

leaders. SNAP resulted from a political coalition of rural, conservative advocates for farmers and urban, liberal advocates for alleviating poverty; we envision a similar partnership between health care leaders taking on risk for population health and cost-related outcomes and human services leaders supporting the same populations. Increased bipartisan advocacy and support from health care leaders could help improve the political stability of human services programs and encourage innovations that enhance their effectiveness.

Smaller-scale programs have been testing grounds for determining how best to incorporate nonmedical factors into population health strategies. Yet scaling up this work will require much that is new: a new vision of responsibility for the health of pop-

ulations that extends beyond delivery of traditional health services; new payment models to support technological and care delivery innovations; and new — and perhaps more interconnected — relationships among various government programs, payers, health care delivery organizations, and community organizations. Failure to make practical progress on these steps risks undercutting the value of our large and growing investments in health care services. But getting them right will enable a coordinated system that uses all available avenues to improve the health of populations.

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From the North Carolina Department of Health and Human Services, Raleigh (A.M., M.C.), the Department of Population Health Sciences, Duke University School of

Medicine and the Margolis Center for Health Policy, Duke University, Durham (A.M.), and the Division of General Medicine and Clinical Epidemiology, University of North Carolina School of Medicine, Chapel Hill (S.A.B.) — all in North Carolina.

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Evolving Board Certification — Glimpses of Success

Alex Macario, M.D., M.B.A., Ann E. Harman, Ph.D., Tamar Hosansky, Mary E. Post, M.B.A., C.A.E., Huaping Sun, Ph.D., and Graham T. McMahon, M.D., M.M.Sc.

Physicians are busier than ever: the complexity of patient care has increased, patient expectations have evolved, production pressure is substantial, administrative burden is high, time is limited, and yet everyone is somehow expected to balance personal and professional responsibilities. Although physicians in practice acknowledge the fast-paced evolution in medical knowledge and skills and are generally committed to their professional responsibility to continuously improve their abilities, errors in decision making are commonplace and physician performance is variable. We believe

a key to overcoming these interconnected challenges is to create lifelong learning experiences that promote self-awareness and leverage principles of adult learning to provide the skills, competencies, and intellectual fulfillment that help physicians practice to the best of their abilities.¹⁻³

Educators and certifying boards are working together to integrate education and assessment, applying a variety of techniques that are effective and efficient in engaging physicians, such as simulation, small-group problem solving, reflective exercises, and adaptive learning. One effort to create ex-

periences to better meet physicians' needs in a changing practice environment is the redesigned Maintenance of Certification in Anesthesiology (MOCA) program from the American Board of Anesthesiology (ABA), known as MOCA 2.0. A collaboration with the Accreditation Council for Continuing Medical Education (ACCME) has enabled the ABA to link assessment with continuing medical education (CME) opportunities to support lifelong learning and skill maintenance.

The MOCA Minute, a longitudinal assessment program introduced in 2016, enables anesthesi-

Educational Rationale for the MOCA Minute Question Program.

Relevance

Questions are preferentially focused on professional practice areas identified by the physician.

Item selection is based on the perceived importance of the learning objective.

Questions are written by clinically active peer physicians.

Convenience

Available anytime by smartphone app

Can be done quickly

Can be done incrementally

Email alerts available

Retention

Items answered incorrectly or with low confidence are repeated.

Items are retired after multiple correct attempts with moderate confidence.

Efficacy

Feedback is immediate.

Feedback is explicit.

Information results in immediate learning.

Efficiency

Amount of irrelevant material is minimized.

Repetition is tailored to individual needs.

Accumulation of data over time allows creation of physician profile — identifying areas of strength and areas for growth.

Engagement

Personalized feedback (correct/incorrect) is intrinsically engaging.

Comparative feedback creates engagement by driving self-awareness.

Repetition of items answered incorrectly prompts engagement, as physicians attempt to improve their responses.

Individual correction of knowledge deficits

Shared data allow connection with related CME activities once gaps are identified.

ologists to identify their scope of practice and answer 30 practice-relevant multiple-choice questions per calendar quarter to continually assess their knowledge and problem-solving skills (see table). The ABA provides immediate and specific feedback for each question answered, connects the physician to targeted CME resources, and tracks the physician's performance longitudinally. The questions focus on relevant information that physicians should know without having to consult refer-

ences, so only 60 seconds is allotted for answering each question. After responding, physicians rate their level of confidence in their answer using a three-point scale (very confident, somewhat confident, or unsure). This system helps clarify what physicians know, when they are merely guessing, and where their blind spots lie. When physicians realize they have responded confidently yet incorrectly, they are more likely to engage in further education and retain knowledge. This process

creates a data-driven basis for seeking out and completing appropriate CME.⁴ Questions answered incorrectly or with low confidence are repeated at varying intervals to maximize reinforcement and retention. After each response, physicians are told whether their answer was correct and are given a critique that includes the key point of the question and offers more information about the topic, literature references, and connections to corresponding CME.

In October 2016, the ABA (with which three of us are affiliated) and the ACCME (with which two of us are affiliated) began a collaboration to help connect physicians to relevant CME activities. The ACCME allows CME providers to map their activities to the ABA's MOCA 2.0 content outline, communicates these opportunities to physicians, hosts a CME activity search tool (cmefinder.org), and shares information on physicians' completion of CME with the ABA. The ABA intends to provide the CME community with high-priority topics based on aggregate MOCA Minute performance data so that CME providers can design new offerings. In addition, because questions are mapped to the MOCA 2.0 content outline, the ABA can recommend targeted CME on the basis of the physician's assessment results. Neither the ACCME nor the ABA produces CME or financially benefits from physicians' participation in CME activities.

