up and technique, and regulatory compliance	Formulates the therapeutic plan, performs the procedure, and recommends follow-up strategies for uncomplicated clinical situations	Formulates the therapeutic plan, performs the procedure, and recommends follow-up strategies for complicated or less common clinical situations	Acts as an expert consultant for parenteral theranostics and acts as a consultant for multidisciplinary conferences
☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐
Comments:				
				Not Yet Completed Level 1 ☐ Not Yet Assessable ☐

Medical Knowledge 1: Physiology and Pathophysiology				
Level 1	Level 2	Level 3	Level 4	Level 5
Describes basic physiology and pathophysiology of common diseases	Identifies physiologic basis for patient preparation and adjunct pharmacologic interventions	Explains imaging findings of common diseases based on knowledge of physiology and pathophysiology	Explains imaging findings of complex and less common diseases based on knowledge of physiology and pathophysiology	Applies knowledge of physiology and pathophysiology to perform meaningful nuclear medicine research, assess and revise (as needed) department protocols for imaging or therapy, or critically assess research in the medical literature
☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐
Comments:				
Not Yet Completed Level 1 ☐ Not Yet Assessable ☐				

Medical Knowledge 2: Anatomic Imaging				
Level 1	Level 2	Level 3	Level 4	Level 5
Demonstrates knowledge of basic normal anatomy for imaging Demonstrates knowledge of anatomy depicted on commonly obtained imaging views	Demonstrates knowledge of normal cross-sectional anatomy, common anatomic variants, and commonly encountered abnormalities Obtains common imaging views to depict desired anatomy	Applies knowledge of anatomy to correlative, functional, and hybrid imaging Directs technical staff members to obtain common imaging views to depict desired anatomy	Demonstrates knowledge of less common anatomic variants, less common abnormalities, and critical findings Directs technical staff members to acquire images to depict less common anatomical views	Teaches anatomic imaging to junior residents, medical students, and technologists Modifies protocols as needed to depict desired anatomy and function
☐	☐	☐	☐	☐ ☐ ☐ ☐
Comments:				
Not Yet Completed Level 1 ☐ Not Yet Assessable ☐				

Medical Knowledge 3: Instrumentation				
Level 1	Level 2	Level 3	Level 4	Level 5
Describes basic image acquisition and image processing	Recognizes common imaging artifacts and technical problems	Demonstrates knowledge of instrument quality control and recognizes unusual and rare artifacts and technique problems	Works with technologist to optimize image acquisition and processing	Modifies institutional protocols, including instrumentation and image acquisition
☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐
Comments:				
				Not Yet Completed Level 1 ☐ Not Yet Assessable ☐

Medical Knowledge 4: Radiopharmaceuticals and Molecular Agents				
Level 1	Level 2	Level 3	Level 4	Level 5
Demonstrates knowledge of common radiopharmaceutical properties Demonstrates knowledge of appropriate use and normal distribution of common radiopharmaceuticals	Demonstrates knowledge of common radiopharmacy operations and routine quality control Demonstrates knowledge of pathology for common imaging procedures	Demonstrates knowledge of less common radiopharmaceutical properties Demonstrates knowledge of appropriate use, abnormal distribution, and pathology of less common radiopharmaceuticals	Demonstrates knowledge of recently approved radiopharmaceuticals and other molecular agents Demonstrates knowledge of appropriate use, abnormal distribution, and pathology for recently approved imaging procedures	Demonstrates knowledge of emerging radiopharmaceuticals that are near Food and Drug Administration (FDA) approval Conducts research on emerging radiopharmaceuticals
☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐
Comments:				
Not Yet Completed Level 1 ☐ Not Yet Assessable ☐				

Medical Knowledge 5: Medical Physics, Mathematics, and Radiation Biology				
Level 1	Level 2	Level 3	Level 4	Level 5
Understands the concepts underlying medical physics pertinent to nuclear medicine Recognizes the importance of radiation/cancer biology in nuclear medicine	Applies basic medical physics and mathematical principles in clinical nuclear medicine practice Discusses the basic concepts of radiation biology as pertains to nuclear medicine	Applies advanced medical physics and mathematical principles in clinical nuclear medicine practice Applies advanced concepts in radiation biology to clinical nuclear medicine practice	Functions and converses with the department's medical physicist staff at an advanced level Serves as an expert consultant with both patients and other medical staff members on matters of radiation treatment	Serves as an expert on the radiation safety committee
☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐
Comments:				
Not Yet Completed Level 1 ☐ Not Yet Assessable ☐				

