

REPORT

AMERICAN BOARD OF RADIOLOGY MAINTENANCE
OF CERTIFICATION—PART IV: PRACTICE QUALITY
IMPROVEMENT FOR RADIATION ONCOLOGY

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Maintenance of Certification is a physician-based response to public concerns about the quality of medical care and physician competency in a rapidly evolving, technically demanding specialty. The American Board of Radiology (ABR) has previously described the first three components of the Maintenance of Certification. The ABR is currently developing a program in practice performance, completing Part IV of the competencies. The Practice Quality Improvement (PQI) program is meant to critically evaluate meaningful aspects of a physician's practice in a simple manner, using identifiable metrics and self-assessment to include an action plan for quality improvement. Each diplomate will be expected to complete three PQI projects during a full 10-year Maintenance of Certification cycle. Current diplomates with time-limited certificates will find prorated requirements determined by their year of certification on the ABR Website. Diplomates will have the option of completing zero to two Type I PQI projects (assessing factors relevant to clinical practice by peer review and self-reporting) and one to three Type II projects (*i.e.*, at least one Type II projects of the three required, assessing parameters of practice by comparison with evidence-based guidelines, consensus statements, or peer comparisons; Type II projects are initiated and managed by professional societies). Several examples of Type I projects that might be offered by societies or directly through the ABR are provided, as well as highlights of the two Type II projects that have sought ABR qualification: the American Society for Therapeutic Radiology and Oncology's Performance Assessment for the Advancement of Radiation Oncology Treatment program and American College of Radiology's RO-PEER program. An additional objective of the PQI is to develop national databases for future reference using aggregate data from the PQI projects. © 2007 by The American Board of Radiology

Maintenance of Certification, Practice performance, Practice Quality Improvement.

INTRODUCTION

Three themes dominate the public's concerns with the United States' healthcare system: quality of care, medical error reduction, and patient safety (1–3). Advances in medical science and technology are moving forward at an unparalleled pace, along with the rapid expansion of scientific knowledge. The outcomes and costs associated with the diagnosis and treatment of cancer patients vary widely among physicians, hospitals, healthcare providers, and regions of the country (4).

To address challenges in the medical system and the public's concerns, the American Board of Medical Specialties, composed of 24 member boards representing all medical specialties in the United States, mandated in March 2000 that each board initiate specialty-specific Maintenance of Certification (MOC) programs (5–7). MOC represents a substantial, physician-led effort to respond to societal con-

cerns (8, 9). Under MOC, diplomates evidence continuing medical education and knowledge, as well as practice quality improvement. American Board of Radiology (ABR) MOC programs for diagnostic radiology, radiation oncology, and radiologic physics have been developed, approved by the American Board of Medical Specialties, and initiated with full implementation for all three disciplines beginning in 2007 (10, 11).

The overriding objective of MOC is to improve the quality of healthcare through physician-initiated learning and quality improvement—a response to public expectation for professional competence. The MOC has four components: professional standing (Part I), lifelong learning and periodic self-assessment (Part II), cognitive expertise (Part III), and evaluation of practice performance (Part IV) (5, 12). Descriptions of Parts I–III have been previously published (10, 11). We here address the ABR's Part IV component for radiation oncology.

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The key characteristics of Part IV include a physician-based response to demonstrate commitment to practice quality improvement, along with progress in continuing individual competence and clinical practice (13). How do we measure competence when practices are diverse and roles unique? The ABR's guidelines state that each diplomate must select a project or projects that can potentially improve the quality of their practice and enhance the quality of care—hence the name of the Part IV component: Practice Quality Improvement (PQI). We anticipate that most PQI projects will include most or all of the six general competencies of medicine defined for training and practice: medical knowledge, patient care, interpersonal and communication skills, professionalism, practice-based learning and self-improvement, and systems-based practice.

A central element of each PQI project is to provide evidence of a critical evaluation of meaningful aspects of an individual's performance in practice. Clearly, the ultimate goals of each individual diplomate, as well as all diplomates collectively, must be to achieve ongoing improvement of practice and to demonstrate competency as a physician (13).

