American Board of Medical Specialties Maintenance of Certification: Theory and Evidence Regarding the Current Framework

Richard E. Hawkins, MD; Rebecca S. Lipner, PhD; Hazen P. Ham, PhD; Robin Wagner, RN, MHSA; Eric S. Holmboe, MD

The American Board of Medical Specialties Maintenance of Certification Program (ABMS MOC) is designed to provide a comprehensive approach to physician lifelong learning, self-assessment, and quality improvement (QI) through its 4-part framework and coverage of the 6 competencies previously adopted by the ABMS and the Accreditation Council for Graduate Medical Education (ACGME). In this article, the theoretical rationale and exemplary empiric data regarding the MOC program and its individual parts are reviewed. The value of each part is considered in relation to 4 criteria about the relationship of the competencies addressed within that part to (1) patient outcomes, (2) physician performance, (3) validity of the assessment or educational methods utilized, and (4) learning or improvement potential. Overall, a sound theoretical rationale and a respectable evidence base exists to support the current structure and elements of the MOC program. However, it is incumbent on the ABMS and ABMS member boards to continue to examine their programs moving forward to assure the public and the profession that they are meeting expectations, are clinically relevant, and provide value to patients and participating physicians, and to refine and improve them as ongoing research indicates.

Key Words: *maintenance of certification, program planning/curriculum development, profession-physicians*

Introduction

In 2000, the American Board of Medical Specialties (ABMS) and its member boards formally adopted Maintenance of Certification (ABMS MOC) as a means of assuring physician engagement in self-assessment, lifelong learning and continued performance improvement. ABMS MOC represented a significant change in physician professional self-regulation, acknowledging that periodic assessment is necessary to assure the public that physicians are maintaining their clinical competence and providing high-quality care throughout their practice career. ABMS MOC is designed to provide a comprehensive approach to physician lifelong learning, self-assessment, and quality improvement (QI) through its 4-part framework and coverage of the 6 competencies previously adopted by the ABMS and the Accreditation Council for Graduate Medical Education (ACGME).[1]

Although feedback from various stakeholders has encouraged continued enhancement and increased rigor with regard to MOC standards, the ABMS and its member boards also receive criticism regarding the perceived financial and time burden of MOC requirements, unnecessary redundancy with other professional and regulatory requirements, and lack of relevance to physicians' clinical practices. Such criticism is

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Dr. Hawkins: Vice President, Medical Education Programs, American Medical Association; *Dr. Lipner:* Senior Vice President, Evaluation, Research and Development, American Board of Internal Medicine; *Dr. Ham:* Vice President, Global Initiatives, American Board of Pediatrics; *Ms. Wagner:* Vice President, Clinical Learning Environment Review, Accreditation Council for Graduate Medical Education; *Dr. Holmboe:* Chief Medical Officer and Senior Vice President, American Board of Internal Medicine.

Correspondence: Richard E. Hawkins, American Medical Association, 330 N. Wabash Ave. Suite 39300, Chicago, IL 60611; e-mail: richard.hawkins@ama-assn.org.

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often delivered in association with questions, or skepticism, regarding the evidence base supporting MOC.[2–4]

The primary purpose of this article is to explore the theoretical underpinnings of MOC, exemplified and supported by research evidence relevant to the individual elements of MOC as outlined below. Development of the evidence base in support of MOC is conceptually similar to validation of an assessment method, and involves 2 related, sequential processes.[5] First, a sound theoretical rationale supported by empiric data should define the need for development of the MOC program and substantiate its initial structure—evidence should determine that such a program is necessary and its initial components are sensible based on theory and evidence. Second, once the program is implemented, it is incumbent on its developers to gather evidence to determine whether the program is performing as it should, and to inform its continued improvement.

