Achieving Desired Results and Improved Outcomes: Integrating Planning and Assessment Throughout Learning Activities

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Most physicians believe that to provide the best possible care to their patients, they must commit to continuous learning. For the most part, it appears the learning activities currently available to physicians do not provide opportunities for meaningful continuous learning. At the same time there have been increasing concerns about the quality of health care, and a variety of groups within organized medicine have proposed approaches to address issues of physician competence and performance. The authors question whether CME will be accepted as a full partner in these new approaches if providers continue to use current approaches to planning and assessing CME. A conceptual model is proposed for planning and assessing continuous learning for physicians that the authors believe will help CME planners address issues of physician competence, physician performance, and patient health status.

Key Words: *education, medical, continuing, physician learning, planning, assessing, formative assessment, physician competence, physician performance*

Introduction

Most physicians believe that to provide the best possible care to their patients, they must commit to continuous learning. Learning is defined by most observers as the acquisition and creation of different types of knowledge that, through complex cognitive processes, leads to the development of new understandings, skills, and capabilities. For the most part, it appears the learning activities currently available to physicians do not provide opportunities for them to develop new understandings, skills, and capabilities. Rather, current

continuing medical education (CME) provides little more than documentation of attendance. Unfortunately, this situation has been reinforced for years because documentation of attendance has been all that physicians have had to demonstrate for certification by their professional associations, re-registration of their medical licenses, or credentialing for hospital staff privileges.[1]

In recent years, the discomfort around this situation has increased steadily. While the perception of deteriorating quality of care has been recognized for some time as the likely result of a combination of system and human errors,[2] some observers believe that directing educational efforts at enhancing physician capabilities to provide the best possible care to their patients is one of the many approaches currently proposed to address suboptimal care.[3] In an increasing number of journal articles and professional presentations, scholars and policy makers see a role for CME in improving health care outcomes, specifically physician performance and patient health status.[4–7]

In response, organized medicine, including the field of CME, has put forward several initiatives. The American Board of Medical Specialties (ABMS) has recently introduced a Maintenance of Certification (MoC) program. To maintain specialty board certification, physicians must demonstrate that they are participating in practice-based learning and improvement and that it leads not only to improved practice procedures but to improved patient health status as well.[8] The Federation of State Medical Boards (FSMB) has intro-

duced a Maintenance of Licensure (MoL) program. To qualify for re-licensure, physicians will have to demonstrate a commitment to life-long learning and practice improvement.[9] In addition, many hospitals and health systems are considering competency-based credentialing, in which physicians would have to demonstrate specific competencies to obtain and maintain privileges to practice.[10]

However, CME in its current form may not be able to help physicians meet these new requirements. In the early nineties, there were calls in the CME profession to develop a new paradigm for CME that focused more on performance data and outcomes than documenting attendance.[11] More recently, to meet these new challenges of MoC, MoL, and competency-based privileging, the Accreditation Council for CME (ACCME) has revised its accreditation standards to focus on improvement of physician competence, physician performance, and patient health status.[12] In addition, research on CME has demonstrated that while most CME activities, in and of themselves, do not contribute to improved physician competence, physician performance, or patient health status, CME activities that are planned according to certain principles can demonstrate improvement in these areas.[13] The evidence reported by this research is complex, but compelling. First, CME should be based on assessed need.[14,15] There is some concern that physicians do not self-assess well, so perspectives external to physicians should be an important part of performance assessment.[16] Second, passive approaches to learning are generally not effective in changing physician behavior.[17] Interactive CME that engages learners, helps them reflect on current practices, identifies a gap between their current performance and a standard, and then requires them to practice what they are learning with feedback to close that gap tend to be more effective in changing performance.[18] Third, multifaceted activities that combine several different interventions have been shown to be effective.[13,19]

Aware of these concerns and recent developments, the authors of this article have made an effort to synthesize current research into a conceptual model to guide CME practice as CME planners work to help physicians meet these new requirements. Much of the current effort of CME planners in response to the new requirements has been to focus on developing strategies to assess outcomes in their CME activities. The authors of this article suggest that a more effective approach would be to integrate assessment efforts with educational planning and instructional design continuously throughout a learning activity, and focus planning and assessment on achieving desired outcomes. To present this approach, we will describe an expanded outcomes framework, a conceptual framework for planning and assessing CME, an approach to planning CME, and a strategy for assessing achievement of desired results.

We are presenting a conceptual model to guide decision making in CME practice, not a prescription to be followed in every CME activity. We encourage CME planners to examine the unique characteristics of their CME practices and then decide how this conceptual model can enhance the CME activities that they offer to their constituents.

An Expanded Outcomes Framework for Planning and Assessing CME

Several years ago, a framework for outcomes assessment in CME was proposed to assist CME planners in their efforts to develop assessment strategies[20] (see column 1, TABLE 1), and variants of this framework and others[21,22] are being used currently by CME planners. We have expanded the original outcomes framework to 7 levels. (See TABLE 1.) We have inserted the 4 levels of an assessment framework developed by Miller[23] (see FIGURE 1) into the middle of the original CME outcomes framework. The pyramid in FIGURE 1 depicts the ideal stages of development of physician clinical skills. First, a physician must *know what to do* (base of the pyramid). Educational psychologists call this "declarative knowledge," the acquisition and interpretation of facts. *Knows how* is the next developmental level. This is called "procedural knowledge" by educational psychologists: Someone who possesses procedural knowledge can describe how to do something but may not be able to actually do it. At the next level (*shows how*), physicians are expected to demonstrate how to do it, that is, show that they can do what they have learned. We suggest that most CME activities omit this extraordinarily important step. Our approach to continuous planning and assessment includes an opportunity for learners to practice what they are learning (shows how) and receive feedback from faculty experts. It is at this level that physicians develop "competence." In our approach to CME, we prefer a definition of *competence* that reflects what a physician is capable of doing. We also prefer making a distinction between *competence* and *performance*, defining *competence* as what a physician is capable of doing as demonstrated in an educational setting and *performance* as what a physician actually does in practice.[24] The final developmental level in Miller's framework is *does*, which refers to practicing physicians using the competence they have developed in their encounters with patients. We refer to that as *performance*. The authors feel that the expanded framework provides a more practical way to identify outcomes and determine learning and assessment strategies in CME.