Projects can be developed by the diplomates individually, by institutions or societies, or as a part of national registries. As we introduce PQI, no penalty results for the diplomate's failure to demonstrate improvement—as long as the PQI projects are meaningful. Early in its development, only failure to participate and/or comply with ABR's reporting requirements for PQI will be considered unsatisfactory Part IV performance.

MOC PART IV: PQI PROJECTS

Each diplomate is expected to maintain active, professional involvement in radiation oncology. The individual is expected to understand and participate in continuous quality improvement manifested by lifelong learning and periodic self-assessment. A basic knowledge set in contemporary radiation oncology is documented through the MOC cognitive

examination (see http://www.theabr.org/RO_home.htm). Radiation oncology Part IV (PQI) is met by completing three PQI projects during the 10-year period. Each project is to be characterized by a patient-based focus, identifiable metrics (preferably measured against established benchmarks), and self-assessment to include an action plan for quality improvement. One or two of the projects can be Type 1, individually based projects qualified by self-attestation; at least one of the projects must be a Type 2, society-based project with a more robust structure. Type 2 projects are qualified in advance by the ABR. As in all aspects of the MOC, the individual diplomate is responsible for maintaining reasonable documentation of their participation; such documentation is subject to random audit as a part of the Board's required demonstration of compliance within our field. A common goal for the ABR and the educational societies is to acquire anonymous aggregate data with which to develop national benchmarks for the field.

Type 1 projects

Type 1 projects build on common practice components to engage the physician in continuous quality improvement. Critical descriptors include a project that is relevant to clinical practice (a specific feature of practice chosen by the individual with quantifiable endpoints) and inclusion of both assessment by the individual and an improvement or action plan. Type 1 projects can reflect departmental or institutional quality improvement programs, adapted by the individual to include their personal assessment and improvement/action plan. The following are examples of hypothetical Type 1 projects that summarize some of the practice components we believe would be appropriate for PQI.

Proposed Type 1 project—National Protocol Enrollment.

A Type 1 project is envisioned for physicians enrolling patients on national protocols in which central quality assessment of radiotherapy includes feedback to the individual or department. A physician would identify a given

Table 1. Protocol enrollment as Practice Quality Improvement project

Critical element	Protocol enrollment
Relevance to patient care	Therapeutic protocols provide opportunity to assess agreed on parameters of "ideal" management in selected cancer settings
Relevance to individual's practice	Documents understanding of radiation oncology parameters; individual's interpretation and performance of target localization, treatment planning and delivery; departmental/system-based submission of required data; response to central quality assurance center if required
Metrics	Fully evaluable cases; specific deficits in treatment planning or delivery or in data submission (completeness, timeliness of required data); goal, 100% compliance
Results	Number of fully evaluable cases among five or more sequential case entries; specific reasons for partially or nonevaluable cases
Assessment	Performance of individual based on goal of 100% fully evaluable cases with which further knowledge or difference in practice can address identified deviations; departmental or institutional processes or procedures for which further physician input/oversight may eliminate deviations
Improvement/action plan to include reassessment	Individual educational efforts; changes in practice to better adhere to protocol requirements; interaction with departmental/institutional infrastructure to ensure full compliance with data submission; plan to reassess evaluability of enrolled patients within given interval (<i>e.g.</i> , 6, 12, or 18 months later)

Table 2. Self-review of prostate implants: postimplant dosimetric assessment

Critical element	Prostate implants: postimplant dosimetric assessment
Relevance to patient care	Physician expertise and technical factors in implantation influence postimplant dosimetry
Relevance to individual's practice	Results of postimplant dosimetry have been correlated with disease-free survival after prostate brachytherapy
Metrics	Dosimetric quantifiers, including V_{100} or D_{90}
Results	Median V_{100} or D_{90} and particularly percentage of cases at less than threshold value (<i>e.g.</i> , $V_{100} < 80\%$ or $D_{90} < 90\%$ prescription dose)
Assessment	Comparison of practitioner's results with recent published data (peer comparison)
Improvement/action plan	Individual educational efforts; changes in technique to ensure that most of prostate is encompassed by prescription dose (<i>e.g.</i> , use of stranded sources, intraoperative planning); plan to reassess dosimetric quantifiers after action plan implemented