Evidence of the Need for MOC

Several sources of evidence suggest the need for a program, such as MOC, to support physician lifelong learning and health care quality improvement. Although delivery system problems are unquestionably important in affecting health care quality and safety, physician competence and performance deficits are also critical factors in medical errors and poor-quality health care.[6] It has been estimated that 6%–12% of physicians fail to maintain professional standards of practice at any given time.[7] Physician peers, as well as medical educators and regulators, point out numerous competency areas that are in need of improvement among their physician colleagues.[8] Evidence stemming from a large study encompassing 12 metropolitan areas demonstrates that patients in the United States receive about 50% of the care that is indicated for their acute and chronic medical conditions.[9] More recent work suggests slow and inconsistent improvement in health care quality in the past decade.[10] A systematic review of 62 studies showed that, on average, physician knowledge, skills, compliance with evidence-based process of care, and patient outcomes, tend to decline as a function of time from initial training.[11] Additionally, the incidence of adverse licensure actions increases as a function of time in practice.[12,13]

The above research supports the potential value of an assessment process to support physician lifelong learning and health care quality improvement. All physicians would benefit from such a process, especially as they get further from initial training. Although much of the research cited summarizes mean findings relative to the different performance elements measured, it is likely there is a spectrum of higher and lower levels of physician performance contained within the studies. In the absence of objective data, it is not possible to provide feedback to physicians regarding their position within that spectrum. Furthermore, given that physicians across the continuum of education and practice are unable to accurately identify their strengths and weaknesses within a range of competencies relevant to patient outcomes, all physicians—regardless of where they fall on the spectrum of competence—can benefit from meaningful assessment processes.[14,15]

Theoretical and Empirical Foundations: MOC Parts I–IV

Having demonstrated the potential value of a program such as MOC, the next step is to determine whether the elements of the MOC program are sensible with regard to their focus on physician competence and performance domains that impact quality of care and patient outcomes. In this regard, the discussion is organized around the 4 parts of MOC and the individual assessment and educational approaches contained therein. TABLE 1 summarizes the 4 parts of MOC, including the required and development standards adopted in 2009 by the ABMS board of directors. Developmental standards are not immediately required for implementation; the ABMS and member boards are expected to study the reliability and validity of practice context-relevant instruments for up to a 5-year period before making a decision. The far right column lists the primary competencies that would be covered by the methods listed within each Part of MOC (including those methods considered developmental standards). For MOC Parts I, III, and IV, the primary assessment components of MOC, the discussion addresses the following fundamental questions, which may be viewed as criteria to help determine whether a particular assessment method is appropriately included in the initial MOC framework:

1. Are the domains targeted by the assessment method identified as important by the medical profession and associated with quality of care and/or health outcomes?
2. Does research demonstrate that physicians underperform in the domains targeted by the assessment methods?
3. Does research support the validity of the proposed methods in assessing the target domain?
4. Do physicians find the feedback from the particular assessment to be credible and/or is there evidence that physicians learn or improve their practice performance based on feedback from the assessment?

Part II includes the primary learning component of the MOC program (although many of the boards' Part II components include self-assessment as part of the learning activity): the discussion summarizes existing literature regarding the value of continuing medical education (CME) that incorporates evidence-based assessment and learning formats. At the end of each section of the discussion, a summary paragraph will comment on the strength of the theoretical rationale

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TABLE 1. Maintenance of Certification Standards[a]

Part	Title	Standards		
		Required	Developmental[b]	ABMS/ACGME Competency[c]
I	Licensure and Professional Standing	Maintain a valid, unrestricted medical license	Communication Core CAHPS Patient Survey (or equivalent survey that addresses communication) at least every 5 years	Interpersonal and Communication Skills Professionalism Patient Care
			An approved Peer Survey at least every 5 years	Professionalism Patient Care Systems-Based Practice
II	Lifelong Learning and Self-Assessment	At least an average of 25 CME credits per year (averaged over 2–5 years)	A patient safety self-assessment program early in the MOC cycle and a minimum of once per MOC cycle	Individual educational activities may target any or all of the 6 competencies
III	Cognitive Expertise	A secure examination to assess cognitive skills at periodic intervals[d]		Medical knowledge
IV	Practice Performance Assessment	Participation in practice assessment and quality improvement every 2–5 years		Patient Care Practice-Based Learning and Improvement Systems-Based Practice

[a]Based on standards approved by the ABMS Board of Directors March 2009 (www.abms.org/.../Standards_for_ABMS_MOC_Approved_3_16_09.pdf).
[b]Developmental Standard: Not immediately required; to be piloted, tested for feasibility, and reevaluated in no more than 5 years.
[c]Primary competency covered by each part and method (although individual methods may assess other competencies to a variable extent).
[d]Requirement for diplomate participation in secure examination unchanged from previous standards.
ABMS = American Board of Medical Specialties; ACGME = Accreditation Council for Graduate Medical Educations; CAHPS = Consumer Assessment of Healthcare Providers and Systems; CME = Continuing Medical Education; MOC = Maintenance of Certification.

and evidence for the method(s) discussed and suggest implementation strategies and directions for future research as appropriate.