A Conceptual Framework for Planning and Assessing CME

A conceptual framework is a set of coherent ideas or concepts organized in a manner that helps people understand how and why something takes place. A robust conceptual framework is usually based on research, and the connections among research findings that form the conceptual framework result from professional judgment. A conceptual framework is not necessarily a tested theory, although it may contain a number of tested theories, nor is it a linear process dia-

TABLE 1. Comparison of an Expanded Outcomes Framework with the Original Framework for Planning and Assessing CME Activities

Original CME Framework	Miller's Framework	Expanded CME Framework	Description	Source of Data
Participation		Participation LEVEL 1	The number of physicians and others who participated in the CME activity	Attendance records
Satisfaction		Satisfaction LEVEL 2	The degree to which the expectations of the participants about the setting and delivery of the CME activity were met	Questionnaires completed by attendees after a CME activity
Learning	Knows	Learning: Declarative knowledge LEVEL 3A	The degree to which participants state *what* the CME activity intended them to know	*Objective:* Pre- and posttests of knowledge. *Subjective:* Self-report of knowledge gain
	Knows how	Learning: Procedural knowledge LEVEL 3B	The degree to which participants state *how* to do what the CME activity intended them to know how to do	*Objective:* Pre- and posttests of knowledge *Subjective:* Self-report of knowledge gain
	Shows how	Competence LEVEL 4	The degree to which participants *show* in an educational setting *how* to do what the CME activity intended them to be able to do	*Objective:* Observation in educational setting *Subjective:* Self-report of competence; intention to change
Performance	Does	Performance LEVEL 5	The degree to which participants *do* what the CME activity intended them to be able to do in their practices	*Objective:* Observation of performance in patient care setting; patient charts; administrative databases *Subjective:* self-report of performance
Patient health		Patient health LEVEL 6	The degree to which the health status of patients improves due to changes in the practice behavior of participants	*Objective:* Health status measures recorded in patient charts or administrative databases *Subjective:* Patient self-report of health status
Community health		Community health LEVEL 7	The degree to which the health status of a community of patients changes due to changes in the practice behavior of participants	*Objective:* Epidemiological data and reports *Subjective:* Community self-report

gram. What a conceptual framework represents is a collection of variables and events that might interact in some way to produce something. In the absence of a comprehensive tested theory, conceptual frameworks are useful to guide practice and/or set research agendas.
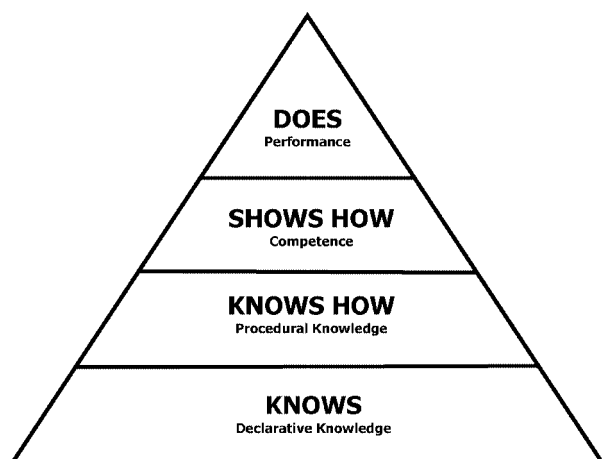
The authors have developed a conceptual framework of an ideal approach to planning and assessing continuing medical education that is focused on achieving desired outcomes. We have organized what we consider to be relevant research into an approach that includes information about (1) how physicians learn, (2) instructional design strategies that might be used during educational planning, (3) the expanded outcomes framework, and (4) where assessment can be used to measure progress of learners and inform the planning process. Our conceptual framework is depicted in FIGURE 2. While our framework does not appear to be as interactive, iterative, and cyclical as models proposed by Kolb,[25] Kern et al,[26] or Caffarella,[27] we designed it to show potential interfaces among all the components. While not depicted, we ask the reader to accept that each of the 4 horizontal strands in the conceptual framework is cyclical and that components of the framework interact vertically as well, depending on the circumstances of the CME practice and physicians involved.[a]

FIGURE 1. Framework for clinical assessment (adapted from Miller[23]).

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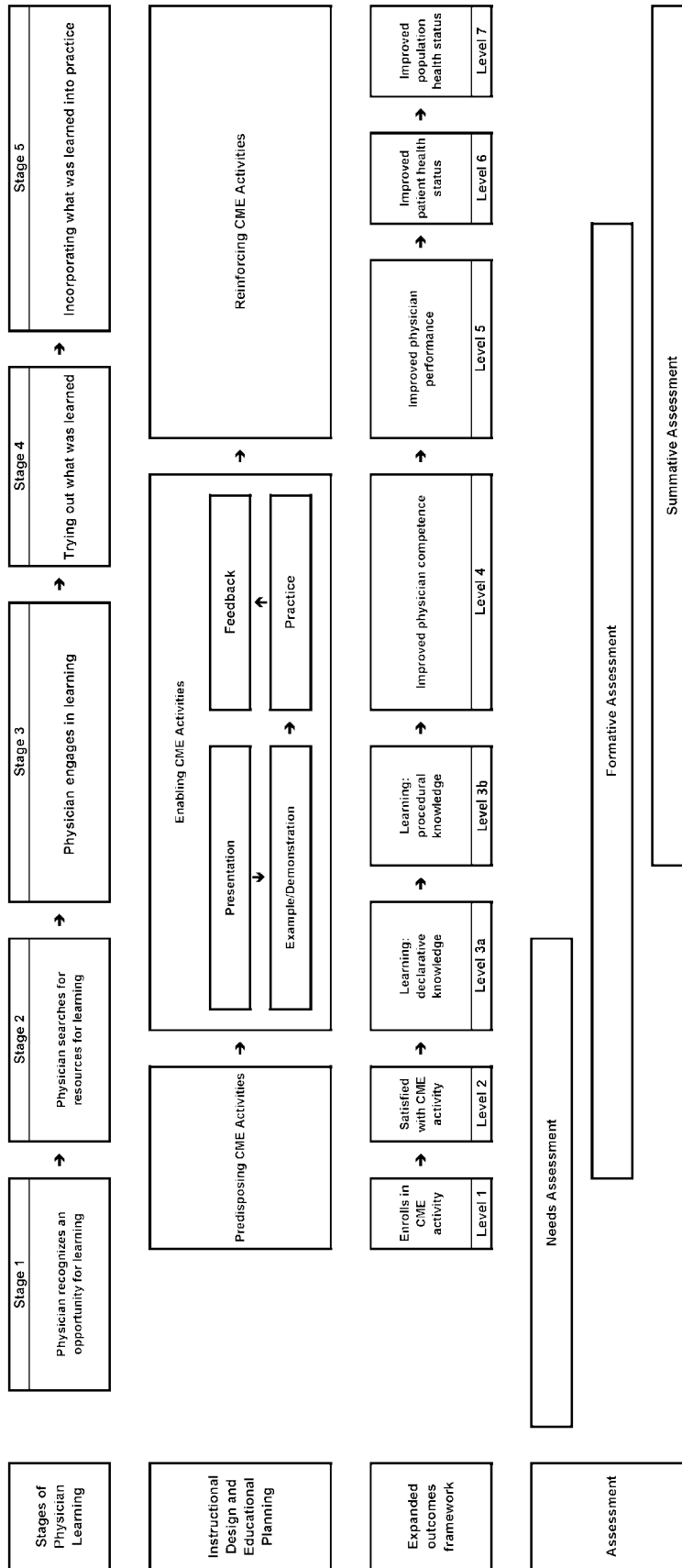[a]We are grateful to our reviewers for pointing out the relevance of these models.

