

# The Pediatric Radiology Milestone Project

*A Joint Initiative of*

The Accreditation Council for Graduate Medical Education

and

The American Board of Radiology



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## The Pediatric Radiology Milestone Project

The Milestones are designed only for use in evaluation of the fellow in the context of their participation in ACGME-accredited residency or fellowship programs. The Milestones provide a framework for the assessment of the development of the fellow physician in key dimensions of the elements of physician competency in a specialty or subspecialty. They do not represent the entirety of the dimensions of the six domains of physician competency, nor are they designed to be relevant in any other context.

## **Pediatric Radiology Milestones**

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## Milestone Reporting

This document presents milestones designed for programs to use in semi-annual review of fellow 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 fellow performance as a fellow moves from entry into fellowship through graduation. In the initial years of implementation, the Review Committee will examine Milestone performance data for each program's fellows as one element in the Next Accreditation System (NAS) to determine whether fellows overall are progressing.

For each period, review and reporting will involve selecting milestone levels that best describe a fellow'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 in the subspecialty.

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

- Level 1:** The fellow demonstrates milestones expected of an incoming fellow.
- Level 2:** The fellow is advancing and demonstrates additional milestones, but is not yet performing at a mid-fellowship level.
- Level 3:** The fellow continues to advance and demonstrate additional milestones, consistently including the majority of milestones targeted for fellowship.
- Level 4:** The fellow has advanced so that he or she now substantially demonstrates the milestones targeted for fellowship. This level is designed as the graduation target.
- Level 5:** The fellow has advanced beyond performance targets set for fellowship 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 fellows will reach this level.

## **Additional Notes**

Level 4 is designed as the graduation *target* and *does not* represent a graduation *requirement*. Making decisions about readiness for graduation is the purview of the fellowship 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.

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.

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

*Answers to Frequently Asked Questions about Milestones are available on the Milestones web page:*

<http://www.acgme.org/acqmeweb/Portals/0/MilestonesFAQ.pdf>.

### **Radiology Subspecialty Assessment tools:**

- End-of-Rotation Global Assessment
- Direct observation and feedback
- Reading out with resident
- Review of reports
- Rate of major discrepancies
- Self-Assessment and Reflections/Portfolio
- OSCE/simulation
- Completion of institutional safety modules, BCLS/ACLS
- Case/Procedure Logs, including complications
- Multi-Source Evaluations

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 fellow's performance on the milestones for each sub-competency will be indicated by selecting the level of milestones that best describes that fellow's performance in relation to those milestones.

Consultant — Patient Care 1				
Level 1	Level 2	Level 3	Level 4	Level 5
Uses established evidence-based imaging guidelines, such as American College of Radiology Appropriateness Criteria®	Is approachable and available for consultation  Appropriately uses the Electronic Health Record to obtain relevant clinical information	Recommends appropriate imaging of common* pediatric conditions independently  Triage and manages case volume efficiently* as defined by the fellowship program	Independently integrates literature, taking into consideration cost effectiveness and risk-benefit analysis to recommend appropriate imaging to referring providers and caretakers	Participates in development of department imaging guidelines  Is sought out for consultation by referring clinicians
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments: <span style="float: right;">Not yet achieved Level 1 <input type="checkbox"/></span>				

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 demonstrated as well as **some** milestones in the higher level(s).

Consultant — Patient Care 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®	Is approachable and available for consultation  Appropriately uses the Electronic Health Record to obtain relevant clinical information	Recommends appropriate imaging of common* pediatric conditions independently  Triage and manages case volume efficiently	Independently integrates literature, taking into consideration cost effectiveness and risk-benefit analysis to recommend appropriate imaging to referring providers and caretakers	Participates in development of department imaging guidelines  Is sought out for consultation by referring clinicians
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Comments:</b>				Not yet achieved Level 1 <input type="checkbox"/>