MOC Part I

Patient Surveys. Patient ratings of physician communication and patient-reported experiences of health care provide a means to assess and provide feedback to physicians on the quality of health care services provided. Inclusion of such assessments within ABMS MOC is supported by research on patient–physician interactions that underscores the relationship between communication skills and patient outcomes. Relevant skills include participatory decision making, clear communication of information, and responsiveness to patient questions and concerns. Research demonstrates that physician communication skills affect patient satisfaction, perceived functional status and quality of life, adherence to treatment, engagement in self-management, utilization of health care resources, and measurable outcomes such as glucose control and blood pressure.[16–23] Most (76%) medical diagnoses are ascertained during the patient interview—thus underscoring the importance of the data gathering elements of physician communication.[24] In addition to affecting patient outcomes, physician communication skills are also linked with important physician-related outcomes such as the likelihood of malpractice litigation and adverse actions by state licensing boards.[8,25,26]

Research studies document physician underperformance with regard to communication skills. For example, physicians often interrupt their patients during the medical interview, thereby affecting the patient's ability to ask questions and adequately express his or her concerns.[27,28] When engaging patients in informed decision making, both primary care physicians and surgeons often omit key elements necessary for patient understanding.[29] Research also shows

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that physicians often miss clues regarding the patient's emotional concerns.[30] In one study, physicians missed 70% of the opportunities for empathic responses during patient interviews.[31]

The availability of valid assessments of interpersonal and communication skills is important given concerns regarding the inaccuracy of physician self-assessment.[14,15,32] Research exists on several tools designed to assess physician interpersonal and communication skills and patient experience of care, including the American Board of Internal Medicine (ABIM) Patient (and Peer) Assessment Module (replaced by condition-specific surveys within ABIM Practice Improvement Modules, discussed below); the Physician Assessment and Review System (PARS) of the College of Physician and Surgeons of Alberta, Canada, which integrates patient feedback into a multisource feedback instrument; and the various Consumer Assessment of Healthcare Providers and Systems (CAHPS) tools. ABIM offered the Patient and Peer Assessment Module as an elective self-evaluation component with their recertification program. Research on its use demonstrates sufficient reliability (generalizability coefficient = 0.67) as an improvement-focused tool. Although the results are modestly impacted by patient health, physician gender, and duration of care, physicians find the feedback to be helpful. In one study, 42% of the physicians indicated intent to change their communication behaviors, including intent to provide more complete and understandable explanations and discuss options more fully with patients.[33] Similarly, physicians in multiple specialties find the patient feedback component of the PARS instrument to be credible and helpful in identifying opportunities to improve their communication skills.[34–37]

When examining the impact of various assessments, research on improving physician interpersonal and communication skills yields mixed results. Three systematic reviews suggest that interventions focused on training or feedback can result in improved communication skills and patient-centered communication behaviors.[38–40] However, it is likely that longer, more intensive interventions are more effective in improving communication skills.[41] When it comes to specific communication behaviors, evidence is inconclusive—particularly with regard to interventions aimed at shared decision making or improved communication with cancer patients.[42–46] Yet other interventions have been successful in improving physicians' abilities to manage and reduce patient stress,[47] provide information in primary care settings,[48] and express empathy.[49]

In summary, given that medicine is a service profession and the patient–physician relationship fundamental to health care quality, assessment of physician communication and interpersonal skills, and the perceived quality of services rendered seems essential to inform learning and improvement efforts. It is nearly impossible to achieve the national goal of patient-centered care without asking the patient about his or her experience with physicians and the health care system. Research linking communication skills to patient and physician outcomes and the documented underperformance in this domain by physicians further supports inclusion of patient surveys. In addition to substantiating the validity of patient surveys included in MOC, further implementation research should focus on defining the optimal approaches to feedback and improving communication skills.

Peer Surveys. Peer surveys play a potential role in the continuing professional development of physicians related to their ability to assess, and thus target for improvement, unique domains that are not typically captured by traditional methods that focus on medical knowledge and patient care.[33,35,50–52] Domains that may be assessed by peers (defined broadly as including medical colleagues and other health care professionals such as nurses, pharmacists, physician assistants and health care administrators) include interprofessional communication, teamwork, health care coordination, and professionalism, and are important to health care quality, safety, and efficiency.

