In 2007, the ABR established and implemented Maintenance of Certification (MOC) as a way to ensure radiologists’ licensure and competency and to promote lifelong learning. MOC was required for all radiologists receiving diagnostic radiology certificates starting in 2002. Those who graduated before 2002 were “grandfathered” in and not required to participate (although participation is strongly encouraged by the ABR [1]).

The 4 components of MOC are (1) Evidence of Professional Standing, (2) Lifelong Learning and Self-Assessment, (3) Cognitive Expertise, and (4) Practice Quality Improvement (PQI)[2,3].

When MOC was established, completion of 1 PQI project was required; however, in 2008, this requirement was increased to 3 PQI projects per 10-year MOC cycle.

Therefore, for the first 10-year MOC cycle for those who graduated from 2002 to 2007, one completed PQI project is required for the first MOC cycle, whereas those who graduated from 2008 to 2011 must complete 3 projects for the first 10-year cycle. Beginning in 2012, graduating diplomates will participate in continuous certification. As per the ABR 2012, there will likely be a transition to continuous certification which will include periodic, more frequent “look-backs” that will require completed PQI projects at a to-be-determined interval, likely one project every 3 years.

Graduates who hold certificates of added qualification (CAQs), regardless of the year of graduation and attainment of their diagnostic radiology certificates, are required to participate in MOC to maintain their CAQs. After the initial attainment of CAQs, individuals enter into a 10-year MOC cycle on the basis of the year in which the CAQs were obtained. These diplomates will also be transitioned into continuous certification.

Like most institutions, my hospital’s large urban radiology department had no preexisting formal MOC or mentor programs to help junior faculty members in the process of certification. Senior department leadership was grandfathered into MOC and was not very familiar with the new requirements. I was tasked with setting up...
a PQI program for the radiology department. A robust quality program was already in place, along with a top-notch IT section with which to work. Initial projects that included elements of quality improvement had been led by a senior research faculty member, whose departure led to a series of efforts to reevaluate and restructure the quality program, including a more vigorous PQI focus to respond to MOC requirements.

CREATING A PQI PROGRAM
Creating a PQI program involves establishing basic goals that, when met, will best benefit a department’s needs. Developing a PQI system that promotes quality improvement will benefit the individuals involved, the department, and the institution. Much good can come from these projects: improved patient safety, increased efficiency and throughput with resultant cost savings, improved outcomes, and revenue generation [4-7]. In addition, these efforts ensure that faculty members and trainees understand the importance of quality efforts in daily practice. The program must be workable in and customized to the department’s environment, and those participating must buy in and play an active role [8-9]. How then does one begin to establish a PQI program? Following are 6 steps to consider.

Step 1: Identify Coordinators and Mentors
Step 1 involves identifying individuals to coordinate and to serve as mentors for the PQI program. The individuals involved in coordinating the program should be enthusiastic about quality in general and PQI in particular. A committee may be formed and should include both junior and senior faculty members. The reason for creating a committee is straightforward: one person cannot do it all alone. The undertaking is not trivial, and others are needed to share the work involved in establishing the main components of the system and in completing the necessary tasks. It is also tremendously helpful to have representatives of different clinical sections assist with faculty compliance and to educate and communicate effectively about the program.

The head of the quality program, the residency program director, and a head departmental administrator are helpful as senior advisors. The core working group may comprise more junior faculty members, including those for whom MOC is required. At our institution, we selected a committee with representatives from 5 different clinical sections; some are recent graduates, and some are nearing the end of their 10-year MOC cycles. It is important to include an informatics representative on the committee because IT is a strategic and important component of any PQI program. PQI projects that are heavily reliant on IT resources can stagnate when IT support and funding are insufficient. Having a specific IT point person to approve and commit resources to projects and to advise on realistic project achievability is necessary for a successful program.