\*as defined by the fellowship program

Safety — Patient Care 2				
Level 1	Level 2	Level 3	Level 4	Level 5
<p><b>Radiation Safety:</b> Is aware of principles of Image Gently®</p> <p>Knows basic radiation protection concepts</p> <p><b>Magnetic Resonance (MR) Safety:</b> Understands principles of MR safety, including safety zones and pre-MR screening</p> <p><b>Patient Handling:</b> Reads patient status indicators from monitors</p> <p>Understands universal precautions, including hand washing</p> <p>Understands appropriate use of “time-out” procedure</p> <p>Knows how to ensure that</p>	<p><b>Radiation Safety:</b> Applies principles of Image Gently®</p> <p>Practices As Low As Reasonably Achievable (ALARA) principle for patients, families, and staff members</p> <p>Is aware of departmental radiation safety initiatives</p> <p><b>MR Safety:</b> Accesses resources to determine the safety of implanted devices and retained foreign bodies</p> <p><b>Patient Handling:</b> Knows location of resuscitative equipment and code team phone numbers</p> <p>Understands the unique vulnerabilities of handling neonates and critically-ill children</p>	<p><b>Radiation Safety:</b> Teaches principles of Image Gently® to junior learners</p> <p>Participates in departmental radiation safety initiatives</p> <p><b>MR Safety:</b> Communicates MR safety of common implants and retained foreign bodies to patients and practitioners</p> <p><b>Patient Handling:</b> Exercises or delegates appropriate monitoring dependent on patient condition</p>	<p><b>Radiation Safety:</b> Teaches principles of Image Gently® to referring clinicians, patients, and families</p> <p><b>MR Safety:</b> Applies principles of MR safety and demonstrates efforts to decrease sedation time and utilization</p> <p><b>Patient Handling:</b> Leads health care team in safe and compassionate patient handling</p>	<p><b>Radiation Safety:</b> Participates in community radiation safety programs</p> <p><b>MR Safety:</b> Participates in establishing MR safety initiatives</p> <p><b>Patient Handling:</b> Implements new safety procedures and quality control measures impacting patient care</p> <p>Teaches health care team safe and compassionate patient handling</p>



<p>each patient has the right study at the right time in the right setting</p> <p><b>Contrast Agents:</b> Recognizes contrast reactions in children</p> <p>Understands issues regarding Gadolinium as related to nephrogenic systemic fibrosis, and iodinated contrast in relation to renal function</p>	<p><b>Contrast Agents:</b> With supervision chooses appropriate contrast agent for routine imaging studies with regard to age, indication, and patient condition</p>	<p><b>Contrast Agents:</b> Independently chooses the appropriate contrast agent for routine imaging studies with regard to age, indication, and patient condition</p>	<p><b>Contrast Agents:</b> Independently chooses appropriate contrast agent for advanced imaging exams</p> <p>Recognizes and manages contrast reactions in children</p>	<p><b>Contrast Agents:</b> Researches new contrast agents and helps introduce indications to the department</p>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<p><b>Comments:</b></p> <p style="text-align: right;">Not yet achieved Level 1 <input type="checkbox"/></p>				

Competence in Procedures — Patient Care 3				
Level 1	Level 2	Level 3	Level 4	Level 5
<p>Competently performs basic* pediatric procedures under direct supervision</p> <p>Recognizes complications of basic procedures</p>	<p>Competently performs basic and intermediate* pediatric procedures with indirect supervision</p> <p>Recognizes complications of intermediate procedures</p>	<p>Competently performs advanced* pediatric procedures under direct supervision</p> <p>Efficiently performs basic* pediatric procedures with indirect supervision</p> <p>Recognizes complications of advanced procedures</p>	<p>Competently, efficiently, and independently performs basic and intermediate* pediatric procedures</p> <p>Examples include:</p> <p><b>Fluoroscopy</b></p> <ul style="list-style-type: none"> <li>▪ Intussusception reduction</li> <li>▪ Contrast enema</li> <li>▪ VCUG</li> <li>▪ Bladder catheterization</li> <li>▪ Upper GI series</li> <li>▪ Airway fluoroscopy</li> <li>▪ Modified barium swallow</li> </ul> <p><b>Ultrasound/Doppler</b></p> <ul style="list-style-type: none"> <li>▪ Head and neck</li> <li>▪ Spine</li> <li>▪ Hips</li> <li>▪ Abdomen – pyloric stenosis, appendicitis, intussusception</li> <li>▪ Pelvic/testicular</li> </ul>	<p>Competently and independently performs advanced pediatric-specific procedures</p>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<p><b>Comments:</b></p>				<p>Not yet achieved Level 1 <input type="checkbox"/></p>