Abbreviations: V_{100} = percentage of prostate volume receiving 100% of prescribed minimal peripheral dose; D_{90} = minimal dose received by 90% of target volume.

interval during which a series of consecutive cases have been entered, for which quality assessment reports have indicated cases as fully evaluable or show deviations in data submitted or technique or therapy as delivered. The individual would complete a database form defining and documenting elements such as those listed in Table 1. The ABR and specialty-related organizations will provide templates such as this that can be used by the individual to complete the PQI project, essentially providing their data related to each critical element, along with self-assessment and an action plan.

Proposed Type 1 project—Prostate Implants: Postimplant Dosimetric Assessment. A second Type 1 PQI example has been suggested by the American Brachytherapy Society (ABS) related to permanent source prostate brachytherapy (Table 2). The ABS, along with other organizations, has recommended that a postimplant dosimetric assessment be performed in all cases (14). Evidence is growing that dosimetric quantifiers (DQs) that can be easily generated after prostate brachytherapy are associated with the likelihood of cancer cure (15–19). DQs derived from multi-institutional cooperative group trials are now available that allow for normative comparisons (20). The ABS has pro-

posed that individual practitioners choose one of the DQ benchmarks and compare the results of the practitioner's last 25 cases with the normative results in the peer-reviewed publications. If the DQs are not consistent with the results of the peers, an action plan outlining possible technical improvements (use of stranded sources, intraoperative dosimetry) would be required. Even if the DQs are consistent with published standards, an action plan would be required. The ABS expects the prostate model to be a template for future proposals in breast and gynecologic brachytherapy.

Proposed Type 1 project—retrospective review. A third Type 1 project might focus on a retrospective review of treatment policies and/or outcomes related to a practitioner's practice in a specific disease setting (Table 3). As an example, practitioners could evaluate their treatment policies for postmastectomy irradiation, comparing their own treatment policies with the American College of Radiology (ACR) appropriateness criteria for postmastectomy irradiation (21). Implicit is that a reasonable proportion of the cases reviewed in a given department or institution reflect the individual's clinical practice and/or systems developed by, or with, the practitioner.

Type 1 projects can link directly to departmental or institu-

Table 3. Individual participant's participation in academic retrospective review relevant to individual practice or role in determining departmental/institutional policies and practice

Critical element	Postmastectomy radiotherapy policies
Relevance to patient care	Evaluation of specific patient-related treatment in radiation management of breast cancer after mastectomy
Relevance to individual's practice	Identifies whether practitioner's treatment policies in postmastectomy irradiation are in accordance with published ACR appropriateness criteria
Metrics	What percentage agreement with ACR appropriateness criteria is apparent in series or practitioner's component thereof
Results	What percentage of ≥ 10 consecutive cases within defined interval (within ≤ 3 y) are in accordance with guidelines outlined in ACR appropriateness criteria for postmastectomy irradiation (17)
Assessment	Goal is 100% compliance with appropriateness criteria with respect to indications for treatment, radiation volume, dose, fractionation, use of bolus, and other technical factors
Improvement/action plan	Individual educational efforts; changes in policy as may be indicated; in areas of noncompliance, individual will read appropriate published reports and modify practice pattern; physician should reassess within 3 years, using an additional sample to demonstrate improvement in compliance with appropriateness criteria

Abbreviation: ACR = American College of Radiology.

tional quality improvement programs. Required would be physician-specific data that might be benchmarked (compared within the department or the institution or with the national data when available), the individual's assessment of their own results, and an improvement or action plan with subsequent planned follow-up assessment. Examples include detailed departmental quality improvement programs related to the ACR standards for chart rounds with associated peer review; institutional quality improvement programs related to patient safety, medical documentation, and/or communication; multidisciplinary quality improvement programs related to patient care and management compared with accepted consensus- or evidence-based practice. Generic templates for such projects will be available through the ABR and/or specialty-related societies.