Step 2: Educate Faculty Members, Fellows, and Residents
Step 2 involves educating faculty members, fellows, and residents on current requirements and guidelines for PQI and ways in which those requirements can be fulfilled. Current PQI requirements should be reviewed with faculty members to ensure that all individuals are familiar with their own personalized requirements for MOC. For those graduating from 2002 to 2011, currently in a 10-year cycle, requirements specify a minimum number of completed PQI projects per MOC cycle. However, PQI is intended to be an ongoing, active process and each individual should be continuously involved in some ongoing PQI activity. Therefore, for these individuals, involvement in 3 projects in the first 5 years, for example, does not mean that the individual is finished with PQI for the remaining 5 years of the cycle. Although the individual may have met the minimum requirement, that individual must continue to have active involvement in some form of PQI for the last 5 years of the cycle as well. For these reasons, the ABR has proposed a target schedule of 1 completed project every 3 years of the 10-year cycle, with year 1 focused on learning about PQI. For 2012 graduates and thereafter, continuous PQI involvement will be monitored through periodic lookbacks.

Residents have a similar requirement called Systems-Based Practice (SBP). They are required by the Diagnostic Radiology Residency Review Committee of the ACGME to participate in one SBP project during residency. This project can vary slightly from a PQI project; however, for the purposes of this discussion, PQI includes both PQI and SBP projects.

Once faculty members, fellows, and residents are made aware of the PQI requirements, it is helpful to educate them on the basics of PQI. PQI can be simply defined as any measurable activity that results in improved patient safety and outcomes or promotes efficiency in daily practice [10-15]. Five categories for PQI have been delineated by the ABR: patient safety, accuracy of interpretation, report turnaround time, practice guidelines and technical standards, and referring physician surveys. Every PQI activity should fit into one (and sometimes more than one) of these categories.

There are different methods for designing PQI projects [16]. One approach includes specific steps, including problem identification, baseline data collection and analysis, improvement plan creation and implementation, and postplan data collection, analysis, and comparison to baseline data (Figure 1). After analyzing the results of the implemented plan, the project may be completed or may be continued when more improvement is needed. The ABR has provided information and resources on PQI to
help diplomates design acceptable PQI projects, available on the ABR’s Web site.

A project should focus on a specific quality issue or problem and must also be specific to the individual’s own practice. The scope of a project should be realistic and achievable within a reasonable time frame. A project must also stay within budget and be consistent with IT and other resource constraints in the department and institution.

PQI projects may involve only a single individual or may include multiple members, an entire clinical section, or even an entire department, as long as all involved play an active and meaningful role. ABR–approved PQI project templates have been created by a number of organizations, including but not limited to the RSNA, the ARRS, the Society of Interventional Radiology, and the ACR, and are available to members within these organizations. In addition, the ABR has provided a number of resources that offer project templates on its Web site (http://www.theabr.org/moc-dr-comp4).

Those creating PQI programs should consider offering training on PQI basics. This training should review the requirements, categories, and approaches to PQI; provide concrete examples that demonstrate PQI; share selected ongoing and completed projects (and give these projects and their teams appropriate recognition); and provide useful information and resources for faculty members. Many helpful articles, Web sites, and presentations are available to help demystify PQI. Many can be found on the ABR’s Web site, including helpful basic information, articles, and presentations. These resources can be made accessible to faculty members and residents through a departmental Web page or as hard copies compiled in binders. It is also helpful to show what has been done previously within the institution. Past PQI projects may be continued or “recycled” if more improvement is needed. Therefore, a repository of past projects and quality efforts within the institution may be helpful. Creating such a repository that includes multiple disciplines may be especially helpful in extending productive efforts in radiology to other disciplines and vice versa. Collaboration with radiology departments in other institutions to share project ideas and templates can also provide new opportunities and venues for presentation.

An introduction to PQI will be useful for all new faculty members and residents during routine orientation and should include an introduction to the program, sufficient information so that participants can judge where they stand with past experience in PQI, and steps to identifying and becoming involved with projects. PQI can also be an important component in the existing department quality program, in addition to a formal MOC program.

**Step 3: Identify Problems in Need of Quality Improvement for PQI Projects**

Many PQI projects will stem from a personal interest, need, incident, or experience. These are the most common and often the best sources of purposeful, meaningful projects. However, many additional sources of ideas for PQI projects should be considered.