Interprofessional communication is important to patient safety and deficiencies may contribute to patient safety events. Professionalism and professional behavior are core elements of physician competence, yet research demonstrates that physicians may deviate in their everyday practice from accepted norms of professionalism.[53] In fact, breaches in professional behavior are among the most common reasons for licensure action against physicians.[8]

A number of papers have described the value of peer assessment, either alone or as part of multisource feedback (MSF) programs, in addressing a range of competencies in support of licensure and professional certification programs.[33,34,36,50–52,54] This research demonstrates that methods of gathering input about physician competence and performance from their medical colleagues and nonphysician coworkers are feasible and provide reliable and valid information to inform physician improvement and continuing professional development.

Published studies focusing on physicians in multiple specialties (including anesthesiology, emergency medicine, family medicine, internal medicine, psychiatry, and surgery) have shown an appropriate number of assessments from peers is attainable.[33–35,50–52,54–57] The manner in which raters are selected does not significantly impact ratings,[51] although rater familiarity may have a small positive or negative effect on ratings.[33,36,37,51] Research demonstrates that 8–12 ratings, depending on the number of items on the scale, from colleagues or coworkers are required to achieve high internal consistency (Cronbach alpha results >0.90) and generalizabilty coefficients that are appropriate for higher stakes assessments.[34,35,50–52,54–58]

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Factor analyses suggest that peer ratings as part of MSF programs address domains that are important to regulatory authorities and that coworkers and colleagues address different domains relevant to their expected observations of physician behaviors. For example, nonphysician coworker ratings in general are most strongly influenced by collegiality, humanistic and psychosocial skills, professionalism, and collaboration and communication factors, whereas physician ratings are more likely to be grouped into domains such as patient management, clinical assessment and performance, record keeping, self-management, and continuing professional development, but also include communication and professionalism.[34,35,50,52,54,55] These domains appear to hold together over successive administration of peer ratings.[57] Several studies have demonstrated that peers and coworkers avoid providing ratings in areas that they don't observe (such as professional development or relationships with patients),[50,52,54,56] and physicians may occasionally question the ability of their colleagues to rate them in selected domains.[59,60] Across multiple studies, ratings of physicians by colleagues and coworkers are skewed toward the higher end of the scale, consistent with the outcomes from many global rating processes of physicians and physicians-in-training,[35,50,52,54,55] although variability in ratings does distinguish levels of performance in a manner that supports identification of improvement opportunities.[33,36]

In general, physicians support the use of peers in rating their clinical skills,[51,61] and find feedback from colleagues and coworkers to be useful, indicating intent to implement changes in their practice to improve.[33–35,59,62] One study found that physicians with lower mean ratings were more likely to contemplate or implement changes in their practices.[59] Other studies have found that unexpected, low ratings may provoke a negative reaction from physicians that impedes change.[52,60] Previous work suggests surprise may occur because the ability required to perform well in a particular domain is also required to recognize good performance in that domain, and insights into prior poor performance may occur only with improved performance.[63,64] Physician responses to feedback, including the likelihood of change, are influenced by a number of variables including perceptions regarding whether their raters had actually observed and were able to accurately rate their performance in selected domains.[60] In addition, environmental factors (workload, institutional support, and culture), the extent to which the assessment context supports reflection and provides guidance, and individual factors such as motivation and self-efficacy influence physician responses to feedback. These factors interact in a manner that allows good feedback facilitation to overcome environmental impediments to change.[65] Little published data are available to determine whether changes implemented from peer feedback lead to measurable performance improvement; however, a recent 5-year longitudinal study showed that feedback from coworkers and medical colleagues led to small-to-moderate increases in performance ratings on subsequent assessments.[57]

In summary, peer assessments have a role in physician lifelong learning related to their ability to address performance domains that are important and not well captured by other methods. In that the practice of medicine is a team-based activity, feedback on interprofessional communication, care coordination, and teamwork is important. Peer surveys implemented in MOC should focus assessment on key behaviors related to the above domains that are observable and measurable to ensure credible and actionable results. Validity and feasibility research should continue to evaluate whether global rating scale limitations impact the quality of feedback provided, factors that impact physician perceptions of and motivation to act on rating results, and the cost-effectiveness and unique contributions of peer ratings to assessment, lifelong learning, and improvement within the MOC program.