FIGURE 2. Conceptual framework of an approach to continuous planning and assessment in continuing medical education.

How Physicians Learn

At any given time, physicians are engaged simultaneously in several different kinds of learning.[28] Systematic reading, self-directed improvement at work, participation in formal CME courses, and consultations with colleagues are woven into the basic fiber of their professional lives to create an approach to learning that is unique to each individual physician. Several studies examining physician learning have outlined a learning process that consists of several stages.[14,29–35] In general, these stages begin when a physician learner becomes aware of a problem or challenge, and end when all stages are completed, with the physician learner comfortable and confident in applying newly learned knowledge and/or skills to the practice setting. These studies have identified 5 stages: (1) recognizing an opportunity for learning; (2) searching for resources for learning; (3) engaging in learning to address an opportunity for improvement; (4) trying out what was learned; and (5) incorporating what was learned.[36] These stages of physician learning are shown at the top of FIGURE 2.

Instructional Design and Educational Planning

We suggest using the predisposing-enabling-reinforcing instructional framework developed by Green and Kreuter[37] to plan an educational activity to achieve desired outcomes, because planners can organize learning activities that are responsive to the 5-stage physician learning model just discussed. (See Stages of Physician Learning and Instructional Design and Educational Planning in FIGURE 2.) There is some evidence that the use of the predisposing-enabling-reinforcing framework is associated with effective CME. For example, Davis and colleagues observed that using the predisposing-enabling-reinforcing organizing scheme was associated with effective CME,[15,38] and several prospective studies produced similar findings.[18,39,40] *Predisposing* activities make it more likely that physicians will pursue a learning activity because CME planners create or help a physician recognize a "teachable moment." Predisposing activities can help physicians recognize an opportunity for learning (stage 1) and search for and find resources for learning about the performance issue they want to address (stage 2). *Enabling* activities help physicians who are ready to address a teachable moment by supplying them with knowledge related to the performance issue(s) they are concerned about, along with opportunities to use that knowledge in "authentic" settings resembling their work circumstances. Enabling activities correspond to physicians learning stages 2 (searching for resources for learning), 3 (engaging in learning), and 4 (trying out what was learned). Using the 4-part approach to instructional design developed by Merrill will facilitate achievement of learning outcomes. *Presentation* methods are used to disseminate declarative knowledge, or what needs to

be done.[b] Presentation methods will produce level 3a outcomes described in the expanded outcomes framework. (See TABLE 1.) *Demonstration/example* methods are useful to convey procedural knowledge, or how it should be done. Demonstration methods will produce level 3b outcomes described in the expanded outcomes framework. (See TABLE 1.) *Practice* methods provide participants an opportunity to try out new knowledge in a setting that resembles their practices (ie, provide learners an opportunity to show an expert (faculty) that they know how to do what was presented and can demonstrate it). *Feedback* provides faculty an opportunity to inform the learners of the difference between what they are doing and what they should do to improve. Practice and feedback are important for physicians in stage 4 because they provide an opportunity to try out what was learned in an environment that is safe for the learner and the learner's patients. The result is competence, a level 4 outcome as described in the expanded outcomes framework. (See TABLE 1.) *Reinforcing* activities or materials following an enabling CME activity strengthen the cognitive imprint of what was learned so that it can be more readily recalled during patient encounters. Reinforcing activities or materials are useful when a physician is in stage 4, trying out what was learned, and stage 5, incorporating what was learned into practice.

Expanded Outcomes Framework

We are proposing the use of an expanded outcomes framework that we believe will help CME planners identify, plan for, and assess desired results, or outcomes. The expanded outcomes framework from TABLE 1 has been incorporated into FIGURE 2. In the past outcome levels 1, 2, 3a, and 3b have been the target of measurement efforts in CME. Now the focus of measurement has become outcome levels 4, 5, 6, and 7. The central point of this article is that before outcomes can be measured, educational planning focused on the outcomes must occur so that these outcomes can be expected to happen. See FIGURE 2 for the connection between a level 4 outcome (improving competence) and opportunities for practicing the desired outcomes and obtaining feedback on that practice. As described above, we recommend Merrill's approach, which consists of 4 techniques sequenced to create opportunities for practice and feedback.