Routine day-to-day discussions involving practice issues can serve as potential sources for the generation of project ideas. PQI leaders should consider ways to coordinate and document ideas to share with the faculty members and residents, as these may spark ideas for PQI projects. These quality issues and potential project ideas can be posted to a Web page or organized in a binder. Quarterly online newsletters or PQI conferences with updates on PQI activities in the department are useful. Faculty members should have accessible and easy-to-use methods for submitting quality issues, such as a link on the PACS monitor to an external Web page with a submissions page or comment and suggestion boxes placed around the department.

We have created a “departmental quality issues and potential PQI project idea” Web page at our institution. On this page, we list ongoing quality issues, ideas for projects, and projects that are in the development stage and have not yet been formally submitted to the committee for approval. Projects in need of participants are also listed on this page by category for faculty members, residents, or support staff (Table 1).

**Step 4: Create Projects and Improvement Plans**

Step 4 involves helping individuals craft acceptable, achievable projects and improvement plans. The committee serves to provide guidance and advice during the creation phase of PQI projects. Linkage is one of the major roles of the committee; groups and teams should be brought together so that each project has adequate representation. Some projects will require support staff, administrators, or IT staff, and the committee can pro-
vide the linkage between faculty members and residents and these staff members. We try to have at least one faculty member and one resident on each major PQI project so that we maximize involvement and credit earned by residents and faculty members for completed projects. Linkage is made by personal referral as well as through our PQI Web page. Faculty members, residents, and staff members can visit this page and see where people are needed and make appropriate contacts when they are interested in joining a project.

Each project should be reviewed by the committee not only to ensure that it is appropriate for PQI but also to address necessary funding or other support that may be needed. To facilitate this process, an application document is important and can serve several purposes. First, this will ensure that the committee is aware of all the ongoing projects and provide the basis for an organized catalog of departmental projects. Second, these documents can help individuals conceptualize and formulate an organized approach to their projects and work through their intended timelines and PQI cycles. Third, these documents will allow the committee to review projects to ensure that they are valid and justifiable and offer assistance when revision is needed. Finally, they identify projects that need monetary, IT, or other resource support and allow for this to be allocated prospectively. These documents should be clear, concise, and as simple as possible. A single-page document, easily accessible and with clear instructions, is optimal. For an example of a basic application, see Figure 2. The ABR has provided PQI recording templates to help guide both individuals and groups in planning PQI projects. These documents are available on the ABR’s Web site.

At our institution, these documents are accessible on the departmental PQI Web site. Completed documents are submitted to the committee for review. If deemed acceptable by the committee, the project is then listed as an ongoing PQI project on the Web page, and the application is filed. If revision is necessary, a committee member will work with the team to revise the project plan. Committee members can serve as mentors on PQI projects. Therefore, they should be familiar and comfortable with PQI project design and requirements and knowledgeable about PQI resources.

**Step 5: Devise Methods to Monitor Ongoing Projects**

In our experience, most projects last approximately 6 months to 2 years. However, because PQI involvement should be continuous throughout the MOC cycle, the duration of a project can be longer. As discussed previously, ABR target goals are approximately 1 project every 3 years.

Monitoring projects is dependent on the level and degree of oversight that is necessary and appropriate for the particular institution and practice. Participants may give regular updates on their progress, perhaps quarterly, or oversight may be minimal. Updates can be informal (via e-mail or in person) or more formally documented. However, it is important for the committee to be aware of all projects that are ongoing and to be available for any advisement needed. Updates also allow project teams to

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**Table 1. Quality issues and potential PQI projects**

<table>
<thead>
<tr>
<th>Quality Issues and PQI Project Ideas by Category</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ongoing departmental quality issues</td>
<td>List of major quality issues, gathered from meetings, conferences, suggestions, and systems tracking tool (Radtracker)</td>
</tr>
<tr>
<td>PQI project ideas</td>
<td>List of potential projects</td>
</tr>
<tr>
<td>Potential projects</td>
<td>Projects that are being developed but not yet approved</td>
</tr>
<tr>
<td>PQI projects in need of participants</td>
<td>Projects in need of participants, broken down by resident, faculty member, or staff member needed categories</td>
</tr>
</tbody>
</table>

Note: PQI = Practice Quality Improvement.
reassess their needs. Some projects will require funding or IT support that was not anticipated at the start of the project, and these needs can be assessed and addressed at the time of update. At our institution, once a project is approved, it progresses with minimal oversight. The committee is available for advisement or support whenever necessary. The committee chair checks in with project leaders quarterly to make sure that projects are progressing as expected.

