

# The Diagnostic Radiology Milestone Project

*A Joint Initiative of*

The Accreditation Council for Graduate Medical Education  
and  
The American Board of Radiology



# The Diagnostic Radiology 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.

## Diagnostic Radiology Milestones

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## 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 diagnostic radiology 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 reporting period, review and reporting will involve selecting the level of milestones that best describes each resident's current performance level in relation to milestones. Milestones are arranged into numbered levels. 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). A general interpretation of levels for diagnostic radiology is below:

- Level 1:** The resident demonstrates milestones expected of one who has had some education in diagnostic radiology.
- Level 2:** The resident is advancing and demonstrating additional milestones.
- Level 3:** The resident continues to advance and demonstrate additional milestones; the resident consistently demonstrates 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* but does not represent a graduation *requirement*. Making decisions about readiness for graduation is the purview of the residency program director (see the following NAS FAQ for educational milestones on the ACGME's NAS microsite for further discussion of this issue: "Can a resident graduate if he or she does not reach every milestone?"). Study of milestone performance data will be required before the ACGME and its partners will be able to determine whether Level 4 milestones and milestones in lower levels are in the appropriate level within 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 follow the ACGME supervision guidelines. For example, a resident who performs a procedure or takes independent call must, at a minimum, be supervised through oversight.

*Answers to Frequently Asked Questions about the NAS and milestones are available on the ACGME's NAS microsite: <http://www.acgme-nas.org/assets/pdf/NASFAQs.pdf>.*

The figure 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
- selecting the “Has not Achieved Level 1” response option

PCTS1: Consultant					
Has not Achieved Level 1	Level 1	Level 2	Level 3	Level 4	Level 5
	Uses established evidence-based imaging guidelines such as American College of Radiology (ACR) Appropriateness Criteria*  Appropriately uses the Electronic Health Record to obtain relevant clinical information	Recommends appropriate imaging of <b>common</b> * conditions independently  *As defined by the residency program	Recommends appropriate imaging of <b>uncommon</b> * conditions independently  *As defined by the residency program	Integrates current research and literature with guidelines, taking into consideration cost effectiveness and risk-benefit analysis, to recommend imaging	Participates in research, development, and implementation of imaging guidelines
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:					

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

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

## DIAGNOSTIC RADIOLOGY MILESTONES

### ACGME REPORT WORKSHEET

**Patient Care and Technical Skills (Residents must be able to meet previous year milestones when evaluated at a specific level)**

<b>PCTS1: Consultant</b>					
<b>Has not Achieved Level 1</b>	<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>	<b>Level 4</b>	<b>Level 5</b>
	Uses established evidence-based imaging guidelines such as American College of Radiology (ACR) Appropriateness Criteria®  Appropriately uses the Electronic Health Record to obtain relevant clinical information	Recommends appropriate imaging of <u>common</u> * conditions independently  *As defined by the residency program	Recommends appropriate imaging of <u>uncommon</u> * conditions independently  *As defined by the residency program	Integrates current research and literature with guidelines, taking into consideration cost effectiveness and risk-benefit analysis, to recommend imaging	Participates in research, development, and implementation of imaging guidelines
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:					

**Possible Methods of Assessment/Examples:**

- 360 Evaluation/Multi-rater/Peer
- Direct observation and feedback
- End-of-Rotation Global Assessment
- Self-Assessment and Reflections/Portfolio
- End-of-Year Examination
- Simulation/OSCE

**Patient Care and Technical Skills**

PCTS2: Competence in procedures					
Has not Achieved Level 1	Level 1	Level 2	Level 3	Level 4	Level 5
	<p>Competently performs basic procedures* under indirect supervision</p> <p>Recognizes and manages complications of basic procedures</p> <p>*Basic procedures, as defined by each residency program, include those needed to take independent call</p>	<p>Competently performs intermediate procedures, as defined by the residency program</p> <p>Recognizes and manages complications of intermediate procedures</p>	<p>Competently performs advanced procedures, as defined by the residency program</p> <p>Recognizes and manages complications of advanced procedures</p>	<p>Able to competently and independently perform the following procedures:</p> <ul style="list-style-type: none"> <li>• adult and pediatric fluoro studies</li> <li>• lumbar puncture</li> <li>• image-guided venous and arterial access</li> <li>• hands-on adult and pediatric ultrasound studies</li> <li>• drainage of effusions and abscesses</li> <li>• image-guided biopsy</li> <li>• nuclear medicine I-131 treatments (<math>\leq 33</math> and <math>&gt; 33</math> mCi)</li> </ul>	<p>Able to teach procedures to junior-level residents</p> <p>Competently performs complex procedures, modifies procedures as needed, and anticipates and manages complications of complex procedures</p>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:					