Continuous Planning and Assessment

When we suggest that planning and assessment are continuously integrated, we mean that needs assessment, formative assessment, and summative assessment apply not only to participant learning throughout the learning activity but to planning decisions *throughout the implementation of*

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[b]Merrill's model uses the term *rule* where we have used the term *presentation*.

a learning activity as well. In terms of learning, needs assessment identifies the gap between what is and what should be. We think it would be useful to define the gap in terms of the expanded outcomes framework. Educational psychologists sometime call this "backward planning."[41] Thus, based on available resources and capabilities, a CME planner might decide to address a problem in practice by concentrating on gaps in competence (level 4), performance (level 5), or patient health status (level 6). To clearly identify the gap and accurately describe it, data are needed for both the "what is" and the "what should be" sides of the gap. Once the gap is described, CME planners can make decisions about content, learning strategies, and an assessment strategy. Content should be selected and organized to reduce the gap. Summative assessment should be designed to determine if desired results ("what should be") were achieved. A formative assessment approach should be designed to measure the progress of learners towards reducing or eliminating the gap. The term *formative assessment* refers to assessment of something while it is still being developed to be sure that it is developing as desired.[42] Use of Merrill's 4-part approach gives CME planners an opportunity to embed formative assessment within a CME activity. In terms of implementation of the learning activity, in-course assessment of the effectiveness of instructional strategies could result in providing additional practice sessions or more time for one-on-one interaction with faculty experts.

Planning Learning Activities for Physicians: Practical Applications

The first section of this article explained our conceptual framework. In the next 2 sections, we will explain how certain elements of our conceptual framework combine first for planning CME activities and then for assessing them.

Our approach to planning learning activities for physicians combines stages of physician learning, instructional design and educational planning, the expanded outcomes framework, and assessment. (See FIGURE 2.) There are 4 strategies that we think should be considered in planning efforts:

1. Start with the end in mind.
2. Take into account physician stages of learning.
3. Focus on clinical problems and knowledge that can be used in practice.
4. Provide opportunities for practice and feedback in authentic settings.

Start With the End in Mind

There have been several calls for planning learning activities with the end in mind in the general education and medical education literature.[41,43] In CME, we suggest that planning with the end in mind, sometimes called "back-

wards planning," means that planning starts with level 7 outcomes and works backward through levels 6, 5, 4, and 3b and 3a. Using the gap-analysis approach to needs assessment to perform backwards planning will help CME planners recognize where to begin planning learning activities for physicians. CME planners should do a gap analysis at each outcome level starting with level 7 until no gap is detected. Here is how that might work in an ideal example using the metabolic syndrome:

- Starting at the end of the expanded outcomes framework, level 7 (community health status), data may show that the health status of individuals with metabolic syndrome in a community is suboptimal. Thus at level 7, there is a gap between the current health status of these individuals and what it should be according, perhaps, to some national standard.
- The next step for a CME planner would be to determine if there is a gap at level 6 (patient health status) in practices in the community, between the current health status of patients with metabolic syndrome in the practice and what national and local guidelines suggest that it should be.
- If a gap exists in certain practices, then the next step for a CME planner would be to determine if there exists a gap at level 5 (physician performance), between what physicians in these practices were currently doing and what they should be doing to promote expected health status of patients with metabolic syndrome.
- If a gap were detected in the performance of certain physicians, the next step would be to determine whether there is a gap at level 4 (physician competence), between what a physician should be able to show he could do and what he actually was able to demonstrate in a controlled educational environment.
- Finally, if a gap were detected in the competence of certain physicians, the next step would be to determine if there is a gap at level 3b (procedural knowledge), between what a physician should be able to describe and what he could actually describe.
- Because we think that most physicians would be able to pass a test on procedural knowledge, there would not be a gap at level 3b for a CME planner to detect. As a result, planning learning activities for physicians should focus on level 4, physician competence.

Realistically, not all CME planners have the resources to work through backwards planning in the fashion just outlined. Nonetheless, we suggest that planning begin at level 4, physician competence, but it should keep the end in mind, the physician skills that are associated with desired results at levels 5, 6, and 7.

Take Into Account Physician Stages of Learning

Once CME planners determine desired results, they can make decisions about planning an educational intervention. As described earlier, a 5-stage model of physician learning describes the efforts that physicians go through to address prob-

lems encountered in practice, understand what they need to learn to address those problems, learn what they need to know and do, experiment with it, and incorporate it into practice on a routine basis.[36,44] Again, we suggest that the predisposing-enabling-reinforcing instructional framework developed by Green and Kreuter[37] is most effective in planning an educational intervention to achieve desired results because it can be used to organize learning activities that are congruent with the 5-stage physician learning model. See TABLE 2 for learning techniques that could be used for predisposing, enabling, and reinforcing activities.

CME planners can use predisposing activities to help physicians identify or recognize teachable moments. Research shows that physicians change their clinical behavior if they are shown that it does not match the behaviors of other practitioners in their area or acceptable professional standards.[45,46] For example, CME planners could collaborate with individuals or agencies that have access to performance data to compile information about current performance with patients who have been diagnosed with metabolic syndrome and contrast the data with guideline-based (or best practice) information. The data could then be shown to physicians to help them recognize the difference between "what is" and "what should be," thus eliciting a teachable moment.

The existence of a teachable moment should make it more likely that physicians will become engaged in learning activities. If learning activities are designed as enabling activities using the presentation-example-practice-feedback approach to skill development, it is more likely that they will develop skills associated with achieving desired results.[47] Because we assumed in the previous section that many physicians may already know what to do and be able to describe how to do it, our recommendation is that less time be spent on the presentation and example and that more time be spent on practice and feedback.