Ongoing projects may be presented and discussed at departmental quality or faculty meetings. This is an excellent way to expose and recognize not only specific individuals and their quality projects but departmental efforts as a whole. This discussion and exposure will also inform faculty members and residents of projects that might be of interest to them, in addition to fulfilling the Diagnostic Radiology Residency Review Committee requirement for residents to present their SBP projects at local or national meetings.

A log of ongoing and completed PQI projects can serve as a useful database for tracking participants’ PQI requirement as part of MOC. This can easily be incorporated into a formal MOC program with organized internal departmental tracking of the 4 components of MOC for each faculty member. This may be complementary to or incorporated into the institutional MOC program being piloted by the ABR in March 2012, with full launch targeted for the fall of 2012.

**Step 6: Document PQI Efforts**

Step 6 involves providing internal documentation of PQI efforts for faculty members and residents. Each project leader should be responsible for providing written documentation to the committee when the project is completed. This allows the committee to review each project to ensure completion of the PQI cycle. In addition, it provides a means of tracking and monitoring all PQI projects and activities within the department. This completion document will also serve as internal institutional documentation of PQI efforts, aside from the documentation required in the personal database through the ABR. The document can be simple and should include project details, purpose, outcomes, and designated category of PQI.

The form is filled out at the completion of the project, and a hard copy may be placed in the resident or faculty member’s portfolio, in addition to being filed with the committee. When projects are completed, they are moved from the “ongoing PQI projects” to the “completed PQI projects” list on a separate Web page. This completed project list serves a few purposes. It displays PQI efforts and successfully completed projects within the department, which is important in demonstrating commitment and efforts in quality. Individuals may also use this Web page to check what has been done in the department to either continue past projects or spark an idea for a new project. Graduates and alumni are also able to access information about past PQI efforts on this page.

The committee should review the outcomes of each project and the impact of each improvement plan. These results can be meaningful and should be given recognition within the department and institution. Because residents are required to present their projects at a meeting (national, state, or institutional) per ACGME guidelines, teams should be encouraged to present their projects at departmental quality or faculty meetings. Positive changes and improvement that have come from PQI projects can be highlighted.

**CONCLUSIONS**

The following should be considered when setting up a PQI program. First, the system should be as easy and as user friendly as possible. Complicated forms, hard-to-use resources, and unclear directions and definitions will only make potential participants avoid the program. The goal should be to create a simple, understandable, and approachable system with opportunities to become involved. Second, support from the top levels of the department is necessary. The support of the department chair is critical to facilitate sufficient academic time to organize and run a PQI program and to ensure faculty compliance. Third, committee members who are enthusiastic and knowledgeable about PQI should be selected so that they can also advise on projects. Administrative and IT support to keep the system running and up to date must be secured. Running a PQI program, no matter how well organized, is labor intensive; one person cannot do it alone. Last, the program should be modeled around the specific needs of the institution. One size does not fit all.

Much potential good can come from the PQI component of MOC, including the routine integration of quality improvement into daily practice. Improvements in quality and efficiency may also result in additional revenue and positive recognition from the larger institution or external groups. The importance of supporting faculty members through the MOC process cannot be underestimated.

**TAKE-HOME POINTS**

- PQI is part IV of MOC, required for all ABR diplomates graduating in 2002 and later. In addition, all diplomates with CAQs must also participate in MOC.
- The establishment of a PQI system can help faculty members meet this requirement in addition to improving practice quality and systems.
- The major components of a system include formation of a PQI committee, faculty education, problem identification, linkage, advisement, and project documentation.
- Support from the top levels of the department is necessary.
• Each system must be tailored to the specific needs of the institution.

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REFERENCES