MOC Part II

Part II of the MOC process is focused on education and learning. The goal of MOC Part II activities is to empower the physician to accept responsibility for their own learning strategy and provide them with access to tools to guide their learning and practice improvement activities. In MOC, the learning activities are embedded in a comprehensive assessment program that supports identification of physician learning and improvement needs. Indeed, a portion of the CME activities in Part II must be based on an external objective assessment. The requirement for externally guided self-assessment is important given concerns regarding the inaccuracy of physician self-assessment.[14,15] When the physician is enabled to identify his/her learning needs and when resources are made available to assist the physician to bridge the gaps that have been identified, that is where the most effective change can take place.[66] MOC Part II programs are designed to do this; learning resources may be provided by the ABMS member boards, professional societies, academic institutions, or other parties.

There is a growing body of evidence suggesting that selected lifelong learning strategies are effective in bridging the gap between best evidence and physician performance and patient outcomes.[67–69] In-depth reviews of the effectiveness of CME show a small to moderate association between CME formats and improvement in physician performance, delivery of patient care, and patient health outcomes. A review of 99 randomized controlled trials over 2 decades found that 70% of the studies demonstrated positive change in physician performance and 48% showed positive changes in patient health outcomes.[70] An Agency for Health Research and Quality (AHRQ)-commissioned review of the literature showed that

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CME was effective in impacting knowledge acquisition and retention (79% of studies reviewed), professional attitudes (85%), skills (80%), practice behaviors (58%), and clinical outcomes (42%).[67] An ongoing Cochrane review of the effects of CME strategies has revealed positive outcomes in both professional practice of physicians and health care outcomes of patients.[68] CME activities result in greater positive findings when: (1) there are multiple exposures to material in a CME live session; and (2) when multiple media types and educational techniques are utilized.[69]

The ABMS committee charged with developing standards for MOC is currently considering criteria for CME credit in MOC that includes the above characteristics, encompasses the 6 general competencies, and provides mechanisms for integrating the assessment activities in Parts I, III, and IV with the educational elements in Part II. These standards will apply to all CME supporting compliance with MOC requirements, whether provided by the boards or other parties.

In summary, there is a growing body of literature defining the characteristics of CME activities that are most likely to result in improved knowledge, skills, and quality of care. In defining the standards for MOC Part II, the ABMS and member boards can now implement requirements that address the need for evidence supporting both the clinical content and the educational methods used in the learning activities. An important area of focus moving forward is to understand how CME and self-assessment in Part II best interact with activities in Parts I, III, and IV, and how all of these parts working together can be optimized to improve learning and health care quality outcomes.

MOC Part III

Medical knowledge and clinical diagnostic reasoning are the competency domains targeted by MOC Part III. Cognitive theory research suggests that physicians need both a sound content knowledge base and strong clinical skills to create an appropriate problem representation.[71–73] Problem representation is the synthesis process physicians use to develop a differential diagnosis, or in other words, what they believe is the cause of the patient's problem. Appropriate problem representation is critical to quality patient care in that diagnostic errors are often due to faulty synthesis of clinical findings rather than systems errors.[74] Clinical diagnostic reasoning has been recognized as an important component of physicians' competence by medical school, residency, and fellowship programs, and licensing and certifying bodies.[75]

Research findings showing, on average, declining knowledge and cognitive skills for many physicians over time,[11,76,77] coupled with an inability to accurately self-assess one's knowledge and skills deficits,[14,15] strongly suggest the need to conduct a periodic reexamination which assures the public that physicians possess the requisite knowledge and clinical diagnostic reasoning skills to manage the types of clinical problems they may encounter during their practice. Research from the American Board of Internal Medicine suggests that declining knowledge over time may be more reflective of failure to acquire new knowledge, as opposed to loss of baseline knowledge.[77] In addition, patients expect physicians to not only be certified in their practice specialty, but specifically undergo a periodic reexamination of their cognitive skills.[78–80]