Common reinforcing activities include sending *materials* to participants after the CME activity (eg, course handouts,

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TABLE 2. Possible Learning Techniques for Predisposing, Enabling, and Reinforcing Activities

	Possible Learning Techniques
Predisposing: Create or reinforce "teachable moment"	1. Presentation of data describing current performance 2. Presentation of guidelines or standards of care using academic detailing or local opinion leaders 3. Presentation that compares actual performance with guidelines or standards of care 4. Panel discussion to identify factors contributing to the difference between current and desired performance 5. Consensus on improvement action: education and other

Enabling: Develop competence related to teachable moment	1. *Presentation/Rule*
	  a. Leads to a level 3a outcome (declarative knowledge; Miller's "what")
	  b. Review consensus on corrective action
	  c. Detailed, step-by-step description of practice guideline or standard of care, summarizing evidence where available
	  d. Description of implementation strategies, including management of barriers, summarizing evidence where available
	2. *Example/Demonstration*
	  a. Leads to a level 3b outcome (procedural knowledge; Miller's "how to")
	  b. Case that describes in detail how the practice guideline or standard of care is used in practice
	  c. Increase complexity (messiness) in each succeeding case, progressing to as authentic a case as possible
	3. *Practice*
	  a. Leads to a level 4 outcome (competence; Miller's "shows how")
	  b. For clinical reasoning (diagnostic and treatment decisions) and communications skills:
	    1) Small group discussion of cases led by expert
	    2) Case studies with audience response system pause at key decision points (Live or on the Web)
	    3) Observation with standardized patients
	  c. For psychomotor skill (surgical and procedural) development:
	    1) Simulation
	    2) Animal lab
	4. *Feedback*
	  a. Leads to a level 4 outcome (competence; Miller's "shows how")
	  b. Based on observation of practice, expert faculty praise correct performance and discuss opportunities for improvement
	  c. Optimal performance is the product of multiple practice-feedback sessions

Reinforcing: Assists in recall of competence	1. Commitment to change/intent to practice agreements 2. Course handouts: Summaries of guidelines with suggestions for implementation and strategies for dealing with barriers 3. Reminders that could be placed on charts of patients for whom the guidelines is relevant 4. Case studies staggered over several months with opportunities to earn CME credit 5. Invitation/opportunity to participate in a "performance-improvement CME" project

practice guidelines, summarized information). Other forms include *reminders*, key pieces of information provided to physicians at the point of care,[48] *commitment to change* by which participants commit to making a change in their practices and then respond to follow-up inquiries about their success in doing so,[49] *case studies* included in postcourse evaluations that emphasize the key points of an activity, and *feedback* from colleagues and local opinion leaders after attempting to learn a new skill.[50,51]

Focus on Clinical Problems and Knowledge That Can Be Used in Practice

Practicing physicians typically are in a continuous search for information to use to solve problems or improve their practice.[28] When physicians select learning resources in their self-directed learning projects, one of the features important to them is this focus on clinical issues.[14,52] They do not necessarily want a detailed description of the basic science or clinical research that led to findings that have clinical implications.[29] This is useful to consider when planning formal CME activities where physicians may be in any one of the 5 stages of learning that were described earlier in this article. Let us use Dr. Learner as an example. If he were at stage 1 in an informal setting, disappointed about the outcomes of his patients with both diabetes and hypertension and concerned about metabolic syndrome, he may begin looking at journals or textbooks in his office to determine whether there were other, better ways to manage these patients. In a formal CME activity, summaries of information contained in recent research publications that he might consult in his office would help Dr. Learner address his questions as a stage 1 learner. In addition, it would be helpful for Dr. Learner to be able to compare his performance (or data about a sample of physicians similar to him) with the research data to help him understand the gap between what he is doing and what he should be doing. In another situation, he might be unaware that his outcomes are not acceptable. Information about standards of care and an exercise that helps him reflect on his own practice would begin to form a teachable moment.

If Dr. Learner were at stage 2, he may have difficulty formulating and articulating questions about moving his current performance to a more desired level of performance. In the informal setting, Dr. Learner might seek out colleagues to help him understand what is required to move to a more desired level of performance; in a formal setting, providing an opportunity for Dr. Learner to interact with other practicing physicians who have made the transition may help him formulate and articulate his questions. The purpose of the questions is to prepare him to recognize what he needs to learn to improve his performance. At stage 3, a physician might seek a formal learning activity. As a physician at stage 3, Dr. Learner might expect to hear about what he should know about managing patients with the metabolic syndrome, hear about ex-

amples of what has worked in a variety of practice settings, practice what he has heard and receive feedback from a faculty expert on what he has practiced. At stage 4, Dr. Learner will be gaining experience and will benefit from practice with feedback, providing reinforcement that his new performance meets the standard. He would benefit from an opportunity to discuss what he has learned with experienced clinicians who have been using the information in their practice setting. At stage 5, he would benefit from specific tools that would help him integrate what he learned into his practice, including, but not limited to, reminders and patient education materials.

Provide Opportunities for Practice and Feedback in Authentic Settings

Effective CME activities help physicians apply what they learned in practice, not simply retain facts. The best way for CME planners to accomplish this is developing physician competence during an educational activity. Using the presentation-example-practice-feedback approach developed by Merrill offers considerable opportunity for developing physician competence.

It is first important to design the learning activity in the context of an "authentic" work setting.[53] Authentic settings engage the learner in complex, realistic, "messy," problem-centered activities, in a setting that is familiar and in which physician learners can recognize what needs to be learned and begin transferring learning to their practice settings. Physicians should learn more effectively in this setting because they can derive insights from clinical practice with the help of faculty who demonstrate how to reflect on a problem, identify the most feasible solution, use the solution in a real-world setting, and assess the effectiveness of the chosen solution.

Like many other learners, physicians learn best by doing.[54,55] CME planners should provide physicians not only with an authentic setting in formal CME activities, but also with opportunities to interact with other participants within that setting by trying out what was learned and receiving performance feedback. Because the goal is for physicians to apply what they learn in a CME activity in a dynamic social environment (the practice setting), a CME activity is most effective when planned as a social process dependent on transactions with others within a context that resembles as closely as possible the practice environment. Indeed, CME course design and materials should permit and encourage physicians to explore the new content, their own experiences, and the experiences of other physician learners. The choice of a particular method is not as important as providing the opportunity for learners to practice what they have learned and receive feedback on their efforts.

Learning requires both practice and feedback. For effective learning to occur, there must be opportunities for practice as well as positive feedback when something is performed

correctly and constructive feedback when something is performed incorrectly. In addition, practice provides opportunities to reflect on the task at hand as well as past experience to understand not just what happened, but why it happened.

