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Assessing Quality in Medical Physics Residency Education

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Thanks to contributors:
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Two levels of assessment of quality of residency education

1. Individual resident: to assess their progress through your program, to measure their competency against expectations
2. Program: to compare your program quality to national standards, to compare your program quality to other programs

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Individual resident assessments

- Competency checklist: yes/no, dated by faculty mentor

	Yes	No
6. The resident has observed at least 2 whole brain external beam treatments*	X	
Comment:		
7. The resident has observed at least 2 brain tumor (glioma or other) external beam treatments.*	X	
Comment:		
8. The resident has observed at least 2 lung external beam treatments.*	X	
Comment:		
9. The resident has observed at least 2 head and neck external beam treatments.*	X	
Comment:		
10. The resident has observed at least 2 liver external beam treatments.*	X	
Comment:		
11. The resident has observed at least 2 spine (and other palliative) external beam treatments.*	X	
Comment:		

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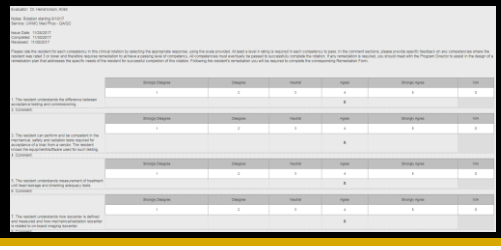
Individual resident assessment

- Learning objectives checklist with scaling: end of rotation evaluation by faculty mentor or oversight committee



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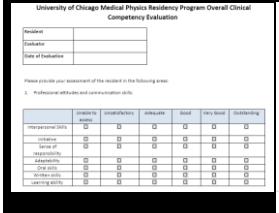


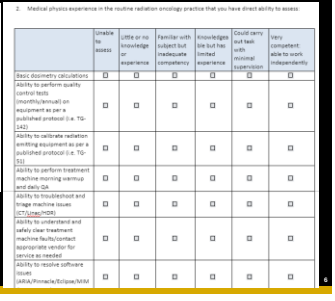
University of Chicago Medical Physics Residency Program Overall Clinical Competency Evaluation

Resident	
Evaluator	
Date of Evaluation	

Please provide your assessment of the resident in the following areas:

1. Professional attitudes and communication skills

	Unable to assess	Unsatisfactory	Adequate	Good	Very Good	Outstanding
Interpersonal Skills	☐	☐	☐	☐	☐	☐
Initiative	☐	☐	☐	☐	☐	☐
Sense of responsibility	☐	☐	☐	☐	☐	☐
Adaptability	☐	☐	☐	☐	☐	☐
Oral skills	☐	☐	☐	☐	☐	☐
Written skills	☐	☐	☐	☐	☐	☐
Learning ability	☐	☐	☐	☐	☐	☐



2. Medical physics experience in the routine radiation oncology practice that you have direct ability to assess:

	Unable to assess	Little or no knowledge or experience	Familiar with subject but inadequate competency	Knowledgeable but has limited experience	Could carry out task with minimal supervision	Very competent; able to work independently
Basic dosimetry calculations	☐	☐	☐	☐	☐	☐
Ability to perform quality control tests (monthly/annual) on equipment as per a published protocol (i.e. TG-142)	☐	☐	☐	☐	☐	☐
Ability to calibrate radiation emitting equipment as per a published protocol (i.e. TG-51)	☐	☐	☐	☐	☐	☐
Ability to perform treatment machine morning warmup and daily QA	☐	☐	☐	☐	☐	☐
Ability to troubleshoot and triage machine issues (CT/Linac/HDR)	☐	☐	☐	☐	☐	☐
Ability to understand and safely clear treatment machine faults/contact appropriate vendor for service as needed	☐	☐	☐	☐	☐	☐
Ability to resolve software issues (ARIA/Pinnacle/Eclipse/MIM	☐	☐	☐	☐	☐	☐

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- Feedback form from staff/faculty; aggregated for discussion with PD monthly

	Inadequate	Average	Good	Exceptional	Comments
Quality of completion					
Attention to detail					
Available when needed					
Finish on-time without reminding					
Finish assigned reading					
Understands physics behind procedures					
Communicates well with physicians					
I'd like to see improvement in					

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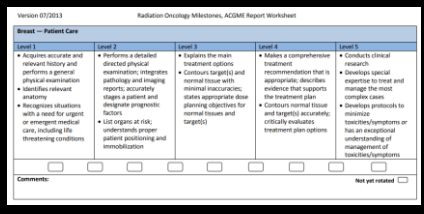
ACGME Radiation Oncology Milestones



Version 07/2013 — Radiation Oncology Milestones, ACGME Report Worksheet

Breast — Patient Care

Level 1	Level 2	Level 3	Level 4	Level 5
• Acquires accurate and relevant history and performs a general physical examination • Identifies relevant anatomy • Recognizes situations with a need for urgent or emergent medical care, including life threatening conditions	• Performs a detailed directed physical examination; integrates pathology and imaging reports; accurately stages a patient and designate prognostic factors • List organs at risk; understands proper patient positioning and immobilization	• Explains the main treatment options • Contours target(s) and normal tissue with minimal inaccuracies; states appropriate dose planning objectives for normal tissues and target(s)	• Makes a comprehensive treatment recommendation that is appropriate; describes evidence that supports the treatment plan • Contours normal tissue and target(s) accurately; critically evaluates treatment plan options	• Conducts clinical research • Develops special expertise to treat and manage the most complex cases • Develops protocols to minimize toxicities/symptoms or has an exceptional understanding of management of toxicities/symptoms