There is a substantial body of research that supports the validity of initial certification examinations and has applicability to the similar examinations used in MOC. For example, certification exam scores correlate with the quality of physicians' prior educational experiences; physicians trained in US medical schools perform better than those trained in international medical schools and physicians' native language is not correlated with exam performance.[81–83] The nature and amount of graduate medical education training (formal residency and fellowship training) has also been shown to be related to better exam performance. Specifically, those with more training in geriatric and critical care medicine do better on related examinations than those without formal training or with less time in formal training.[81,84–86]In addition, physicians who either withdrew or were dismissed from a graduate medical education program were less likely to be board certified.[87] For the MOC examinations in Internal Medicine and Surgery, the amount of CME activities is positively related to MOC exam performance.[88]

Examination performance has also been shown in several studies to be related to other measures of clinical performance. Ratings of clinical competence by residency program directors correlate with exam scores so that those rated higher achieve higher exam scores.[88–91] Physicians who change programs more frequently or have lower ratings of overall clinical competence typically have lower exam scores.[86,88,92–94]Likewise, exam scores have been shown to be correlated with peer assessments of physicians' clinical performance.[95,96] Complexity of the problems presented by physicians' patient panel are related to MOC exam performance for critical care medicine.[97,98]Exam scores are also related to professionalism in that higher scores predict a decreased risk for future disciplinary action.[99]

Although comparison with other measures of physician competence are valuable, the study of the relationship between exam performance and patient care and health outcomes provides more compelling evidence supporting such examinations. Evidence exists to support the link between board certification (sometimes specific board scores) and quality patient care. A meta-analysis of the literature prior to July 1999 found that of those studies that used appropriate methodology, there were 16 findings that showed a positive association between board certification and quality of patient care.[100] For example, board-certified physicians were more

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likely to provide preventive care services and show improved outcomes for some measures (eg, lower mean glycosylated hemoglobin levels for diabetics)[95]; board-certified surgeons had better outcomes for peptic ulcer disease surgery[101]; and board-certified physicians were more likely to provide recommended prenatal treatments for pregnant women, and infants had few lower birth weights.[102]

Research findings after July 1999 show another 18 studies with positive relationships between certification and quality.[103–120] For example, studies involving patients with acute myocardial infarction demonstrated a link between physician board certification and higher compliance with evidence-based processes of care,[113] as well as significant reductions in mortality and length of stay in the hospital.[103–106] For midcareer anesthesiologists, lack of board certification is associated with higher mortality rates,[109] and being board certified in surgery is associated with lower complication and mortality rates for colorectal surgery.[110] Using data drawn from a pool of 124 total performance measures for 23 subspecialty areas in commercial health plans in Massachusetts, 1 study showed that board certification was modestly related to better performance on composite measures.[120] Although many of the studies to date have focused on initial board certification examinations, more recent research demonstrates a positive relationship between MOC examination performance and the care of hypertensive and diabetic patients and in obtaining screening mammography where indicated.[114,115,118,119]

In summary, there is strong theoretical and empiric evidence supporting the need to periodically assess the knowledge base and cognitive skills (in particular, diagnostic reasoning) of physicians. The question for the ABMS and member boards is not whether to include knowledge assessment in MOC, but how best to do so as MOC is evolving into a more robust improvement framework. Moving forward, alternative strategies to the current examination format should be considered for ensuring that both practice- and specialty-relevant knowledge are addressed in a manner that synergistically links knowledge assessement in Part III to knowledge acquisition in Part II and health care quality improvement in Part IV. On behalf of the public, this work will need to done very carefully, given the evidence supporting the current examination format.

MOC Part IV

The primary goal of MOC Part IV is to help physicians assess and improve the quality and safety of health care. Quality improvement (QI) is defined as "the combined and unceasing efforts of everyone—health care professionals, patients and their families, researchers, payers, planners, and educators — to make changes that will lead to better patient outcomes (health), better system performance (care), and better professional development (learning)."[121]

The Institute of Medicine reports *To Err is Human* and *Crossing the Quality Chasm* concluded over a decade ago that our health care system is unsafe, ineffective, inefficient, not patient-centered, inequitable, and difficult to access for timely care.[122,123] As noted earlier, McGlynn and colleagues found that the majority of Americans received just a little over half of the recommended evidence-based care across multiple conditions and services.[9] The United States also compares unfavorably with many other health systems internationally. In a study highlighted by the Commonwealth Fund, the United States ranked last among 16 comparable countries in preventable mortality despite spending almost twice as much per capita for health care.[124] Progress in improving this situation has been disappointingly slow. The Agency for Healthcare Research and Quality (AHRQ) 2010 report found that while almost two-thirds of 179 total measures of health care quality showed some improvement, the overall median rate of change was only 2.3% per year, with the median rate of change in outcomes being only 1.6% per year.[125]

