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



Second Revision: December 2019 First Revision: December 2012

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### The Nuclear Medicine Milestone Project

A Jaint Initiative of

The Accreditation Council for Graduate Medical Education and The American Board of Nuclear Medicine



July 2015



# **Diagnostic Radiology Milestones**

The Accreditation Council for Graduate Medical Education



Second Revision: December 2019 First Revision: December 2012

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## **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**

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# 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** 

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### **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.

Additional resources are available in the Milestones section of the ACGME website. Follow the links under "What We Do" at www.acgme.org.

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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
Comments:			Not Yet G	ompleted Level 1
Selecting a response box in the middle of a level implies that milestones in that level and in lower levels have been substantially demonstrated.		between levels ind		

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Patient Care 1: Reporting	9		_	
Level 1	Level 2	Level 3	Level 4	Level 5
Generates reports with appropriate elements for coding	Efficiently generates clear and concise reports which do not require substantive correction	Efficiently generates clear and concise reports which rarely require correction	Generates tailored reports meeting the needs of the care provider	Generates tailored reports meeting subspecialty needs
Describes lexicons and structured reporting	Uses lexicons and structured reporting that do not require substantive correction	Uses lexicons and structured reporting which rarely require correction	Proficiently uses lexicons and structured reporting to provide accurate and timely reports which do not require correction	
Comments:				Completed Level 1

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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

Patient Care 3: Image Int	erpretation			
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 Co Not Yet As	ompleted Level 1

Patient Care 4: Compete	nce 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:	Comments: Not Yet Completed Level 1 Not Yet Assessable			

Medical Knowledge 1: D	iagnostic Knowledge			
Level 1	Level 2	Level 3	Level 4	Level 5
Demonstrates knowledge of imaging anatomy	Applies knowledge of anatomy to make common imaging diagnoses	Applies knowledge of anatomy to make uncommon imaging diagnoses	Proficiently integrates knowledge of anatomic	Proficiently integrates knowledge of anatomic
Demonstrates knowledge of pathophysiology of disease processes	Applies knowledge of pathophysiology to make common imaging diagnoses	Applies knowledge of pathophysiology to make uncommon imaging diagnoses	and molecular imaging with pathophysiology to formulate a diagnosis	and molecular imaging with pathophysiology to formulate a diagnosis at the expected level of a subspecialist
Demonstrates	Applies knowledge of	Applies knowledge of		
knowledge of cellular	cellular and molecular	cellular and molecular		
and molecular systems	systems to make common imaging diagnoses	systems to make uncommon imaging diagnoses		
Comments:			Not Yet 0	Completed Level 1
				Assessable

Medical Knowledge 2: Pl	nysics			
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 C Not Yet As	ompleted Level 1

Medical Knowledge 3: P	rotocol Selection and Cont	rast Agent Selection/Dosin	g	
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:				ompleted Level 1

Medical Knowledge 4: In	naging Technology and Ima	age 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 C Not Yet A	ompleted Level 1

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

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 C	ompleted Level 1

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 and disparities	Identifies specific population and community health needs and inequities 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 health care inequities

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 how components of a complex health care system are inter-related, and how this impacts patient care	Discusses how individual practice affects the broader system (e.g., length of stay, readmission rates, clinical efficiency)	Manages various components of the complex health care system to provide efficient and effective patient care and transition of care	Advocates for or leads systems change that enhances high-value, efficient, and effective patient care and transition of care
Describes the mechanisms for reimbursement, including types of payors	States relative cost of common procedures	Describes the technical and professional components of imaging costs	Describes the radiology revenue cycle and measurements of productivity (e.g., relative value units)	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 C	ompleted 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 C	ompleted 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 C	ompleted 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:					

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 C	ompleted 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	Independently recognizes status of personal and professional well-being using available resources when appropriate	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 when emotional responses or limitations in knowledge/skills do not meet professional expectations
Recognizes limits in the knowledge/skills of self or team, with assistance	Independently recognizes limits in the knowledge/skills of self or team and demonstrates appropriate help-seeking behaviors	With assistance, proposes a plan to remediate or improve limits in the knowledge/ skills of self or team	Independently develops a plan to remediate or improve limits in the knowledge/skills of self or team	
Comments: Not Yet Completed Level 1				