The diplomate will indicate the title of the PQI project, the date of initial completion, and the timeframe to document improvement or completion of the action plan on their Internet-based personal ABR repository; as with other aspects of MOC, the completed documentation will be subject to audit by the Board on a random basis.

Type 2 projects

Type 2 initiatives differ from Type 1 in that they are society or organization initiated and are reported through the sponsoring organization. Type 2 initiatives must meet

the fundamental elements of any practice quality improvement program. Furthermore, the program must have predetermined measurable endpoints, in which the measured baseline parameters are compared with evidence-based guidelines, consensus statements, or peer comparisons (21, 22). An action plan outlining how the diplomate will improve performance should be in place, as well as a follow-up plan to assess the effect of the improvement plan within the 3-year PQI project interval. Type 2 initiatives must be submitted by the sponsoring society or organization to the ABR for qualification.

Sponsoring societies or organizations interested in developing Type 2 initiatives should have at least a 3-year history of an established infrastructure and ≥ 10 members who are diplomates of the ABR. Societies are encouraged to develop programs in which the data collected can be organized into large anonymous aggregate databases that can serve to further establish national standards. These databases will provide future metrics and benchmarks of quality standards in radiation oncology.

To date, two societies, the ACR and the American Society for Therapeutic Radiology and Oncology (ASTRO), have submitted Type 2 programs for qualification by the ABR. The ACR's RO-PEER program and the American Society for Therapeutic Radiology and Oncology's Performance Assessment for the Advancement of Radiation On-

Table 4. Outline of critical elements of available Type 2 programs

Critical element	ACR RO-PEER	ASTRO PAAROT
Relevance to patient care	Evaluation of direct patient care through chart review as component of ACR facility review or independent review of diplomate's submitted cohort of consecutive patient records	Evaluation of direct patient care through chart review of 10–15 randomly selected charts
Relevance to individual's practice	Sample of individual practitioner's charts reviewed for adherence to established standards	Sample of individual practitioner's charts reviewed for adherence to established standards
Metrics	Metrics from ACR's practice guidelines and standards for radiation oncology evaluated in each chart; evaluation conducted by independent peer radiation oncologists; professional/patient satisfaction survey included	Recognized parameters evaluated by individual practitioner by responding to specific questions for each chart; Internet-based program includes individual's distribution of professional/patient satisfaction surveys
Results	Goal is 100% compliance with practice guidelines and standards and to benchmark to aggregate peer data from ACR practice accreditation program and the Patterns of Care studies	Practitioner's answers and survey results will be compared with ideal answers and, ultimately, to aggregate peer data compiled through this process
Assessment	Individual will be scored for compliance in selected areas	Based on how practitioner varies from ideal answers, areas for improvement will be identified
Improvement/action plan	Areas of noncompliance will be identified and practitioner will develop plan for improvement; future consideration of time-specific reassessment will document improvement in areas of noncompliance over time	Practitioner will formulate plan for improvement, and repeat measurement will occur at fixed interval from initial assessment

Abbreviations: ACR = American College of Radiology; ASTRO = American Society for Therapeutic Radiology Oncology; PAAROT = Performance Assessment for the Advancement of Radiation Oncology Treatment.

cology Treatment (PAAROT) are both chart-based reviews in which specific parameters are measured at baseline and compared with predetermined standards. The features of the two programs yet in development are summarized in Table 4.

Currently, these two programs evaluate the diplomate's practice at a fixed point in time, but incorporate an improvement plan and method for reassessment of the improvement plan. It is anticipated that the Type 2 initiatives will provide an opportunity for reassessment over an approximate 3-year cycle. Such data will be a valuable resource to the diplomate, documenting improvements in the individual's practice, as well as improvements in overall quality of care.

