

General Competencies in Radiology Residency Training: Definitions, Skills, Education and Assessment

Prepared by the Association of Program Directors in Radiology (APDR) Education
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Introduction

The Accreditation Council for Graduate Medical Education (ACGME) Outcome Project is a long-term initiative by which the ACGME is increasing emphasis on educational outcomes in the accreditation of residency programs (<http://www.acgme.org>). The impetus for this project is based on a system of medical education that relies heavily on public funding and is therefore accountable to the public in terms of meeting public needs and preparing well-qualified new physicians in the most cost-effective way possible. The current model of accreditation focuses on the potential of a residency program to educate residents (i.e. whether the program complies with the requirements, has established objectives and an organized curriculum, and evaluates the residents and itself). However, measuring program quality by examining structure and process is not a direct or complete measure of the quality of the educational outcomes of a program. In the future, accreditation will focus on actual accomplishments of a program, through assessment of program outcomes (i.e. whether the residents achieve the learning objectives set by the program, whether the program provides evidence of this achievement, and whether the program demonstrates continuous improvement in its educational process).

The ACGME Outcome Project Advisory Committee identified six general competencies that were subsequently endorsed by the ACGME in February 1999. They are patient care, medical knowledge, practice based-learning and improvement, interpersonal and communication skills, professionalism, and systems-based practice. All Residency Review Committees (RRCs) must include minimum language regarding the general competencies and evaluation processes in their respective Program Requirements by July 2002.

A major activity of the Outcome Project was the identification and development of measurement tools for programs to use as part of an overall evaluation system. The ACGME and the American Board of Medical Specialties (ABMS) collaborated on the development of a “Toolbox” (<http://www.acgme.org>) of assessment methods. The Toolbox (© Copyright 2000 Accreditation Council for Graduate Medical Education and American Board of Medical Specialties, Version 1.1, September 2000) includes descriptions of instruments recommended for use by programs as they assess the outcomes of their educational efforts. In addition to a description, the Toolbox includes information pertaining to the use, psychometric qualities, and feasibility/practicality of different assessment methods.

A radiology “quadrad”, composed of representatives from the Radiology RRC (including a resident member of the RRC), the American Board of Radiology, and the Association of Program Directors in Radiology (APDR) was formed in the spring of 2000 to interpret the six competencies as they relate to radiology, and choose evaluation methods from the ACGME/ABMS Toolbox that are most appropriate for evaluating radiology resident competence. As an extension of the work done by the quadrad, the APDR Education Committee developed and adopted the following descriptions of the six competencies, outlining for each the definition of the competency, resident skills and education related to the competency and assessment of resident competence. Descriptions of selected assessment methods are provided in the Appendix.

PATIENT CARE: Provide patient care that is compassionate, appropriate and effective.

Skills
<ul style="list-style-type: none">• Gather essential and accurate information about patients• Develop a diagnostic plan based upon the clinical question/s and relevant clinical, radiologic and pathologic information• Oversee diagnostic imaging to ensure adequacy of studies performed• Counsel patients concerning preparation for diagnostic testing• Demonstrate a basic understanding of electronic patient information systems• Demonstrate the ability to use the Internet as an educational instrument to expand medical knowledge• Demonstrate knowledge of the levels of ionizing radiation related to specific imaging procedures and employ measures to minimize radiation dose to the patient• Perform radiologic examinations appropriately and safely, assuring that the correct examination is ordered and performed
Education (with graduated faculty supervision and feedback)
<ul style="list-style-type: none">• Practical experience in developing a differential diagnosis and management plan based upon clinical data, imaging findings and other medical test results• Active participation in journal reviews to determine the effectiveness of diagnostic imaging for specific diagnostic questions• Graduated responsibility in performing radiologic procedures• Didactic instruction in radiation safety• Preparation and presentation of radiologic cases to other members of the health care team
Assessment
<ul style="list-style-type: none">• Global ratings by faculty• 360 degree examination• Procedure log• Objective structured clinical examination

MEDICAL KNOWLEDGE: Residents must demonstrate knowledge about established and evolving biomedical and clinical sciences and the application of this knowledge to patient care.

Skills
<ul style="list-style-type: none">• Demonstrate sufficient knowledge of medicine and apply this knowledge to radiological studies in a clinical context to generate meaningful differential diagnoses• Demonstrate progressive acquisition of radiological knowledge• Demonstrate knowledge of the principles of research design and implementation• Generate a clinically appropriate diagnostic treatment plan• Demonstrate the ability to use all relevant information resources to acquire evidence-based data• Understand how radiologic equipment can be used to generate appropriate and diagnostic images
Education
<ul style="list-style-type: none">• Didactic lectures and self-directed learning on the science and practice of radiology• Participation in departmental and inter-departmental case conferences• Participation in the clinical activities of the radiology department• Departmental or institutional training programs on research design and implementation
Assessment
<ul style="list-style-type: none">• Global ratings by faculty• Program-developed written examinations• ACR in-training examination• Written ABR examination• Oral ABR examination• Raphex physics examination

INTERPERSONAL AND COMMUNICATION SKILLS: Residents must demonstrate interpersonal and communication skills that result in effective information exchange with patients, patient family members, medical students, other residents, supervising faculty, referring physicians, technologists, nurses and other members of the health care team.