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 barriers to effective communication (e.g., language, health literacy, cultural)	Identifies biases that hinder effective communication	Actively minimizes communication barriers	Coaches other learners to minimize communication barriers
Identifies the need to adjust communication strategies based on assessment of patient/family expectations and understanding of their health status and treatment options	Organizes and initiates communication with patient/family by clarifying expectations and verifying understanding of the clinical situation	With guidance, sensitively and compassionately delivers medical information, elicits patient goals and preferences, and acknowledges uncertainty and conflict	Independently, uses shared decision making to align patient goals, and preferences with treatment options to make a personalized care plan	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
Omments:         Omment         Ommen				
			Not Yet C	ompleted 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				

# The Nuclear Medicine Milestone Project

A Joint Initiative of

The Accreditation Council for Graduate Medical Education and The American Board of Nuclear Medicine





July 2015

### The Nuclear Medicine Milestone Project

The milestones are designed only for use in evaluation of resident physicians 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 resident physician 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.

#### **Nuclear Medicine Milestones**

Chair: Lorraine Fig, MD, MPH

#### Working Group

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#### **Advisory Group**

Timothy Brigham, MDiv, PhD Dominique Delbeke, MD, PhD Michael Graham, MD Louis Ling, MD George Segall, MD Harvey Ziessman, MD

#### **Milestone Reporting**

This document presents milestones designed for programs to use in semi-annual review of resident performance and reporting to the ACGME. Milestones are knowledge, skills, attitudes, and other attributes for each of the ACGME competencies organized in a developmental framework from less to more advanced. They are descriptors and targets for resident performance as a resident moves from entry into residency through graduation. In the initial years of implementation, the Review Committee will examine milestone performance data for each program's residents as one element in the Next Accreditation System (NAS) to determine whether residents overall are progressing.

For each period, review and reporting will involve selecting milestone levels that best describe a resident's current performance and attributes. Milestones are arranged into numbered levels. Tracking from Level 1 to Level 5 is synonymous with moving from novice to expert. These levels do not correspond with post-graduate year of education.

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

- Level 1: The resident demonstrates milestones expected of an incoming resident.
- Level 2: The resident is advancing and demonstrates additional milestones, but is not yet performing at a mid-residency level.
- **Level 3:** The resident continues to advance and demonstrate additional milestones, consistently including the majority of milestones targeted for residency.
- Level 4: The resident has advanced so that he or she now substantially demonstrates the milestones targeted for residency. This level is designed as the graduation target.
- Level 5: The resident has advanced beyond performance targets set for residency and is demonstrating "aspirational" goals which might describe the performance of someone who has been in practice for several years. It is expected that only a few exceptional residents will reach this level.

#### **Additional Notes**

Level 4 is designed as the graduation *target* and <u>does not</u> represent a graduation *requirement*. Making decisions about readiness for graduation is the purview of the residency program director. Study of milestone performance data will be required before the ACGME and its partners will be able to determine whether milestones in the first four levels appropriately represent the developmental framework, and whether milestone data are of sufficient quality to be used for high-stakes decisions.

Some milestone descriptions include statements about performing independently. These activities must conform to ACGME supervision guidelines, as well as institutional and program policies. For example, a resident who performs a procedure independently must, at a minimum, be supervised through oversight.

Examples are provided with some milestones. Please note that the examples are not the required element or outcome; they are provided as a way to share the intent of the element.

Answers to Frequently Asked Questions about Milestones are available on the Milestones web page: <u>http://www.acqme.org/acqmeweb/Portals/0/MilestonesFAQ.pdf</u>.