The approach to instructional design developed by Merrill, adapted for CME in the following 4 steps, can be used to design learning experiences that provide practice and feedback. Following this approach would be most effective for "enabling" activities. (See TABLE 2.)

1. *Presentation:* Presentation methods are used when learning objectives call for knowledge acquisition, when learners need to learn "what to do" (level 3a; see TABLE 1). In an *enabling* activity, the knowledge presented should be a description of the performance standard, the information that supports it, and methods central to the performance of the skill. The skill could be cognitive (eg, clinical decision making), psychomotor (eg, surgical or interventional), or communicative. Audience participation (eg, questions, comments, clarifications) and interaction among audience members should be encouraged. In the example of the physician who was concerned about the management of patients with metabolic syndrome, presentation of information about guidelines for management of metabolic syndrome might be a first step in skill development.

2. *Example/Demonstration:* Examples and demonstrations help learners know how to do something (level 3b; see TABLE 1). Learning should be enhanced if physicians are provided an example or demonstration of the skill to be learned, followed by the description; this helps learners access already stored knowledge and integrate new knowledge into existing cognitive structures.[56] *Case presentation* is an excellent method to demonstrate the skill to be learned in the context of clinical decision making. Audience participation (eg, questions, comments, clarifications) and interaction among audience members should be encouraged. A case presentation, perhaps using video, of a clinical encounter in which desired behaviors are highlighted would be a useful way to provide an example.

3. *Practice:* One of the major criticisms of lecture-based CME is that it does not give physicians the opportunity to try out new knowledge in a setting that resembles their practices. Because new knowledge is integrated into existing cognitive structures after listening to a lecture and hearing about an example, a physician should know *what* to do and even be able to describe *how* to do it but might be uncomfortable and uncertain about actually doing it. Including a practice skill-development session can provide physicians with an opportunity to show an expert faculty "how to do it" under supervision (level 4 outcome; see TABLE 1).[23] A practice session may consist of an exercise in which a skill is performed repeatedly until it is successfully performed, or the skill may be performed once or twice with expert supervision and feedback. *Case discussion*, which can engage learners in key clinical decisions in the case, could be facilitated by an audience-response system. Practice using standardized patients in an OSCE (Objective Structured Clinical Examination)[57] format or individually would be an ideal way of providing opportunities for practice; simulations online or on DVD also would be useful.

4. *Feedback:* Sustainable learning is more likely to occur when practice is accompanied by feedback. Feedback provides information that highlights the difference between what learners are doing and what they are expected to do. Learners should be provided with performance criteria during the initial description of a skill; these criteria should be highlighted during the demonstration and coached during practice, contributing to the achievement of a level 4 outcome. When providing feedback, an instructor should focus on how the learner performed the components of the skill and how the learner can improve performance.[50,51] Positive feedback contributes significantly to learner motivation and should be used when appropriate. The combination of practice and feedback will produce a cognitive imprint of the skill components that are being learned that should facilitate transfer into the practice setting.

The ultimate goal of the approach to educational planning and instructional design that we have described is transfer of skills that are associated with achieving the desired results from the learning setting to the practice setting. We view our approach as a continuum from learning to practice with appropriate assistance along the way to help individual learners and groups of learners move from where they are at the beginning of the learning activity to being capable of executing the skills that they are learning in a practice setting. But we would be unrealistic if we did not point out that there are a number of other factors that influence whether or not a physician learner can implement in his or her practice what was learned in a CME activity.

Caffarella[27] has identified 6 clusters of factors that influence transfer of learning into practice:[c]

1. *Participants* bring a variety of personal experiences, diverse backgrounds, and varying motivations to a learning activity, which will affect what they might learn and what they might use after the learning activity.

2. When *designing and implementing a learning experience*, planners may or may not consider transfer of learning to the practice setting. We believe that our approach considers transfer by suggesting the use of predisposing-enabling-reinforcing activities combined with the presentation-example-practice-feedback in the enabling activities.

3. The *content* of the learning activity may not provide participants the opportunities to develop necessary skills. In our approach, we suggest that planners focus on the clinically relevant information that is necessary to help participants develop skills associated with achieving the desired results.

4. Implementing new knowledge or skills into a physician's practice is a *complex undertaking* that involves changes in the people in the practice, professional practices, and the organization of the practice. We believe that the use of "authentic" cases and scenarios as described in our approach can approximate some of the messy, complex circumstances in most practices. But even the best authentic case cannot anticipate all of the complexities that exist in a practice. We

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suggest that planners consider using a performance consultant as part of reinforcing activities. A performance consultant could help practices understand how practice complexity interferes with implementation of new knowledge and skills and suggest strategies that take them into account.

5. *Organizational factors* such as structural factors, political climate, and cultural milieu can facilitate or inhibit the transfer of learning into practice.
6. *Community and societal forces*, such as the social, economic, political, and cultural conditions that exist in a specific community could affect how patients are able to access care and follow the treatment plan that a physician has developed for them.

Caffarella[27] points out that these factors can serve as barriers to or facilitators of learning transfer. We agree with her suggestion that content about how to manage potential barriers and how to take advantage of possible facilitators must be included in CME content along with the most recent evidence in clinical care. But we also suggest that this content must be included in enabling activities so it can be practiced under the watchful eye of expert faculty, with feedback provided where appropriate to enable learners to reach a level of competence in managing barriers and facilitators.

Finally, in an active learning environment, physicians can feel vulnerable and resist participation because they fear being exposed for lack of knowledge or posing an incorrect solution to a problem encountered as part of an educational exercise. CME planners should work to develop a safe environment for learning.[58] CME faculty should be encouraged to follow a strategy that helps physicians recognize a gap in performance and focus on improvement for the benefit of their patients, and should avoid actions that might threaten self-esteem.

Assessing Achievement of Desired Results Throughout the Learning Experience

In this section, we will address assessment. As in the previous section, we will describe an approach that integrates the components of our conceptual framework. Assessment, the extended outcomes format, instructional design and educational planning, and stages of physician learning will be integrated to varying degrees in our approach to continuous assessment.