<p>Skills</p>
<ul style="list-style-type: none"> • Provide a clear and informative written radiologic report including a precise diagnosis whenever possible, a differential diagnosis when appropriate, and recommended follow-up or additional studies when appropriate • Provide direct communication to the referring physician or appropriate clinical personnel when interpretation reveals an urgent or unexpected finding and document this communication in the radiologic report • Demonstrate effective skills of face-to-face listening and speaking with physicians, patients, patient’s families and support personnel • Demonstrate appropriate telephone communication skills • Demonstrate skills in obtaining informed consent, including effective communication to patients of the procedure, alternatives and possible complications
<p>Education (with graduated faculty supervision and feedback)</p>
<ul style="list-style-type: none"> • Participation as an active member of the radiology team by communicating face-to-face with clinicians, answering the telephone, providing consults, problem solving and decision-making • Act as the contact person for technologists and nurses in managing patient and imaging issues • Active participation in preparing and moderating multi-disciplinary conferences • Practical experience in dictating radiological reports
<p>Assessment</p>
<ul style="list-style-type: none"> • Global ratings by faculty • 360° evaluations • Oral ABR examination • Record review (systematic evaluation of resident dictations)

PROFESSIONALISM: Demonstrate a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse patient population.

Skills
<ul style="list-style-type: none">• Demonstrate altruism (putting the interests of patients and others above own self-interest)• Demonstrate compassion: be understanding and respectful of the patients, patient families, and staff and physicians caring for patients• Demonstrate excellence: perform responsibilities at the highest level and continue active learning throughout one's career• Be honest with patients and all members of the health care team• Demonstrate honor and integrity: avoid conflicts of interest when accepting gifts from patients or vendors• Interact with others without discriminating on the basis of religious, ethnic, sexual or educational differences and without employing sexual or other types of harassment• Demonstrate knowledge of issues of impairment (i.e. physical, mental and alcohol and substance abuse), obligations for impaired physician reporting, and resources and options for care of self-impairment or impaired colleagues• Demonstrate positive work habits, including punctuality and professional appearance• Demonstrate an understanding of broad principles of biomedical ethics• Demonstrate principles of confidentiality with all information transmitted during a patient encounter• Demonstrate knowledge of regulatory issues pertaining to the use of human subjects in research
Education
<ul style="list-style-type: none">• Discussion of conflicts of interest and the ethics of conducting research during departmental or institutional conferences and daily clinical work• Training programs (i.e. videotapes) on the issues of harassment and discrimination.• Didactic presentations on the recognition and management of the "impaired physician"• Participation in hospital-sponsored core curriculum educational activities (i.e. lectures, web-based programs)• Didactic lecture/training program on the broad principles of medical ethics• Institutional web-based self-directed learning and assessment programs on human subjects research guidelines

Assessment

- Global ratings by faculty
- 360° evaluations
- Conference attendance logs
- Resident self-assessment
- Written ABR examination

PRACTICE BASED LEARNING AND IMPROVEMENT: Residents must be able to investigate and evaluate their patient care practices, and appraise and assimilate scientific evidence in order to improve their radiologic practices.

Skills
<ul style="list-style-type: none">• Analyze practice experience and perform practice-based improvement in cognitive knowledge, observational skills, formulating a synthesis and impression, and procedural skills• Demonstrate critical assessment of the scientific literature• Demonstrate knowledge of and apply the principles of evidence-based medicine in practice• Use multiple sources, including information technology to optimize life-long learning and support patient care decisions• Facilitate the learning of students, peers and other health care professionals
Education
<ul style="list-style-type: none">• Participate in critical assessment of the scientific literature through journal clubs, clinical conferences and independent learning• Didactic lectures on the assessment of scientific literature, study designs and statistical methods• Teaching students, peers and other health care professionals, with graduated supervision and feedback from supervising faculty• Active participation in departmental or institutional quality assurance (QA)/quality improvement (QI) activities with faculty supervision
Assessment
<ul style="list-style-type: none">• Global ratings by faculty• ACR in-service examination• Written ABR examination• QA/QI conference attendance logs• Global ratings by students• Procedure log

SYSTEMS BASED PRACTICE: Demonstrate an awareness and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide optimal care.