A distinguishing feature of MOC Part IV is the requirement to *act* on performance data to improve quality of care through changes to the local health care systems using evidence-based QI methods.[126] Physicians can meet the goals of MOC part IV through 1 of 2 primary pathways: (1) assessment of their own individual practice using some combination of performance-based methods that examine actual physician practice; and (2) involvement in group, institutional, and/or national QI projects or ongoing programs.

Individually Focused Pathway. In the individually driven pathway, the physicians can use performance data from medical record audit, registries, claims-based data, patient and peer surveys and other tools that evaluate the quality of care they deliver to patients within a practice or system. As noted earlier, substantial research shows physician inability to accurately self-identify gaps in performance without externally derived quantitative or qualitative performance data.[14,15] Assessment of patient quality data provides the physician an opportunity to uncover unknown gaps in their actual practice. The Part IV component also provides an opportunity across specialty boards to meaningfully confront the substantial quality problems currently affecting the US health care system.

One of the principal methods used in the individually focused MOC Part IV pathway is audit and feedback. Several systematic reviews have found audit and feedback alone can produce meaningful, although modest, improvements in care.[127,128] Audits can be accomplished through the use of chart review, registries, claims data, and patient surveys. However, the most important factor is what the physician

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does with the feedback results. In investigating how physicians respond to performance data as part of self-directed assessment seeking processes, Sargeant found a complex and dynamic interplay between internal and external conditions involving the physician's practice, the source of the performance data, how the performance information was interpreted, and tensions within the environment that led to variable responses to the performance information and feedback.[129]In a follow-up paper, Sargeant found that participants in self-directed assessment activities reported that receiving objective performance data on quality measures, patient input through surveys about their care experience, and supportive and useful data from peers were all factors that enhanced the effectiveness of self-directed activities.[130] These findings are consistent with experiential learning theories and align with the goals of MOC Part IV.

For example, the ABIM added a self-assessment of practice performance requirement to their program in 2006.[126] To help physicians meet this requirement, ABIM developed Web-based tools—Practice Improvement Modules (PIMs)—that allow physicians to examine elements of their practice and to receive feedback from peers and patients. The majority of physicians, but by no means all, were very satisfied with the PIM experience and also self-reported behavior changes in practice.[131–133] Several pre-post studies and 2 randomized comparative trials found the PIMs can help facilitate improvements in care,[134,135] and a pre-post study in a residency clinic also found substantial improvements in preventive care.[136] Much work remains to be done, but a specific MOC Part IV multifaceted assessment tool, the PIM, based on solid theory and empirical evidence from other fields, shows promise in helping physicians improve the care they provide as part of the MOC process. Early data from the PIMs demonstrates that an instrument designed for evaluation of performance in practice can be a catalyst for improvements in patient care. The primary limitation of these individual assessment tools is the time and effort required to enter data into the Web-based forms; future methods will need to leverage information technology to reduce the data collection burden so as to maximize the primary objective of the assessment process—review and analyze data that catalyzes improvements in care. Future methods also need to more effectively emphasize the team-based nature of QI.

Project and Institutionally Focused Pathway. While individually focused pathways, using performance-based assessment data, can lead to meaningful changes, QI is often performed as a team activity. For example, physicians using the ABIM PIMs are strongly encouraged to involve other members of their team in completing the QI activity and can complete PIMs with a group of physicians working together. A growing number of boards are actively engaging and promoting physician involvement in ongoing, effective QI initiatives and programs for MOC Part IV credit. The QI projects that meet the boards' standards can be conducted within the physician's practice or health care system.

Examples come from the American Board of Pediatrics (ABP) and the American Board of Pathology (ABPath). In 2006, the ABP established standards for valid and credible quality improvement projects using published, accepted guidelines.[137,138] Along with these evidence-based standards for projects and QI activities, the ABP concomitantly developed standards for meaningful participation in team-based activities so that physicians could receive MOC Part IV credit where appropriate.