Comments: Not yet rotated

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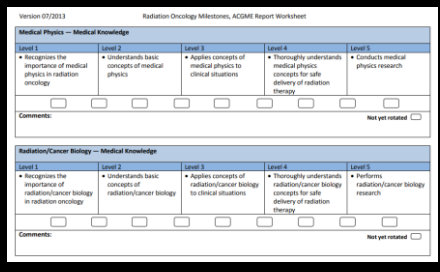

Version 07/2013 — Radiation Oncology Milestones, ACGME Report Worksheet

Medical Physics — Medical Knowledge

Level 1	Level 2	Level 3	Level 4	Level 5
• Recognizes the importance of medical physics in radiation oncology	• Understands basic concepts of medical physics	• Applies concepts of medical physics to clinical situations	• Thoroughly understands medical physics concepts for safe delivery of radiation therapy	• Conducts medical physics research

Comments: Not yet rotated

Radiation/Cancer Biology — Medical Knowledge

Level 1	Level 2	Level 3	Level 4	Level 5
• Recognizes the importance of radiation/cancer biology in radiation oncology	• Understands basic concepts of radiation/cancer biology	• Applies concepts of radiation/cancer biology to clinical situations	• Thoroughly understands radiation/cancer biology concepts for safe delivery of radiation therapy	• Performs radiation/cancer biology research

Comments: Not yet rotated

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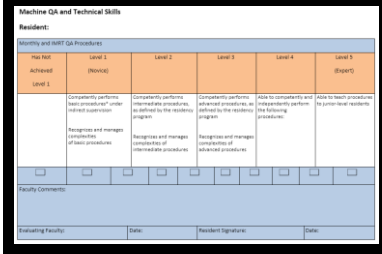
Example milestone for medical physics



Machine QA and Technical Skills

Resident:

Monthly and IMRT QA Procedures					
Has Not Achieved Level 1	Level 1 (Novice)	Level 2	Level 3	Level 4	Level 5 (Expert)
	Competently performs basic procedures* under indirect supervision Recognizes and manages complexities of basic procedures	Competently performs intermediate procedures, as defined by the residency program Recognizes and manages complexities of intermediate procedures	Competently performs advanced procedures, as defined by the residency program Recognizes and manages complexities of advanced procedures	Able to competently and independently perform the following procedures:	Able to teach procedures to junior-level residents
Faculty Comments:					
Evaluating Faculty:	Date:	Resident Signature:	Date:		

Basic Procedures
Knows how to operate the controls from within the room and from the console
Correctly uses of the mechanical and radiation test equipment
Familiar with safety precautions dealing with mechanical collision of gantry and table components and radiation exposure
Intermediate Procedures
Must understand the calibration principles involved with in-phantom measurements using a dose calibrated ion chamber
Must understand the calibration principles of diode or ion chamber array, and be able to operate the treatment unit in the QA mode to perform the tests and analyze the findings in accordance with the physics guidelines established (IMRT QA).
Must be familiar with the TG-51 protocol for photon and electron dose specification for external beam machines including the concepts of temperature and pressure corrections, chamber calibration factor, and conversion from dose in plastic to dose in water
Advanced Procedures
When a QA check indicates a parameter is exceeding its tolerance, the resident performing the test is able

Oral exams or mock oral ABR exams

- End of rotation presentations to oversight committee
- Oral questioning at the end of the presentation
- OR no presentation but trainee appears before oversight committee to answer questions related to the rotation topic (oral exam)
- Mock ABR exams annually or more frequently on all ABR topics

Potential issues with individual assessment

- Hesitation for honesty in critical feedback, potential for retaliation

Possible solutions:

- Become better at giving critical feedback; how to engage millennials in their own learning
- Aggregate feedback from multiple faculty members
- Milestones with explicit list of what defines each level of competence in each milestone category, minimizes subjectivity of assessment

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Assessing quality of education at the program level

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Metric of program quality: reputation

Track admissions numbers
- How many applicants?
- Perceived quality of applicants
- Success in filling positions with favored candidates

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Feedback requests:
- Formal survey requests from current residents on rotations, workload, faculty mentors
- Likewise survey requests from faculty
- Open door policy for program director to be available for feedback on the program at any time

Follow up on feedback:
- Steering committee meets regularly (monthly or quarterly) to discuss collected feedback, propose and implement program changes/improvements

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Exit Interviews

- Individual interview with each trainee
- Ask: looking back over the 2-3 years of their training, what was the best/worst of the educational program?

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Follow up surveys

- 1-year survey of graduate:
  What aspects of your residency training prepared you well for your current job? What preparation for your current job was missing from your training program?
- 1-year survey of the employer

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Graduates' success

- Ability of trainees to secure their preferred job before graduating from your program
- ABR Part II and III pass rates

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Conclusions

What's missing?

- National standards for individual assessments, like ACGME milestones
- Metrics to compare quality of education with other residency programs

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Thank you

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