When most people think about assessment, they typically think about *summative assessment*, that is, assessment at the end of an educational activity. The purpose of summative assessment is to determine if the desired results of the educational activity were achieved. There are 2 other forms of assessment, however. One, formative assessment, occurs during an educational activity to determine if it is on track to achieve the desired results. The second, needs assessment, occurs before and during the early stages of an educational activity to determine what content the educational activity should address to accomplish desired results by comparing

what participants know and what they could or should know. Thus, the 3 forms of assessment are really 3 parts of an assessment continuum that (1) identifies what the desired results of an educational activity are; (2) examines if the learning activities are contributing to the achievement of the desired results; and (3) determines if the desired results were actually achieved.

Summative Assessment and Desired Results

CME planners face enormous challenges if they continue to use current approaches to summative assessment in their efforts to help physicians meet the new MoC, MoL, and competency-based credentialing requirements described earlier in this article. Many CME planners have been using assessment techniques such as postcourse self-report questionnaires that focus on accomplishment of objectives, critiques of speaker performance, and meeting planning/logistical issues. Some planners have used knowledge tests, usually in connection with enduring materials, and other planners have begun to use commitment-to-change approaches,[59,60] occasionally with follow-up 3–6 months after a CME activity. In all probability, these approaches (with the possible exception of a revised commitment to change approach) will not help CME planners help physicians meet the new requirements.

Formative Assessment and Desired Results

There are challenges, but also significant opportunities, for formative assessment. When people think of formative assessment, they usually think in terms of "midcourse corrections," which usually mean changes in format or content. For example, the instructional design plan that is selected should be the best method to achieve the desired result(s). If planners determine during the activity that desired result(s) may not be accomplished, they may decide that the instructional design selected is not the best approach and make a change. This is most effective when CME planners regularly take a "biopsy" during learning activities by asking the question, "Will this lead to the achievement of desired results?" or "Is the gap between 'what is' and 'what should be' being reduced or eliminated?"

While this approach to formative assessment is important and should not be ignored, we are suggesting an additional approach that we think will make it more likely that desired results will be achieved. We believe that formative assessment should be a central part of the instructional design strategy and will be most useful in stage 4 of physician learning, trying out what was learned. Earlier, we suggested Merrill's approach to instructional design (presentation, example, practice, feedback) as the way to organize enabling learning activities. In practice and feedback, declarative and procedural knowledge are applied in authentic settings under the watchful eyes of faculty who are experts in the area of the desired result. As a result, the physician-learner becomes

more competent in skills related to the desired result. Methods in practice and feedback can range from case scenarios[61,62] with embedded audience response systems[63,64] or small group work[65] to objective structured clinical examinations (OSCEs)[66] with standardized patients.[67]

Needs Assessment and Desired Results

There are challenges and opportunities for needs assessment as well. Many CME planners have used surveys, "expert" opinion, and literature reviews as a primary method of gathering needs-assessment data. The needs-assessment data that have been collected in this way will be minimally useful in helping CME planners identify and address the learning needs of physicians. We described a different function for needs assessment in the previous section on planning. Using a gap-analysis approach to needs assessment, CME planners will be able to identify and describe desired results at an outcomes level consistent with the learning needs of physician-participants. This provides data showing the difference between what is and what should be that CME planners could use to create teachable moments during predisposing learning activities, provide guidance for both learners and faculty during practice and feedback sessions, and develop content for reinforcing activities and materials.

Measuring Competence, Performance, and Patient Health Status

While there have been some advances in approaches to all 3 forms of assessment, CME planners will have to use more sophisticated approaches to measurement at the competence, performance, and patient health status levels. There are not many examples for CME planners to use as models to measure CME outcomes. The uncontrolled and heterogeneous setting of patient care makes measuring physician performance and patient health status and then determining its association with an educational activity seem impossible.[68] To begin a conversation about assessment of physician competence and performance and patient health status, we will make some suggestions about approaches to measurement but with the caveat that these approaches are evolving and still need considerable work.

Assessing patient health status. Historically, patient health status (level 6) has been described in terms of morbidity and mortality. In recent years, the number of health status measures has increased to include physiological measures such as blood pressure and hemoglobin A1c, clinical events such as stroke and symptoms such as difficulty in breathing, and functions of daily living.[68] The primary assessment question here would be, "Did the health status of the patients of a physician-participant improve after participating in a CME activity?" If planning occurred as we described in the earlier section of this article, a desired result would have been identified from the needs assessment in terms of patient health status. Let us assume that the desired result was reduction in hemoglobin A1c to a range of 6.5 to 7.0, currently regarded as standard glycemic control.[69] We would be looking, therefore, for information about this health status measure, hemoglobin A1c. The best source for data about this measure, as well as many others, is the patient health record, but direct access to these records may be problematic because of cost and regulatory issues such as HIPAA. Another potential source is administrative data.[70] Considerable information about the practice of doctors is generated and stored as part of the process of administering health care and reimbursing services. While the clinical content of such databases typically is limited to demographics, diagnoses, and codes for procedures, these data have been used successfully to support research and quality-improvement efforts.[68] Again, access for CME planners may not be possible due to HIPAA issues.

In addition, CME planners can send self-report questionnaires to physicians, asking them to review their own charts and report about the health status of their patients. If this method is chosen, there may be problems with accuracy and "socially acceptable" responses. Planners also could send self-report questionnaires to patients asking them about a sample of health status measures. Questionnaires could be designed locally but instruments that have been evaluated for validity and reliability are recommended.[71] As with physician self-reports, there also may be problems with accuracy and socially acceptable responses.[72,73] CME planners and their collaborators must also be sensitive to "noneducational" factors that may have prevented accomplishment of desired results. Staffing, practice organization, and lack of health insurance are 3 examples of the many factors that might affect a physician's success in achieving desired results.

Assessing physician performance. The next set of issues would address measuring physician performance (level 5). Did physicians do what they were supposed to do to achieve the desired results? CME planners can answer this question by evaluating the process of care delivered to patients.[68] Activities of care include but are not limited to screening, evaluation, detection, diagnosis, prevention, development of a management plan, prescribing, and follow-up. The primary assessment question here is, "Did the clinical performance of physician-participants improve (ie, did she incorporate what was learned in the CME activity)?" Let's continue with the example of the diabetes patients and hemoglobin A1c. An important process of care for patients with diabetes is routine ordering of the H_{A1c} test. CME planners assessing physician performance could consider whether this test was ordered. As in assessing patient health status, data sources include patient health records, administrative data,[68,70] and self-report questionnaires to physicians and patients—all options that pose significant challenges as described in the section above.