THE ABR, THE DIPLOMATE, AND MOC

Dramatic change has occurred in the relationship of the diplomate to the ABR. In the past, interaction occurred only during and immediately after residency for the four examinations: physics, biology, clinical, and oral. Now, the relationship between a radiation oncologist and the ABR will begin in residency and continue throughout professional life. The relationship will be maintained through frequent electronic communication of MOC updates, tracking key milestones of progress through the MOC cycle, and reminders to document requisite activity in which the diplomate may be falling behind.

The ABR is committed to providing a Web-based system for diplomates to access current information about MOC requirements and record their own progress. The ABR Website enables diplomates to access specialty-specific information and resources about MOC, the four components, six competencies, and all requirements, examinations, and fees. The password-protected ABR personal database will be each diplomate's center for personalized information about MOC requirements and a registry for documenting MOC progress. Within their personal database, the individual will be able to record participation in educational activities, attest to the fulfillment of various requirements (*e.g.*, continuing medical education from sources not linked to the ABR, participation in PQI projects), update personal information, pay fees, and register for examinations.

Near-future plans call for linkages between the ABR and societies sponsoring continuing medical education credit, Self-Assessment Modules (SAMs), and PQI projects. These links, individually activated with permission of the diplomate, will allow for the transmission of credits and PQI participation directly into the individual's ABR personal database. As part of the Board's responsibility, random audits will confirm documentation for life-long learning, self-assessment, and PQI projects. Audited diplomates will be required to provide original documentation (paper or electronic) for continuing medical education, self-assessment, and PQI. All MOC activities listed through formal links with major educational

societies will be regarded by the ABR as validated—requiring no further documentation during any audit process.

ROLE OF SPECIALTY SOCIETIES

Radiation oncology-related societies play a unique role as they serve their members by advancing the science and practice of their subspecialty. The societies help promote quality in practice. Their multiple and potentially expanded roles include, but are not limited to

Educational courses or SAMs concerning PQI

Workshops on topics of PQI

Identification of key PQI focus areas and potential metrics

Development of tools or project templates for their members

DEVELOPMENT OF NATIONAL DATABASES RELATED TO PRACTICE OF RADIATION ONCOLOGY

The development of national databases related to practice parameters in radiation oncology is an important future goal for those societies participating in the PQI process. National databases of practice parameters are valuable tools in optimizing the practice of medicine for our patients—they allow each radiation oncologist to benchmark their own personal practice against evidence-based data (*e.g.*, consensus statements, major prospective clinical trials, data from Quality Research in Radiation Oncology, formally Patterns of Care Study) (22). The need for pooled, anonymized PQI results to allow benchmarking represents an opportunity for collaboration among all radiation oncology-related societies to establish national databases for the benefit of our patients, our specialty, and all of medicine.

CONCLUSION

The MOC Program is the physician's response to societal concerns about the quality of medical practice. MOC provides a means for diplomates of the ABR to confirm a continuing effort to maintain competency and improve the quality of practice. Radiation oncology has been in the forefront of documenting practice standards for the specialty but is only now addressing what we do individually—documenting our individual levels of ongoing education and quality improvement in clinical care (22). With PQI, we have an opportunity to document and improve the individual practitioner's standard of care. PQI is the final component of MOC to be developed by the ABR. Although aspects of PQI are still best described as "works-in-progress," by providing examples of Type 1 and Type 2 PQI projects, we hope to further the understanding of the ABR's MOC program. PQI projects use common practice metrics to document practice performance in a manner linked to continuous quality improve-

ment. In summarizing the state of the ABR's effort at this point, we seek to broaden the understanding of PQI and encourage active participation of all certified radiation oncologists—those who have and will automatically enter MOC on successful completion of their initial certi-

fying examinations (all diplomates who obtained Board certification after 1994) and those holders of lifetime certificates who wish to engage in a personally rewarding, publicly visible process for ongoing quality improvement (23).