**Possible Methods of Assessment/Examples:**

- 360 Evaluation/Multi-rater/Peer
- End-of-Rotation Global Assessment
- Case/Procedure Logs, including complications
- Direct observation and feedback
- Procedural competency checklists
- Self-Assessment and Reflections/Portfolio
- Simulation/OSCE



**Medical Knowledge**

MK1: Protocol selection and optimization of images					
Has not Achieved Level 1	Level 1	Level 2	Level 3	Level 4	Level 5
	<p>Selects appropriate protocol and contrast agent/dose for basic imaging, including protocols encountered during independent call as defined by the residency program</p> <p>Recognizes sub-optimal imaging</p>	<p>Selects appropriate protocols and contrast agent/dose for intermediate imaging as defined by the residency program</p>	<p>Selects appropriate protocols and contrast agent/dose for advanced imaging as defined by the residency program</p> <p>Demonstrates knowledge of physical principles to optimize image quality</p>	<p>Independently modifies protocols as determined by clinical circumstances</p> <p>Applies physical principles to optimize image quality</p>	<p>Teaches and/or writes imaging protocols</p>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:					

**Possible Methods of Assessment/Examples:**

- End-of-Rotation Global Assessment
- Direct observation and feedback
- Self-Assessment and Reflections/Portfolio
- Core exam
- OSCE/simulation

**Medical Knowledge**

MK2: Interpretation of examinations					
Has not Achieved Level 1	Level 1	Level 2	Level 3	Level 4	Level 5
	Makes core observations, formulates differential diagnoses, and recognizes critical findings  Differentiates normal from abnormal	Makes secondary observations, narrows the differential diagnosis, and describes management options	Provides accurate, focused, and efficient interpretations  Prioritizes differential diagnoses and recommends management	Makes subtle observations  Suggests a single diagnosis when appropriate  Integrates current research and literature with guidelines to recommend management	Demonstrates expertise and efficiency at a level expected of a subspecialist  Advances the art and science of image interpretation
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:					

**Possible Methods of Assessment/Examples:**

- End-of-Rotation Global Assessment
- Direct observation and feedback
- Reading out with resident
- ER preparedness test
- Review of reports
- Rate of major discrepancies
- Core exam

**Professionalism**

PROF1: Professional Values and Ethics					
Has not Achieved Level 1	Level 1	Level 2	Level 3	Level 4	Level 5
	<p>Demonstrates the following professional behaviors:</p> <ul style="list-style-type: none"> <li>• recognizes the importance and priority of patient care and advocates for patient interests</li> <li>• fulfills work-related responsibilities</li> <li>• is truthful</li> <li>• recognizes personal limitations and seeks help when appropriate</li> <li>• recognizes personal impairment and seeks help when needed</li> <li>• responds appropriately to constructive criticism</li> <li>• places needs of patients before self</li> <li>• maintains appropriate boundaries with patients, colleagues, and others</li> <li>• exhibits tolerance and acceptance of diverse individuals and groups</li> <li>• maintains patient confidentiality</li> <li>• fulfills institutional and program requirements related to professionalism and ethics</li> <li>• attends required</li> </ul>	<p>Is an effective health care <u>team member</u></p> <p>Demonstrates professional behaviors listed in the second column</p>	<p>Is an effective health care <u>team leader</u>, promoting primacy of patient welfare, patient autonomy, and social justice</p> <p>Demonstrates professional behaviors listed in the second column</p>	<p>Serves as a role model for professional behavior</p> <p>Demonstrates professional behaviors listed in the second column</p>	<p>Participates in local and national organizations to advance professionalism in radiology</p> <p>Mentors others regarding professionalism and ethics</p>

	conferences										
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:											

**Possible Methods of Assessment/Examples:**

- End-of-Rotation Global Assessment
- 360 Evaluation/Multi-rater/Peer
- Simulation/OSCE
- Direct observation and feedback
- Conference attendance logs
- Timeliness in completing institutional and program requirements

**Suggested Educational Tools:**

1. Teaching and Assessing Professionalism: A Program Director’s Guide by the ABP and APPD – see Chapter 8: Measuring Professionalism
  - Critical incidents
  - Peer assessments
  - Multi-source assessments
  - Professionalism Mini-Evaluation Exercise (P-MEX)
  