The institutionally based pathway helps to accomplish several goals. First, it encourages physicians to engage directly in meaningful QI initiatives that facilitate their own systematic acquisition and continued professional growth of knowledge, skills, and attitudes in QI science and methods. Second, it fosters teamwork competencies that have traditionally not been strengths of physician training and practice.[139] Third, this approach helps to maximize the impact of QI, especially when the physician works in larger group practices, hospitals, or health care networks. The trend toward patient-centered medical homes and accountable care organizations[140,141] will further the need for this type of QI activity as small practices join new practice models and networks.

Two activities approved for MOC Part IV credit by the ABP have demonstrated substantial impact on improving care. The Cystic Fibrosis (CF) Foundation–sponsored QI collaborative publically shares CF center–specific quality-performance data to help CF centers to identify and learn from high performing, quality "benchmark" centers.[142] The impact of this collaborative has significantly affected the lives of children with CF. Another national-level collaborative approved by the ABP is the initiative to eliminate catheter-related infections in pediatric intensive care units. Sponsored by the National Association of Children's Hospitals and Related Institutions, this project has significantly reduced catheter-related infections with resultant reductions in mortality, morbidity, and costs.[143]

Based on these experiences and others, multiple certification boards in partnership with the ABMS are now working together to expand this MOC Part IV pathway to more physicians and institutions.[2,144] This pathway is appealing to hospitals and health care networks because it helps physicians meet their MOC requirements while concomitantly helping the institution to engage physicians in meaningful cross-cutting QI initiatives. The ABPath's Part IV program includes essential evidence-based components: (1) required documentation of the accreditation status of the laboratory where the pathologist practices; (2) mandatory participation and documentation in interlaboratory performance improvement and quality assurance programs appropriate for the

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procedures performed in the laboratory; and (3) each diplomate "must participate in at least one laboratory performance improvement and quality assurance activity or program per year appropriate for his/her principal professional activities."[145]

The QI activities can involve national initiatives that target important care activities such as quality of specimen collection, turnaround times, reporting errors, patient identification, and diagnostic accuracy. Quality assurance and improvement have been a major focus of the pathology community, and the inclusion of evidence-based methods and activities has now been incorporated into the ABPath MOC Part IV program.[146–150]

Across the majority of ABMS specialty boards, diplomates enrolled in the MOC program can now engage in evidence-based approaches at the individual, group, institutional, or interinstitutional level. The examples and evidence noted above highlights that the Part IV options align well with the stated goals of MOC Part IV and with the essential physician competencies of practice-based learning and improvement (PBLI) and systems-based practice (SBP). As the evidence and experience in quality and safety science, as well as the evolving nature of PBLI and SBP as physician competencies, grows and deepens, these findings and evidence will guide improvements to the Part IV component of MOC.

In summary, Part IV is evolving into a major and clinically important element of MOC and when designed well is most relevant to a physician's actual practice. It is the primary means for addressing the PBLI and SBP competencies and also for the Patient Care competency regarding care patients actually receive. There is an evidence base supporting the value of QI generally, and within the context of MOC participation "evidence" is continuously generated as part of the physician's individual activities in meeting Part IV requirements. As the ABMS and member boards continue to implement Part IV QI requirements, research and development should continue to focus on introducing measures to address important public health issues, tailoring methods and performance measures within individual specialties to enhance practice through relevant patient care data, and evaluating Part IV in relation to the other MOC parts to support continued improvement in the cost-effectiveness of MOC. In addition, continued work to align Part IV with other accountability initiatives, as exemplified above, will help ensure that important health care quality issues are addressed, and is responsive to one of the primary concerns about the redundancy and cost-effectiveness of MOC.

Conclusion

In conclusion, the framework and individual Parts of the MOC program are based on a sound theoretical rationale and evidence-based foundation, target areas of physician competence known to be in need of improvement, and provide a self-directed mechanism to help physicians assess and improve their health care practices in a professional self-regulatory framework. While much work is still needed to evaluate the specific tools currently in use for MOC, such as the patient and peer surveys, the practice improvement modules and other knowledge assessment approaches, substantial work has already been performed. Moving forward with continued implementation of MOC, the specialty board community will need to continue to rigorously evaluate and refine the MOC components and the program as a whole, as the practice of medicine, technology, and the field of assessment evolve.

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