REFERENCES

1. Kohn LT, Corrigan JM, Donaldson MS. To err is human: Building a safer health system. Washington, DC: National Academy Press, 2000.
2. Institute of Medicine. Crossing the quality chasm: A new health system for the 21st century. Washington, DC: National Academy Press, 2001.
3. Rosenberg RN. Translating biomedical research to the bedside: A national crisis and a call to action. *JAMA* 2003;289:1305–1306.
4. McGlynn EA, Asch SM, Adams J, *et al.* The quality of health care delivered to adults in the United States. *N Engl J Med* 2003;348:2635–2645.
5. Steinbrook R. Renewing board certification. *N Engl J Med* 2005;353:1994–1997.
6. Miller SH. American Board of Medical Specialties and repositioning for excellence in lifelong learning: Maintenance of certification. *J Contin Educ Health Prof* 2005;25:151–156.
7. Stevens RA. Public roles for the medical profession in the United States: Beyond theories of decline and fall. *Milbank Q* 2001;79:327–353.
8. Brennan TA, Horwitz RI, Duffy FD, *et al.* The role of physician specialty board certification status in the quality movement. *JAMA* 2004;292:1038–1043.
9. Miller SH. ABMS' Maintenance of Certification: The challenge of continuing competence. *Clin Orthop Relat Res* 2006;449:155–158.
10. Madewell JE, Hattery RR, Thomas SR, *et al.* American Board of Radiology: Maintenance of Certification. *Radiology* 2005;234:17–25.
11. Kun LE, Ang K, Erickson B, *et al.* Maintenance of Certification for radiation oncology. *Int J Radiat Oncol Biol Phys* 2005;62:303–308.
12. Cassel CK, Holmboe ES. Credentialing and public accountability: A central role for board certification. *JAMA* 2006;295:939–940.
13. Baron RJ. Personal metrics for practice—How'm I doing? *N Engl J Med* 2005;353:1992–1993.
14. Nag S, Bice W, DeWyngaert K, *et al.* The American Brachytherapy Society recommendations for permanent prostate brachytherapy postimplant dosimetric analysis. *Int J Radiat Oncol Biol Phys* 2000;46:221–230.
15. Kollmeier MA, Stock RG, Stone N. Biochemical outcomes after prostate brachytherapy with 5-year minimal follow-up: Importance of patient selection and implant quality. *Int J Radiat Oncol Biol Phys* 2003;57:645–653.
16. Papagikos MA, Deguzman AF, Rossi PJ, *et al.* Dosimetric quantifiers for low-dose-rate prostate brachytherapy: Is V(100) superior to D(90)? *Brachytherapy* 2005;4:252–258.
17. Potters L, Huang D, Calugaru E, *et al.* Importance of implant dosimetry for patients undergoing prostate brachytherapy. *Urology* 2003;62:1073–1077.
18. Stock RG, Stone NN, Tabert A, *et al.* A dose-response study for I-125 prostate implants. *Int J Radiat Oncol Biol Phys* 1998;41:101–108.
19. Wallner K, Merrick G, True L, *et al.* ¹²⁵I versus ¹⁰³Pd for low-risk prostate cancer: Preliminary PSA outcomes from a prospective randomized multicenter trial. *Int J Radiat Oncol Biol Phys* 2003;57:1297–1303.
20. Lee W, Bae K, Lawton C, *et al.* A descriptive analysis of postimplant dosimetric parameters from Radiation Therapy Oncology Group P0019. *Brachytherapy* 2006;4:239–243.
21. Taylor ME, Haffty BG, Shank BM, *et al.* Postmastectomy radiotherapy: American College of Radiology—ACR appropriateness criteria. *Radiology* 2000;215(Suppl.):1153–1170.
22. Wilson JF, Owen J. Quality research in radiation oncology: A self-improvement initiative 30 years ahead of its time? *J Am Coll Radiol* 2005;2:1001–1007.
23. Brennan TA. Recertification for internists—One “grandfather's” experience. *N Engl J Med* 2005;353:1989–1992.