The diagram below presents an example set of milestones for one sub-competency in the same format as the milestone 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 the milestones
- or,
- for Patient Care and Medical Knowledge milestones, selecting the option that says the resident has "Not yet rotated"
- or,
- for Interpersonal and Communication Skills, Practice-based Learning and Improvement, Professionalism, and Systems-based Practice milestones, selecting the option that says the resident has "Not yet achieved Level 1"

Professional Ethics and Acco	ountability — Professionalisr	n		
Level 1	Level 2	Level 3	Level 4 Level 5	
<ul> <li>Demonstrates integrity, respect, honesty and compassion</li> <li>Timely for assigned rotations, reports, state licensure and duties</li> </ul>	<ul> <li>Honest and truthful in all circumstances. Reliably ethical</li> <li>Accountable in completion of duties, records and patient care</li> <li>Sensitive and responsive to diverse patient population and needs, regardless of gender, age, race, sexual orientation, religion, or disabilities</li> </ul>	<ul> <li>Acknowledges errors with Program Director, faculty, and/or patient.</li> <li>Takes on responsibility related to learning, coordination of care, patient care, Charted Quality Institute (CQI), and compliance issues</li> </ul>	Responds well to professional	lism and hate patient tes n the t and
Comments:			Not yet achieved Level 1	
	e box in the middle o ilestones in that leve been substantially	l and Selo ind sub	ecting a response box on the line in cates that milestones in lower leve stantially demonstrated as well as he higher level(s).	els have b

Diagnostic: General Nuclear Medicine, Cardiovascular, and Molecular Imaging (Patient Evaluation, Procedure Selection, Monitoring, and Interpretation) — Patient Care

Level 1	Level 2	Level 3	Level 4	Level 5
<ul> <li>Performs focused patient evaluation</li> <li>Is familiar with routine nuclear medicine procedures, common indications, and contraindications</li> <li>Recognizes normal physiologic distribution of commonly used radiopharmaceuticals</li> </ul>	<ul> <li>Proposes procedure, patient preparation, and basic procedure modification based on exam request and patient information</li> <li>Recognizes normal physiologic distribution of less common radiopharmaceuticals</li> <li>Performs image correlation and forms a preliminary impression</li> </ul>	<ul> <li>Synthesizes patient information and selects appropriate procedures for routine cases</li> <li>Assesses completion of and accurately interprets procedures done for uncomplicated cases</li> </ul>	<ul> <li>Synthesizes patient information and selects appropriate procedure for complex, less common cases.</li> <li>Assesses completion of and accurately interprets procedures done for complex or less common cases</li> </ul>	<ul> <li>Develops or modifies protocol(s) for nuclear medicine procedures</li> <li>Presents or publishes nuclear medicine research in peer- reviewed media</li> <li>Independently acts as a consultant in an interdisciplinary conference</li> </ul>
Comments:				Not yet rotated

Level 1	Level 2	Level 3	Level 4	Level 5
<ul> <li>Performs targeted patient evaluation</li> <li>Is familiar with the range of cardiac stress protocols</li> </ul>	<ul> <li>Is familiar with electrocardiogram (EKG) interpretation and stress monitoring, and knows criteria for procedure termination</li> <li>Recognizes adequate/inadequate stress and indications for procedure termination or rescheduling</li> </ul>	<ul> <li>Knows common contraindications and understands when to select various forms of stress testing</li> <li>Recognizes and manages common procedure complications</li> </ul>	<ul> <li>Recognizes and manages less common/complex procedure complications</li> </ul>	<ul> <li>Independently acts a a consultant in a cardiovascular nuclea medicine interdisciplinary conference</li> </ul>

Therapy: Radioiodine for Benign Thyroid Disease- Patient Evaluation, Procedure Selection, Procedure Performance, and Follow-Up — Patient Care Level 2 Level 3 Level 4 Level 5 Level 1 • Familiar with patient Identifies relevant • Synthesizes relevant • Synthesizes relevant • Independently acts as a patient information and patient information, patient information, consultant in an preparation, indications, confirms patient formulates therapeutic formulates therapeutic interdisciplinary contraindications, and plan, performs the plan, performs the preparation conference radiation safety • Confirms therapeutic procedure, and procedure, and precautions procedure setup and recommends follow-up recommends follow-up strategies for routine strategies for • Performs initial patient technique complicated/less clinical situations evaluation common situations **Comments:** Not yet rotated