\*as defined by the fellowship program

Protocol Selection and Optimization of Images — Medical Knowledge 1				
Level 1	Level 2	Level 3	Level 4	Level 5
<p>Recognizes suboptimal imaging</p> <p>With supervision, selects appropriate protocol and contrast agent/dose for common* pediatric indications</p>	<p>With supervision, selects appropriate protocol and contrast agent/dose for uncommon* pediatric indications</p> <p>Knows basic techniques to optimize image quality</p>	<p>With supervision, selects appropriate protocol and contrast agent/dose for complex* pediatric indications</p> <p>With supervision, appropriately applies techniques to optimize image quality</p>	<p>Appropriately applies techniques to optimize image quality independently</p> <p>Independently modifies routine* pediatric studies as needed</p> <p>Examples include:</p> <p><b>US</b></p> <ul style="list-style-type: none"> <li>Selects appropriate exam</li> <li>Optimizes images using depth, gain, focal zone, probe selection</li> </ul> <p><b>CT</b></p> <ul style="list-style-type: none"> <li>Selects reduced dose protocols</li> <li>Selects appropriate bowel prep</li> </ul> <p><b>MR</b></p> <ul style="list-style-type: none"> <li>Selects appropriate field of view/sequences</li> <li>Appropriately uses contrast</li> </ul> <p><b>Nuclear Medicine</b></p> <ul style="list-style-type: none"> <li>Selects appropriate exam</li> </ul>	<p>Can appropriately modify advanced* pediatric protocols</p>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Comments:</b>				Not yet achieved Level 1 <input type="checkbox"/>

\*as defined by the fellowship program

Interpretation — Medical Knowledge 2				
Level 1	Level 2	Level 3	Level 4	Level 5
Makes core observations, and formulates differential diagnoses	Understands normal pediatric developmental and anatomic variations	With supervision, differentiates pediatric normal from abnormal	Independently differentiates pediatric normal from abnormal	Demonstrates expertise at a level expected of a pediatric radiology subspecialist
Recognizes critical findings	Makes secondary observations, narrows the differential diagnosis, and is aware of management options	Provides accurate, focused interpretations  With supervision, prioritizes differential diagnoses and recommends appropriate management	Independently suggests a single diagnosis when appropriate  Independently recommends appropriate management	Integrates current research and literature when recommending management
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Comments:</b>				Not yet achieved Level 1 <input type="checkbox"/>

Knowledge of Basic and Clinical Science Appropriate to Pediatric Radiology — Medical Knowledge 3				
Level 1	Level 2	Level 3	Level 4	Level 5
Has a basic fund of knowledge regarding anatomy, physiology, and pathophysiology of common pediatric diseases  Understands physics principles of imaging  Able to access evidence-based literature	Understands imaging findings based on knowledge of anatomy, physiology, and pathophysiology of common* pediatric diseases  Routinely reviews peer-reviewed journals/literature to advance knowledge	Understands imaging findings based on knowledge of anatomy, physiology, and pathophysiology of less common* pediatric diseases	Appropriately synthesizes imaging findings based on knowledge of anatomy, physiology, and pathophysiology of pediatric diseases	Advances knowledge of anatomy, physiology, and/or pathophysiology of pediatric diseases by production of original scientific work  Demonstrates knowledge of current literature of common* pediatric diseases
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Comments:</b>				Not yet achieved Level 1 <input type="checkbox"/>

\* as defined by the fellowship program

Quality Improvement — Systems-based Practice 1				
Level 1	Level 2	Level 3	Level 4	Level 5
Understands the importance of ongoing quality improvement initiatives	Attends departmental quality assurance meetings  Understands the departmental incident/occurrence reporting system	Aware of departmental quality improvement initiatives  Participates in quality improvement initiatives within the department or hospital	Incorporates quality improvement into own practice	Develops a quality improvement initiative  Completes a quality improvement project  Displays effective teamwork skills in quality improvement initiatives
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Comments:</b>				Not yet achieved Level 1 <input type="checkbox"/>

Health Care Economics — Systems-based Practice 2				
Level 1	Level 2	Level 3	Level 4	Level 5
Dictates reports that contain the elements necessary to support pediatric-specific exam coding	Understands relative cost of common procedures	Participates in departmental cost savings initiatives	Has a basic knowledge of Medicaid and private insurance reimbursement requirements	Understands the roles of the ACR and American Medical Association (AMA) in the valuation and re-valuation of CPT codes  Understands fundamentals of billing and coding of subspecialty-specific exams
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Comments:</b>				Not yet achieved Level 1 <input type="checkbox"/>

Self-directed learning — Practice-based Learning and Improvement 1				
Level 1	Level 2	Level 3	Level 4	Level 5
Is aware of personal knowledge and expertise and uses feedback from teachers, colleagues, and patients	Continually seeks and incorporates feedback to improve performance  Develops a learning plan and uses published resources	Demonstrates a balanced and accurate self-assessment of competence  Selects evidence-based information to answer specific questions	With little external guidance, performs self-directed learning using evidence-based information	Organizes educational activities at the program level to fill gaps in knowledge  Develops assessment tools
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Comments:</b>				Not yet achieved Level 1 <input type="checkbox"/>