Systems-Based Practice 1: Patient Safety and Quality Improvement				
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 to prevent patient safety events
Demonstrates knowledge of how to report patient radiation safety events	Reports patient safety events through institutional reporting systems (simulated or actual)	Participates in disclosure of patient radiation safety events to patients and their families (simulated or actual)	Discloses patient radiation safety events to patients and their families (simulated or actual)	Role models or mentors others in the disclosure of patient radiation safety events
Demonstrates knowledge of basic quality improvement methodologies and metrics	Describes local quality improvement initiatives	Participates in local quality improvement initiatives	Demonstrates the skills required to identify, develop, implement, and analyze a quality improvement project	Creates, implements, and assesses quality improvement initiatives at the institutional or community level
☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐
Comments:				
Not Yet Completed Level 1 ☐				

Systems-Based Practice 2: System Navigation for Patient-Centered Care				
Level 1	Level 2	Level 3	Level 4	Level 5
Demonstrates knowledge of care coordination in nuclear medicine imaging and therapies	Coordinates care of patients in routine nuclear medicine imaging and therapies, effectively utilizing the roles of the interprofessional team members	Coordinates care of patients in complex nuclear medicine imaging and therapies, effectively utilizing the roles of the interprofessional team members	Role models effective coordination of patient-centered care among different disciplines and specialties	Analyzes the process of care coordination and leads in the design and implementation of improvements
Identifies key elements for safe and effective transitions of care and hand-offs	Performs safe and effective transitions of care/hand-offs in routine clinical situations	Performs safe and effective transitions of care/hand-offs in complex clinical situations	Role models and advocates for safe and effective transitions of care/hand-offs within and across health care delivery systems, including outpatient settings	Improves quality of transitions of care within and across health care delivery systems to optimize patient outcomes
Demonstrates knowledge of population and community health needs	Identifies specific population and community health needs for the local population	Uses local resources effectively to meet the needs of a patient population and community	Participates in changing and adapting practice to provide for the needs of specific populations	Leads innovations and advocates for populations and communities with specific health care needs
☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐

Comments:

Not Yet Completed Level 1 ☐

Systems-Based Practice 3: Physician Role in Health Care Systems				
Level 1	Level 2	Level 3	Level 4	Level 5
Identifies key components of the complex health care system (e.g., hospital, finance, personnel, technology) Describes basic health payment systems (e.g., government, private, public, uninsured care) and practice models	Describes how components of a complex health care system are interrelated and impact patient care Delivers care with consideration of each patient's payment model (e.g., insurance type)	Discusses how individual practice affects the broader system (e.g., length of stay, readmission rates, clinical efficiency) Engages with patients in shared decision making, informed by each patient's payment model	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	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
☐	☐	☐	☐	☐
Comments:				
Not Yet Completed Level 1 ☐				

Systems-Based Practice 4: Radiation Protection, Patient Safety, and Procedural Safety				
Level 1	Level 2	Level 3	Level 4	Level 5
Demonstrates knowledge of basic radiation protection concepts and basic procedural safety in nuclear medicine	Demonstrates knowledge of radiation protection concepts in nuclear medicine and correlative imaging	Consistently practices ALARA (as low as reasonably achievable) principle for patients, patients' families, staff members, and the public	Models excellent understanding of radiation protection and/or procedural safety	Participates in Radiation Safety Committee meetings and/or independently manages radiation safety events
Demonstrates knowledge of universal precautions, including hand washing and sterile injection technique	Demonstrates knowledge of appropriate use of "time-out" procedure, and how to ensure the right patient has the right study or therapy at the right time in the right setting	Demonstrates knowledge of more complex concepts of procedural safety and contraindications	Demonstrates knowledge of prevention and management of procedural complications for nuclear medicine and correlative imaging studies	Implements new safety procedures and quality control measures impacting patient care
☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐
Comments:				
				Not Yet Completed Level 1 ☐ Not Yet Assessable ☐

Practice-Based Learning and Improvement 1: Evidence-Based and Informed Practice				
Level 1	Level 2	Level 3	Level 4	Level 5
With assistance, accesses available evidence and practice guidelines for patient care	Independently identifies available evidence and practice guidelines for patient care	Critically appraises evidence and applies to patient care	Applies best available evidence, even in the face of insufficient and/or conflicting information	Coaches others and serves as a role model to apply evidence to patient care and/or participates in the development of guidelines
☐	☐	☐	☐	☐	☐	☐	☐	☐
Comments:				
Not Yet Completed Level 1 ☐				

Practice-Based Learning and Improvement 2: Reflective Practice and Commitment to Personal Growth				
Level 1	Level 2	Level 3	Level 4	Level 5
Identifies gaps in knowledge and performance	Reflects on the factors that contribute to gaps between expectations and actual performance	Institutes changes to narrow the gaps between expectations and actual performance	Intentionally seeks performance data to narrow the gaps between expectations and actual performance	Role models reflective practice
Actively seeks opportunities to improve	Designs and implements a learning plan, with assistance	Independently creates and implements a learning plan	Measures the effectiveness of the learning plan and makes appropriate changes	Facilitates the design and implementation of learning plans for others
☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐
Comments:				
Not Yet Completed Level 1 ☐				