Therapy: Radioiodine for Th	Therapy: Radioiodine for Thyroid Malignancy – Patient Evaluation, Procedure Selection, Procedure Performance, and Follow-Up – Patient			
Care				
Level 1	Level 2	Level 3	Level 4	Level 5
Is familiar with patient preparation, indications, contraindications, and radiation safety precautions Performs initial patient evaluation	Confirms patient preparation and requests additional studies/consultations as needed	Synthesizes relevant patient information, formulates therapeutic plan, performs the procedure, and recommends follow-up strategies for routine clinical situations	Synthesizes relevant patient information, formulates therapeutic plan, performs the procedure, and recommends follow-up strategies for complicated/less common situations	Independently acts as a consultant in an interdisciplinary conference
Comments:				Not yet rotated

evel 1	Level 2	Level 3	Level 4	Level 5
Is familiar with patient preparation, indications, contraindications, and radiation safety precautions Performs initial patient evaluation	<ul> <li>Confirms procedure set-up, regulatory compliance, and technique for therapy administration</li> <li>Confirms patient preparation and requests additional studies/consultations as needed</li> </ul>	<ul> <li>Synthesizes relevant patient information, formulates therapeutic plan, performs the procedure, and recommends follow-up strategies for uncomplicated clinical situations</li> </ul>	<ul> <li>Synthesizes relevant patient information; formulates therapeutic plan, performs the procedure, and recommends follow-up strategies for complicated/less common clinical situations</li> </ul>	<ul> <li>Independently acts as consultant at an interdisciplinary conference</li> </ul>

evel 1	Level 2	Level 3	Level 4	Level 5
<ul> <li>Knows basic physiology and pathophysiology of common diseases</li> </ul>	<ul> <li>Understands physiologic basis for patient preparation</li> <li>Explains imaging findings of common diseases based on knowledge of physiology and pathophysiology</li> </ul>	<ul> <li>Understands physiologic basis for pharmacologic interventions</li> </ul>	<ul> <li>Explains imaging findings of complex and less common diseases based on knowledge of physiology and pathophysiology</li> </ul>	<ul> <li>Presents or publishes nuclear medicine research in peer- reviewed media</li> </ul>

Level 2	Level 2	Level 3	Level 4	Level 5
<ul> <li>Knows basic normal anatomy for imaging</li> </ul>	<ul> <li>Knows normal cross sectional anatomy, common anatomic variants, and commonly encountered abnormalities</li> </ul>	<ul> <li>Applies knowledge of anatomy to correlative, functional, and hybrid imaging</li> </ul>	<ul> <li>Knows less common anatomic variants, less common abnormalities, and critical findings</li> </ul>	<ul> <li>Teaches anatomic imaging to junior residents, medical students, and technologists</li> </ul>

Instrumentation — Medical	Knowledge			
Level 1	Level 2	Level 3	Level 4	Level 5
Has basic knowledge of instrumentation	<ul> <li>Understands basic image acquisition and image processing, and recognizes common imaging artifacts and technical problems</li> </ul>	<ul> <li>Demonstrates knowledge of instrument quality control and image reconstruction</li> </ul>	<ul> <li>Works with technologist to optimize image acquisition and processing</li> </ul>	<ul> <li>Presents or publishes instrumentation research in peer- reviewed media</li> </ul>
Comments:				Not yet rotated

Level 1	Level 2	Level 3	Level 4	Level 5
<ul> <li>Is familiar with routine radiopharmaceuticals and the Tracer principle</li> </ul>	<ul> <li>Recognizes abnormal radiopharmaceutical distribution for routine procedures</li> </ul>	<ul> <li>Is familiar with basic radiopharmacy operations and routine quality control</li> </ul>	<ul> <li>Recognizes abnormal radiopharmaceutical distribution for less common procedures</li> <li>Is aware of emerging radiopharmaceuticals that are near Food and Drug Administration (FDA) approval</li> </ul>	<ul> <li>Demonstrates current knowledge of emerging radiopharmaceuticals and other molecular agents</li> </ul>
Comments:				Not yet rotated