Assessing physician competence. That being said, assessing physician competence provides the most controlled and homogeneous circumstances for measurement, and a variety of assessment methods are available. But predictive validity (ie, will a physician perform the same in practice as she performed under educational conditions) is not certain.[74] The primary assessment question asks, "Was a physician-participant able to show *in the educational setting* that she could do what she learned?" Again, in the case of patients with metabolic syndrome, a physician would be expected to order the H_{A1c} test for all patients with metabolic syndrome. The best technique for assessment would be observation of a participant engaged in "showing how to do what she has learned" during the practice-feedback sessions of the learning activity. If a physician were not able to show that she could do what she learned, additional questions would focus on whether or not she possessed the appropriate procedural and/or declarative knowledge. It might also be appropriate to ascertain if a physician-participant were satisfied with the educational activity; that is, did it meet her needs and expectations?

TABLE 3 lists selected assessment methods that could be used at outcome levels 4, 5, and 6. Use of these methods should be considered throughout the assessment continuum. For a more extensive listing as well as discussion of advantages and disadvantages of various approaches, consult articles by Jennett and colleagues,[75] Norcini,[68] Hays and colleagues,[76] van der Vleuten and Schuwirth,[77] and van der Vleuten,[78] and the Accreditation Council for Graduate medical Education (ACGME) toolbox.[79]

TABLE 3 includes both observed and self-report methods for assessment. There are strengths and weaknesses in both methods. Observation methods may produce more accurate data but may be more costly and more difficult to access. Self-report data might be more accessible and less expensive, but may be less accurate because respondents may provide the answers that they think surveyors want (social responses). Each method may be affected by HIPAA and IRB restrictions. In any case, each CME provider should consider resources and capabilities in decision making about which assessment method to use.

Summary

At the beginning of this article, we described the quality of health care in the United States as a major concern. Many groups inside and outside organized medicine have suggested ways to address the place of physician education in this concern. Among these groups, the Institute of Medicine has issued a challenge to reform health professions education, the ABMS and FSMB have begun initiatives to address issues of physician competence and performance, and the ACCME has established a new set of criteria that focuses more forcefully on improving physician competence, physician performance, and patient health status. We believe that current approaches to planning and assessing CME will not measure up to the new requirements and the expectations of society, and change will be required if CME planners expect to participate as full partners in efforts to address physician competence, physician performance, and patient health status.

It has been our goal in this article to initiate a discussion with the CME community and its stakeholders about this change and to propose our approach as that change. Here are some of the key features of our approach:

1. Developing approaches to assessing outcomes is not enough by itself; strategies for planning for the outcomes to be measured must be integrated with strategies for assessing them.
2. Start with the end in mind. CME planners should do gap analysis at each level of the expanded outcomes framework starting with level 7 (community health status) and continue until no gap is detected. Based on resources and capabilities, CME planners should determine an outcome level for planning and assessing, identify the gap between "what is" and "what should be" at that level, and develop a description of the desired results in terms of movement from "what is" to "what should be" that will serve as a guide for planning and assessment decisions.
3. Formative assessment is a very important part of the approach we are suggesting. It is important to create a teachable moment for physicians to become engaged, and it is important to provide reinforcing activities and materials to help physicians remember what to do, but it is even more important to provide a supporting framework for physicians to develop the skills that are associated with achieving de-

TABLE 3. Suggested Assessment Methods and Levels of Assessment

	Observed	Self-report
Patient Health Status *Level 6*	Patient health record Administrative records	Physician questionnaire Patient questionnaire
Performance *Level 5*	Patient health record Administrative records	Physician questionnaire Patient questionnaire
Competence *Level 4*	Observation during practice and feedback during learning activity OSCEs Scenarios with ARS Scenarios in small groups Standardized patients	Physician questionnaire Clinical scenarios (electronic) Clinical scenarios (print)

Lessons for Practice

- Current approaches to continuing medical education may not be useful as CME providers attempt to provide more performance-based learning activities in response to the requirements of Maintenance of Certification (MoC), Maintenance of Licensure (MoL), and competency-based re-credentialing.

- CME planners should examine the characteristics of their CME programs to determine what elements of the conceptual model presented here will help them develop and assess more performance-based CME activities.

- The single most important change that CME planners can make may be to provide opportunities for formative assessment during CME activities by incorporating practice and feedback sessions.

sired results. This can best be done during enabling activities by providing practice and feedback activities. Currently, most CME activities do not include practice and feedback opportunities.

4. Physicians who participate in CME activities are at different stages of their own learning. Using the "predisposing-enabling-reinforcing" approach to instructional design to provide clinically relevant information should connect with almost every physician-participant.

5. Assessment should be thought of as a continuum that identifies what content should be addressed in an educational activity, examines whether or not the educational activity is contributing to learning that content, and determines if the content was learned. CME planners should use gaps defined in terms of the extended outcomes framework to develop an assessment strategy.

6. Transfer of new knowledge and skills into practice is the ultimate goal and the desired result of a CME activity. But transfer of learning is a complex undertaking that may be affected positively or negatively by 6 clusters of factors. Including content about strategies to manage or take advantage of these factors as well as opportunities to practice these strategies in authentic case studies should be considered to enhance the possibility of transfer.

We understand that CME planners will not be able to implement this approach immediately after reading this article. If what we have presented is appealing, we suggest the following activities.

1. Think of your own learning about this approach in the same way that physicians learn about clinical issues: recognizing a need; searching for resources to address the need; engaging in learning activities (don't forget practice and feedback); trying out what was learned; and implementing what was learned.

2. As part of your learning activities, discuss with colleagues locally and nationally.

3. Begin to identify potential collaborators in your setting.[80]

4. Don't forget about formative assessment as you proceed to implementation.

Acknowledgment

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