2. The Professionalism Mini-Evaluation Exercise: A Preliminary Investigation
  - Richard Cruess, Jodi Herold McIlroy, Sylvia Cruess, Shiphra Ginsburg, and Yvonne Steinert Acad Med. 2006 Oct;81(10 Suppl):S74-8
  
3. ABRF Online Modules on Ethics and Professionalism  
<https://www.abronline.org/asp/abrf/>
  
4. “Medical Professionalism in the New Millennium: A Physician Charter.” *Ann Intern Med.* 5 February 2002;136(3):243-246. "

**Interpersonal and Communication Skills**

ICS1: Effective communication with patients, families, and caregivers					
Has not Achieved Level 1	Level 1	Level 2	Level 3	Level 4	Level 5
	<p>Communicates information about imaging and examination results in routine, uncomplicated circumstances</p> <p>Obtains informed consent</p>	<p>Communicates, under <u>direct</u>* supervision, in challenging circumstances (e.g., cognitive impairment, cultural differences, language barriers, low health literacy)</p> <p>Communicates, under direct supervision, difficult information such as errors, complications, adverse events, and bad news</p> <p>*see ACGME definition of direct supervision in the Program Requirements</p>	<p>Communicates, under <u>indirect</u>* supervision, in challenging circumstances (e.g., cognitive impairment, cultural differences, language barriers, low health literacy)</p> <p>*see ACGME definition of direct supervision in the Program Requirements</p>	<p>Communicates complex and difficult information, such as errors, complications, adverse events, and bad news</p>	<p>Serves as a role model for effective and compassionate communication</p> <p>Develops patient-centered educational materials</p>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:					

**Possible Methods of Assessment/Examples:**

- End-of-Rotation Global Assessment
- 360 Evaluation/Multi-rater/Peer
- Simulation/OSCE
- Direct observation and feedback
- Self-Assessment and Reflections/Portfolio

**Interpersonal and Communication Skills**

ICS2: Effective communication with members of the health care team					
Has not Achieved Level 1	Level 1	Level 2	Level 3	Level 4	Level 5
	<p>Adheres to transfer-of-care policies</p> <p><b>Written/Electronic:</b> Generates accurate reports with appropriate elements required for coding</p> <p><b>Verbal:</b> Communicates urgent and unexpected findings according to institutional policy and ACR guidelines</p>	<p><b>Written/Electronic:</b> Efficiently generates clear and concise reports that do not require substantive faculty member correction on routine cases</p> <p><b>Verbal:</b> Communicates findings and recommendations clearly and concisely</p>	<p><b>Written/Electronic:</b> Efficiently generates clear and concise reports that do not require substantive faculty member correction on common complex cases</p> <p><b>Verbal:</b> Communicates appropriately under stressful situations</p>	<p><b>Written/Electronic:</b> Efficiently generates clear and concise reports that do not require substantive faculty member correction on all cases</p> <p><b>Verbal:</b> Communicates effectively and professionally in all circumstances</p>	<p>Leads interdisciplinary conferences</p> <p><b>Written/Electronic:</b> Generates tailored reports meeting needs of referring physician</p> <p>Develops templates and report formats</p> <p><b>Verbal:</b> Serves as a role model for effective communication</p>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:					

**Possible Methods of Assessment/Examples:**

- End-of-Rotation Global Assessment
- 360 Evaluation/Multi-rater/Peer
- Simulation/OSCE (Intradepartmental and Team)
- Direct observation and feedback
- Self-Assessment and Reflections/Portfolio

**Systems-based Practice**

<b>SBP1: Quality Improvement (QI)</b>					
<b>Has not Achieved Level 1</b>	<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>	<b>Level 4</b>	<b>Level 5</b>
	<p>Describes departmental QI initiatives</p> <p>Describes the departmental incident/occurrence reporting system</p>	<p>Incorporates QI into clinical practice</p> <p>Participates in the departmental incident/occurrence reporting system</p>	<p>Identifies and begins a systems-based practice project incorporating QI methodology</p>	<p>Completes a systems-based practice project as required by the ACGME Review Committee</p> <p>Describes national radiology quality programs (e.g., National Radiology Data Registry, accreditation, peer-review)</p>	<p>Leads a team in the design and implementation of a QI project</p> <p>Routinely participates in root cause analysis</p>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:					