Level 1	Level 2	Level 3	Level 4	Level 5
<ul> <li>Knows basic physics for nuclear medicine</li> </ul>	<ul> <li>Understands basic medical physics, mathematics and radiobiology in nuclear medicine</li> </ul>	<ul> <li>Knows basic medical physics and radiobiology for correlative imaging</li> </ul>	<ul> <li>Knows radiation dose optimization to include dose reduction strategies</li> </ul>	<ul> <li>Calculates radiation dose using the Medical Internal Radiation Dose (MIRD) approach and International Commission of Radiological Protection (ICRP) tables</li> </ul>

Level 1	Level 2	Level 3	Level 4	Level 5
<ul> <li>Is familiar with regulatory agencies</li> </ul>	<ul> <li>Knows laws and regulations regarding the medical use of radioactive materials</li> </ul>	<ul> <li>Understands and applies laws and regulations regarding the medical use of radioactive materials</li> <li>Understands the composition and function of the Radiation Safety Committee and the responsibilities of the Radiation Safety Officer</li> </ul>	<ul> <li>Understands the purpose and functions of a radiation safety program</li> <li>Understands the process for reportable or recordable incidents</li> <li>Is familiar with The Joint Commission, NRC, and state radiation safety inspection processes</li> </ul>	<ul> <li>Is capable of participating with a regulatory committee such as the Radiation Use Committee (RUC) or Radiation Safety Committee (RSC)</li> </ul>

Level 1	Level 2	Level 3	Level 4	Level 5
<ul> <li>Knows basic radiation protection concepts and basic procedural safety in nuclear medicine</li> <li>Understands universal precautions, including hand washing and sterile injection technique</li> <li>Aware of the importance of fall prevention</li> </ul>	<ul> <li>Understands radiation protection concepts in nuclear medicine and correlative imaging</li> <li>Understands appropriate use of "time-out" procedure</li> <li>Knows how to ensure that the right patient has the right study at the right time in the right setting</li> </ul>	<ul> <li>Uniformly practices ALARA principles for patients, family, staff, and public</li> <li>Knows more complex concepts of procedural safety and contraindications</li> </ul>	<ul> <li>Understands prevention of procedural complications for nuclear medicine and correlative imaging studies</li> <li>Knows how to manage procedural complications</li> </ul>	<ul> <li>Demonstrates excellent understanding of radiation protection and/or procedural safety</li> <li>Implements new safety procedures and quality control measures impacting patient care</li> </ul>

_evel 1	Level 2	Level 3	Level 4	Level 5
<ul> <li>Accesses clinical computer systems; is familiar with word processing and spreadsheet programs</li> </ul>	<ul> <li>Retrieves basic patient information from the electronic medical record; is able to use the basic functions of picture archiving and communication system (PACs) and voice recognition systems</li> <li>Understands Health Insurance Portability and Accountability Act (HIPAA) policies and appropriate use concepts</li> </ul>	<ul> <li>Retrieves complex patient information from the electronic medical record; is able to use the advanced functions of PACs and voice recognition systems</li> </ul>	<ul> <li>Is familiar with the basic functions of the billing systems</li> </ul>	Recommends changes to computer systems/records to provide additional useful functionality

Economics —Systems-based Practice				
Level 1	Level 2	Level 3	Level 4	Level 5
<ul> <li>Has a basic understanding of the advantages and disadvantages of different payment systems</li> </ul>	<ul> <li>Has a basic understanding of the economics of inpatient vs. outpatient care, and the impact of quality improvement incentives</li> <li>Develops understanding of relative cost per procedure</li> </ul>	<ul> <li>Has a basic practical understanding of the pre-certification process, radiology benefits managers, structured computer- based order entry systems, and Medicare/Medicaid procedure and report requirements</li> </ul>	<ul> <li>Has an advanced practical understanding of the pre-certification process, radiology benefits managers, structured computer- based order entry systems, and Medicare/Medicaid procedure and report requirements</li> </ul>	<ul> <li>Has a basic understanding of current state and national health care policies and their implications</li> </ul>
Comments: Not yet achieved level 1				