Skills
<ul style="list-style-type: none">• Demonstrate the ability to design cost-effective care plans based on knowledge of best practices• Demonstrate knowledge of the sources of financing for U.S. health care including Medicare, Medicaid, the Veteran’s Affairs and Department of Defense, public health systems, employer-based private health plans, and patient’s own funds• Demonstrate knowledge of basic health care reimbursement methods• Demonstrate knowledge of the regulatory environment including state licensing authority, state and local public health rules and regulations, and regulatory agencies such as Centers for Medicaid and Medicare Services (CMS) and Joint Commission for the Accreditation of Healthcare Organizations (JCAHO)• Demonstrate knowledge of basic practice management principles such as budgeting, record keeping, medical records, and the recruitment, hiring, supervision and management of staff
Education
<ul style="list-style-type: none">• Systematic review of appropriate literature, including current American College of Radiology (ACR) Appropriateness Criteria, to develop knowledge of evidence-based indications for imaging procedures• Attendance and active participation in departmental and multi-disciplinary conferences where there is discussion of the imaging evaluation of specific diseases and most appropriate and cost-effective methods for establishing a diagnosis• Interaction with department administrators and knowledgeable faculty to gain an understanding of the costs of diagnostic examinations and the influence of the type of payer system on reimbursement• ACR/APDR non-interpretive skills videotapes• Membership and active participation in local and national radiological societies• Departmental or institutional presentations on health care funding and regulation
Assessment
<ul style="list-style-type: none">• Global ratings by faculty• Written ABR examination• ACR in-training examination• Multi-disciplinary conference attendance logs• Documented membership and participation in radiologic societies and other health care organizations

Appendix. Descriptions of Selected Assessment Methods

360° evaluation. 360° evaluations consist of measurement tools completed by multiple people in a person's sphere of influence. Evaluators can include superiors, peers, subordinates, patients, and patient families. Most 360° evaluation processes use a survey or questionnaire to gather information about an individual's performance on several topics (e.g. teamwork, communication, management skills, decision-making), and use rating scales to assess how frequently a behavior is performed. Reproducible results are most easily obtained when five to ten nurses rate a resident, while a greater number of faculty and patients are needed for the same degree of reliability.

Global ratings. Global rating forms are distinguished from other rating forms in that a rater judges general categories of ability (e.g. patient care skills, medical knowledge, interpersonal and communication skills) instead of specific skills, tasks or behaviors. The ratings are completed retrospectively based on general impressions collected over a period of time (e.g. at the end of a clinical rotation) derived from multiple sources of information (e.g. direct observations or interactions; input from other faculty, residents, or patients; review of work products or written materials). Typical rating scales consist of qualitative indicators and often include numeric values for each indicator. Written comments are important to allow evaluators to explain the ratings. Scores can be highly subjective when raters are not well trained. Sometimes all competencies are rated the same regardless of performance. Reproducibility is easier to achieve for ratings of knowledge and more difficult to achieve for patient care and interpersonal and communication skills.

Objective structured clinical examination (OSCE). In an objective structured clinical examination (OSCE), one or more assessment tools are administered at 12 to 20 separate stations, each station lasting 10-15 minutes. All candidates move from station to station in sequence on the same schedule. Radiologic OSCEs include image interpretation and procedural exercises. OSCEs are only cost-effective when many candidates are examined at one administration.

Procedure case logs. Procedure logs document each patient encounter by medical conditions seen, procedure performed, and complications. Regular review of logs can be used to help residents track what cases or procedures must be completed in order to meet residency requirements or specific learning objectives. Logs documenting experience for the entire residency can serve as a summative report of that experience, but the numbers do not necessarily indicate competence.

Record review. Trained persons (e.g. radiology faculty members) perform a review of patient records produced by the resident (e.g. dictations). A checklist of predefined criteria can be used to abstract information from the records. The record review can provide evidence about observational, synthesis, management and communication skills.

Standardized oral examination. The standardized oral examination is a type of performance assessment using realistic radiologic cases with a trained radiologist questioning the examinee. Resident skills in observation, synthesis and management can be assessed. Fifteen of the 24 American Board of Medical Specialties (ABMS) Member Boards use standardized oral examinations as the final examination for initial certification. “Mock orals”, that use cases but with much less standardization compared to board oral examinations, are often used in residency training programs to help familiarize residents with the oral examinations conducted for board certification.

Standardized written examination. A written or computer-based examination is composed, usually, of multiple-choice questions (MCQ) to sample medical knowledge and understanding of a defined body of knowledge, not just factual or easily recalled information. The examination can include image interpretation items. Medical knowledge and understanding can be measured by MCQ examinations. Comparing the test scores on in-training examinations with national statistics can serve to identify strengths and limitations of individual residents to help them improve. Comparing test results aggregated for residents in each year of a program can be helpful to identify

residency training experience that might be improved. All of the 24 ABMS Member Boards use MCQ examinations for initial certification.