**Possible Methods of Assessment/Examples:**

- End-of-Rotation Global Assessment
- 360 Evaluation/Multi-rater/Peer
- Direct observation and feedback
- Self-Assessment and Reflections/Portfolio
- Semi-annual evaluation with program director
- Written feedback on project (with mentor)
- Project presentation feedback (faculty, peers, others in system)
- Critical incidents reporting and feedback

**Systems-based Practice**

SBP2: Health care economics					
Has not Achieved Level 1	Level 1	Level 2	Level 3	Level 4	Level 5
	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 measurements of productivity (e.g., RVUs)	Describes the radiology revenue cycle
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:					

**Possible Methods of Assessment/Examples:**

- End-of-Rotation Global Assessment
- Project presentation feedback (faculty, peers, others in system)
- Completion of knowledge-based modules

**Suggested educational strategies:**

- Annual QA session with head of billing
- Institute for Health Care International modules
- Agency for Healthcare Research and Quality modules



Practice-based Learning and Improvement

PBL1: Patient safety: contrast agents; radiation safety; MR safety; sedation					
Has not Achieved Level 1	Level 1	Level 2	Level 3	Level 4	Level 5
	<p><b>Contrast Agents:</b> Recognizes and manages contrast reactions</p> <p><b>Radiation Safety:</b> Describes the mechanisms of radiation injury and the ALARA (“as low as reasonably achievable”) concept</p> <p><b>MR Safety:</b> Describes risks of MRI</p>	<p><b>Contrast Agents:</b> Re-demonstrates recognition and management of contrast reactions</p> <p><b>Radiation Safety:</b> Accesses resources to determine exam-specific average radiation dose information</p> <p><b>MR Safety:</b> Accesses resources to determine the safety of implanted devices and retained metal</p>	<p><b>Contrast Agents:</b> Re-demonstrates recognition and management of contrast reactions</p> <p><b>Radiation Safety:</b> Communicates the relative risk of exam-specific radiation exposure to patients and practitioners</p> <p><b>MR Safety:</b> Communicates MR safety of common implants and retained foreign bodies to patients and practitioners</p>	<p><b>Contrast Agents:</b> Re-demonstrates recognition and management of contrast reactions</p> <p><b>Radiation Safety:</b> Applies principles of Image Gently® and Image Wisely®</p> <p><b>MR Safety:</b> Applies principles of MR safety including safety zones and pre-MR screening</p> <p><b>Sedation:</b> Describes the principles of conscious sedation</p>	<p><b>Contrast Agents:</b> Teaches appropriate treatment of contrast reactions</p> <p><b>Radiation Safety:</b> Promotes radiation safety</p> <p><b>MR Safety:</b> Participates in establishing or directing a safe MR program</p> <p><b>Sedation:</b> Selects appropriate sedation agent and dose for conscious sedation</p>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:					

Possible Methods of Assessment/Examples:

- End-of-Rotation Global Assessment
- 360 Evaluation/Multi-rater/Peer
- Simulation/OSCE
- Direct observation and feedback
- Self-Assessment and Reflections/Portfolio
- Completion of institutional safety modules, BCLS/ACLS

**Practice-based Learning and Improvement**

PBLI2: Self-Directed Learning					
Has not Achieved Level 1	Level 1	Level 2	Level 3	Level 4	Level 5
	Develops an annual learning plan based on self-reflection and program feedback	Evaluates and modifies learning plan	Evaluates and modifies learning plan	Evaluates and modifies learning plan	Advocates for lifelong learning at local and national levels
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:					

**Possible Methods of Assessment/Examples:**

- End-of-Rotation Global Assessment
- Semi-annual evaluation meeting with program director
- Self-Assessment and Reflections/Portfolio
- Resident teaching and feedback
- Core exam

**Practice-based Learning and Improvement**

PBLI3: Scholarly activity					
Has not Achieved Level 1	Level 1	Level 2	Level 3	Level 4	Level 5
	Documents training in critical thinking skills and research design	Works with faculty mentors to identify potential scholarly projects	Begins scholarly project	Completes and presents a scholarly project	Independently conducts research and contributes to the scientific literature and/or completes more than one scholarly project  Completes an IRB submission
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:					

**Possible Methods of Assessment/Examples:**

- End-of-Rotation Global Assessment
- Self-Assessment and Reflections/Portfolio
- Core exam
- Journal club discussions
- Written feedback on project (with mentor)
- Project presentation feedback (faculty, peers, others in system)
- Completion of AJR Self-Assessment Modules or CITI modules