Self-Directed Learning and Understanding Scientific Studies — Practice-based Learning and Improvement				
Level 1	Level 2	Level 3	Level 4	Level 5
<ul> <li>Acknowledges gaps in personal knowledge and asks for feedback</li> <li>Uses information technology to optimize learning</li> <li>Describes basic concepts in clinical epidemiology and biostatistics</li> </ul>	<ul> <li>Assesses performance and develops a learning plan with some external assistance</li> <li>Uses published review articles or guidelines to review common practice topics</li> <li>Evaluates study design by level of evidence and identifies sources of bias</li> </ul>	<ul> <li>Selects appropriate evidence-based information to answer specific questions while providing care</li> <li>Critically evaluates scientific literature</li> </ul>	<ul> <li>Performs mostly self- directed learning without external guidance</li> <li>Cites evidence supporting common diagnostic and therapeutic algorithms and strategies</li> </ul>	<ul> <li>Incorporates practice change based upon new evidence</li> <li>Independently teaches and assesses evidence- based medicine techniques</li> </ul>
Comments: Not yet achieved level 1				

Implements Quality Improvement Project — Practice-based Learning and Improvement					
Level 1	Level 2	Level 3	Level 4	Level 5	
<ul> <li>Identifies problems in health care delivery</li> </ul>	<ul> <li>Begins working on a quality improvement project either as an individual or team member</li> </ul>	<ul> <li>Continues to develop a quality improvement project, employing methods to measure and analyze the data</li> </ul>	<ul> <li>Completes a quality improvement project and displays effective teamwork skills</li> </ul>	<ul> <li>Develops and leads complex quality improvement projects and is able to lead a root cause analysis</li> </ul>	
Comments:			Not	yet achieved level 1	

Level 1	Level 2	Level 3	Level 4	Level 5
<ul> <li>Demonstrates integrity, respect, honesty, and compassion</li> <li>Is timely for assigned rotations, reports, state licensure, and duties</li> </ul>	<ul> <li>Is honest and truthful in all circumstances; is reliably ethical</li> <li>Is accountable in completion of duties, records, and patient care</li> <li>Is sensitive and responsive to diverse patient population and needs, regardless of gender, age, race, sexual orientation, religion, or disabilities</li> </ul>	<ul> <li>Acknowledges errors with program director, faculty members, and/or patients</li> <li>Takes on responsibility related to learning, coordination of care, patient care, continuous quality improvement (CQI), and compliance issues</li> </ul>	<ul> <li>Is committed to self- improvement; responds well to constructive criticism</li> <li>Patient needs supersede self-interest; advocates for quality patient care</li> <li>Operates professionally and independently in various educational and patient care environments</li> </ul>	<ul> <li>Role models honesty, integrity, professionalism, and compassionate patient care</li> <li>Demonstrates leadership in the department and professional organizations</li> </ul>
Comments: Not yet achieved level 1				

_evel 1	Level 2	Level 3	Level 4	Level 5
<ul> <li>Creates an ethically sound relationship with patients and families</li> <li>Learns to obtain informed consent</li> </ul>	<ul> <li>Learns to perform effective interviews and to educate patients and their families</li> <li>Obtains informed consent</li> </ul>	<ul> <li>Performs effective interviews with patients and families</li> <li>Educates patients and families, including explaining procedure(s) in an understandable and compassionate manner</li> </ul>	<ul> <li>Teaches junior residents how to obtain informed consent, communicate effectively, perform effective interviews with patients, and educate patients' families</li> </ul>	<ul> <li>Role models effective patient and family communications</li> </ul>

Health Care Team — Interper	rsonal and Communications S	kills	Level 4	Level 5
Communicates clearly and effectively and works well with all members of the health care team	<ul> <li>Communicates results of routinely performed nuclear medicine procedures in a clear and concise fashion, both verbally and in the written procedure report</li> </ul>	<ul> <li>Discusses and advises the referring health care provider(s) about the appropriateness of a procedure in routine clinical situations</li> <li>Communicates results of complex, less common nuclear medicine procedures in a clear and concise fashion, both verbally and in the written procedure report</li> </ul>	<ul> <li>Discusses and advises the referring health care provider(s) about the appropriateness of a procedure in complex, less common situations</li> </ul>	<ul> <li>Independently acts as a consultant during interdisciplinary conferences</li> </ul>
Comments: Not yet achieved level 1				