Professionalism 1: Professional Behavior and Ethical Principles				
Level 1	Level 2	Level 3	Level 4	Level 5
Demonstrates knowledge of common ethical principles and potential triggers for professionalism lapses Describes when and how to appropriately report professionalism lapses	Analyzes straightforward situations using ethical principles Recognizes and takes responsibility for one's own professionalism lapses	Manages and resolves complex ethical situations, including personal lapses, with assistance	Intervenes and uses appropriate resources to prevent and manage professionalism lapses and dilemmas in oneself and others	Coaches others when their behavior fails to meet professional expectations
☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐
Comments: Not Yet Completed Level 1 ☐				

Professionalism 2: Accountability/Conscientiousness				
Level 1	Level 2	Level 3	Level 4	Level 5
Takes responsibility for failure to complete tasks	Performs tasks in a timely manner or provides notification when unable to complete tasks	Performs tasks in a timely manner with appropriate attention to detail in complex or stressful situations	Takes responsibility in situations that impact the ability of team members to complete tasks and responsibilities in a timely manner	Coaches others in taking responsibility for administrative and clinical care duties
☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐
Comments:				Not Yet Completed Level 1 ☐

Professionalism 3: Well-Being and Help-Seeking				
Level 1	Level 2	Level 3	Level 4	Level 5
Recognizes status of personal and professional well-being, as well as the limits of such knowledge, with assistance	Independently recognizes status of personal and professional well-being, as well as the limits of such knowledge	With assistance, proposes a plan to optimize personal and professional well-being	Independently develops a plan to optimize personal and professional well-being	Coaches others and role models the continual ability to monitor and address personal and professional well-being
☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐
Comments:				
Not Yet Completed Level 1 ☐				

This subcompetency is not intended to evaluate a resident's well-being. Rather, the intent is to ensure that each resident has the fundamental knowledge of factors that impact well-being, the mechanism by which those factors impact well-being, and available resources and tools to improve well-being.

Interpersonal and Communication Skills 1: Patient- and Family-Centered Communication				
Level 1	Level 2	Level 3	Level 4	Level 5
Identifies common barriers to effective communication	Identifies complex barriers to effective communication	Reflects on biases while attempting to minimize communication barriers	Proactively improves communication by addressing barriers	Role models communication that addresses barriers
Recognizes the need to adjust communication strategies based on context	Verifies patient's/patient's family's understanding of the clinical situation to optimize effective communication	With guidance, uses shared decision making to align the patient's/patient's family's values, goals, and preferences with treatment options to make a personalized care plan	Independently uses shared decision making to make a personalized care plan	Role models shared decision making in patient/patient's family communication, including in situations with a high degree of uncertainty/conflict
Learns to obtain informed consent	Obtains informed consent for routine procedures	Obtains informed consent for complex procedures	Teaches junior residents how to obtain informed consent in common clinical and research situations	Addresses informed consent in complex clinical and research situations
☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐
Comments:				
				Not Yet Completed Level 1 ☐

Interpersonal and Communication Skills 2: Interprofessional and Team Communication				
Level 1	Level 2	Level 3	Level 4	Level 5
Uses respectful communication (verbal and non-verbal) with all members of the health care team Demonstrates openness to feedback	Communicates effectively with all health care team members Is responsive to feedback	Adapts communication style within and across heath care teams to ensure mutual understanding Seeks and provides performance feedback	Coordinates recommendations from different members of the health care team to optimize patient care Uses feedback to improve one's own performance and provides actionable feedback to team members	Role models flexible communication strategies that value input from all health care team members, resolving conflict when needed Role models giving and receiving of feedback
☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐
Comments: Not Yet Completed Level 1 ☐				

Interpersonal and Communication Skills 3: Communication within Health Care Systems				
Level 1	Level 2	Level 3	Level 4	Level 5
Accurately records information in the patient record	Demonstrates organized diagnostic and therapeutic reasoning through notes in the patient record	Concisely reports diagnostic and therapeutic reasoning in the patient record	Communicates clearly, concisely, timely, and in an organized written form, including anticipatory guidance	Role models optimal documentation
Safeguards patients' personal health information in communications	Appropriately selects forms of communication based on context	Includes key stakeholders in all communications	Produces written or verbal communication that serves as an example for others to follow	Guides departmental or institutional communication around policies and procedures
☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐
Comments:				
Not Yet Completed Level 1 ☐				