Scholarly Activity — Practice-based Learning and Improvement 2				
Level 1	Level 2	Level 3	Level 4	Level 5
Demonstrates critical thinking skills and understands research design  Demonstrates knowledge of basic principles of ethical conduct of research and the protection of Human Subjects	Identifies a faculty research mentor and a potential scholarly project  Understands the role of the Institutional Review Board (IRB)	Makes progress on scholarly project  Collects and analyzes data  Understands the importance of maintaining data safely for the protection of human subjects	Presents scholarly project to peers for review and critique  Critically reviews and interprets the literature with the ability to identify study aims, hypotheses, design, and biases	Submits manuscript for publication in peer-reviewed journal  Demonstrates an understanding of statistical analyses and epidemiology
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Comments:</b>				Not yet achieved Level 1 <input type="checkbox"/>

Personal — Professionalism 1				
Level 1	Level 2	Level 3	Level 4	Level 5
Demonstrates the following professional behaviors: <ul style="list-style-type: none"> <li>▪ is truthful</li> <li>▪ is compassionate</li> <li>▪ recognizes personal limitations and seeks help when appropriate</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>▪ recognizes the importance and priority of patient care</li> <li>▪ fulfills work-related responsibilities</li> <li>▪ maintains patient confidentiality</li> <li>▪ adheres to Institutional and Program Requirements related to professionalism and ethics</li> <li>▪ prepares for and attends required conferences</li> </ul>	Serves as an effective health care team member, promoting advocacy of child welfare and social justice  Demonstrates professional behaviors listed in Level 1	Actively reflects on personal professionalism  Discusses professionalism issues with other learners and faculty members  Demonstrates professional behaviors listed in Level 1	Serves as a role model for professional behavior to junior learners  Demonstrates professional behaviors listed in Level 1	Mentors others regarding professionalism and ethics  Serves as a leader in institutional, regional, or national organizations to advance professionalism
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Comments:</b>				Not yet achieved Level 1 <input type="checkbox"/>

Effective Communication with Patients, Families, and Caregivers — Interpersonal and Communication Skills 1				
Level 1	Level 2	Level 3	Level 4	Level 5
With supervision, exhibits basic communication skills  Effectively communicates patient information in non-stressful situations  Aware of child development milestones  Aware of Child Life services where available	Explains procedures in language appropriate to patient’s age and development  Explains procedures to parents/caregivers in understandable and compassionate language  Develops rapport with parents/caregivers  Appropriately uses Child Life services as needed	Develops rapport and achieves cooperation of even reluctant pediatric patients by providing developmentally-appropriate explanations  With supervision, appropriately and effectively communicates complex information to patients and families	With supervision, appropriately, effectively, and compassionately communicates difficult information, such as new diagnoses, complications, and adverse events	Serves as a role model for, and teaches, effective and compassionate communication  Develops models and guidelines for communication in the department and/or for national professional organizations
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Comments:</b>				Not yet achieved Level 1 <input type="checkbox"/>

Effective Communication with Members of the Health Care Team (Written and Oral) — Interpersonal and Communication Skills 2				
Level 1	Level 2	Level 3	Level 4	Level 5
<p>Efficiently generates clear and concise reports for basic pediatric cases that do not need substantial faculty member corrections</p> <p>Communicates effectively and professionally with health care team members (specialists, nurses, technologists) in non-stressful situations</p> <p>Effectively communicates urgent and unexpected findings according to institutional and ACR guidelines</p>	<p>Efficiently generates clear and concise reports for most cases that do not need substantial faculty member corrections</p> <p>With supervision, communicates effectively and professionally with health care team members in most stressful situations</p>	<p>Efficiently generates clear and concise reports for complex cases that do not need substantial faculty member corrections</p> <p>Independently communicates effectively and professionally with health care team members in most stressful situations</p> <p>Effectively manages transitions of care and hand-offs</p>	<p>Generates structured reports meeting the specific needs of the referring physicians</p> <p>Serves as a role model for effective and professional communication</p>	<p>Develops guidelines for written and oral communication</p> <p>Seeks leadership opportunities in the department and/or in national professional organizations</p>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Comments:</b>				Not yet achieved Level 1 <input type="checkbox"/>

Effective Teaching — Interpersonal and Communication Skills 3				
Level 1	Level 2	Level 3	Level 4	Level 5
Is able to generate effective teaching presentations  Participates in teaching and interdisciplinary conferences	Under direct faculty member supervision, prepares for departmental and/or interdisciplinary teaching conferences	With minimal faculty member supervision, prepares for departmental and/or interdisciplinary teaching conferences  Presents a formal lecture to junior learners for review and critique	Independently leads a departmental and/or interdisciplinary teaching conference  Effectively teaches junior learners at the view box	Present educational material at a hospital or at a regional or national meeting  Effectively teaches junior learners procedural skills
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Comments:</b>				Not yet achieved Level 1 <input type="checkbox"/>