Physicians who actively participated in a pilot MOCA Minute program scored higher on the traditional high-stakes written cognitive examination taken to meet certification requirements than those who were not enrolled in

the program.⁵ In 2016, when the program was formally launched, 21,074 anesthesiologists participated, of whom 18,366 had time-limited (every 10 years) board certification; 90% of these physicians answered all 120 questions. In 2017, a total of 24,277 physicians participated, and among the 21,334 with time-limited certificates, 19,916 (93%) completed all 120 questions. Only a small number of physicians did not meet the minimum performance standard established by the ABA.

As of November 2018, 53% of MOCA Minute questions were linked to at least 1 CME activity, and more than 110 accredited CME providers had linked a combined total of 3261 activities to the content outline. ABA-certified physicians have access to 18,314 credits, or an average of 5.45 credits per linked activity. In the 2 years since its launch, more than 22,000 ABA-certified physicians have earned CME credits through this collaboration.

A 2017 survey conducted by the ABA found that 89% of the 4000 respondents who had taken the previous MOCA certifying exam considered the MOCA Minute a better approach for demonstrating their knowledge and problem-solving skills — 82% indicated that the program had served well as an assessment tool, 91% believed it effectively identified knowledge gaps, and 88% acknowledged the usefulness of the links to relevant CME.

We believe that the ABA's experience offers some generalizable lessons for other accreditors and certifying boards. First, relevance and efficiency are essential. Physicians welcome self-assessment and learning materials targeted to their self-identified scope

of practice and are more willing to engage in programs customized to their needs. Repetition of missed or guessed materials maximizes efficiency and ensures that each interaction with the program is engaging.

Second, it's important to identify blind spots. Physicians are motivated to perform well and willing to engage in remediation when their knowledge gaps are identified. Assessment programs can help physicians become more aware of their gaps and link them to easily accessible, accredited CME options to close those gaps. An additional benefit is that longitudinal assessment creates a powerful and ongoing connection between individual physicians and the accredited CME community.

Third, it is helpful to allow learners to take frequent small bites: intermittent, spaced repetition and retrieval maximize learning and retention. In contrast, bingeing or cramming diminishes retention. With MOCA Minute, for example, physicians are encouraged to answer their 30 quarterly questions in blocks of 3 to 5 at a time and then to read and later review the feedback materials and references for the questions, particularly for questions they initially answered incorrectly.

Fourth, research demonstrating the effectiveness of adaptive systems and educational technology suggests that boards and accreditors should clearly communicate the program's goals and outcomes, solicit and listen to users' feedback, continuously improve their education and assessment programs, and adapt their offerings to changes in the art and science of clinical practice.

Educational technology is rapidly advancing and enabling increasingly sophisticated insight into a range of individual competencies. Available technology can help educators and certifying boards to personalize assessments that promote greater self-awareness and support participation in CME and will further improve physicians' competency and skills. Certifying boards can, like the ABA, find new ways to give credit to physicians for their engagement in workplace learning (alone or in teams, in person or online) and in quality assurance and quality improvement work in collaboration with CME initiatives.

As our collaboration has shown, certifying boards and accreditors can work together to incorporate adult learning theory into systems that facilitate effective, efficient learning that is acceptable to physicians. To be successful, collaborating organizations will need to nimbly adopt a variety of new approaches that reflect a commitment to continuous improvement. By creating frameworks that inspire and nurture physicians, they can support physicians' accountability to their patients and the public, increase their access to meaningful learning experiences, and help them to remain current and to achieve their full potential.

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From the American Board of Anesthesiology, Raleigh, NC (A.M., A.E.H., M.E.P., H.S.); the Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University, Stanford, CA (A.M.); and the Accreditation Council for Continuing Medical Education, Chicago (T.H., G.T.M.).

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The Grace of Denial

Heather Sher, M.D.

I sat listening to the case presentation about a woman who waited far too long to seek care for advanced breast cancer. By the time she presented for medical evaluation, her right breast was twice the size of her left and hung like a misshapen butternut squash hidden under her blouse. The physical exam revealed that the tumor was breaking down her skin, which was ulcerated and excoriated, with the orange-peel texture common in advanced breast cancer. I listened quietly to the familiar conversation among the surgeons, oncologists, radiation oncologists, and presenting medical student. The “wonder why she waited so long” commentary was inevitable. The “what a shame” discussion followed. “She had health insurance,” the well-meaning student added, as evidence that funding was not a barrier to care in her case. The tenor of the conference was familiar to me after 14 years in clinical practice. I am well versed in the concept of patients’ denial in the face of a devastating diagnosis.

My mind drifted back to a lecture during my first year of medical school that had included a detailed discussion of the progressive symptoms and hopeless prognosis for patients with amyotrophic lateral sclerosis (ALS).

Outlining the way in which function would decline until the patient was left with no ability to move even a single muscle, the professor described the disease as “a front-row seat to one’s own death.” “What a horrible fate,” I thought, mentally cataloguing ALS as one of the worst diagnoses imaginable.

Then, during my second year of medical school, my father was diagnosed with ALS. To be honest, he wouldn’t be formally diagnosed until my third year — a delay caused by my own denial. During a hurried call I made from a pay phone at the library, my dad mentioned that he was becoming slow to get to the ball on the tennis court. I laughed it off as his excuse for having lost a match to his cousin over the weekend. My dad was notoriously hypercompetitive in recreational sports — with his friends, his relatives, and especially his children. But despite my attempt to minimize his complaint, he insisted that his muscles felt weak. Odd — my dad rarely complained.

I don’t know what prompted my next question. Perhaps it was the physiology test on motor neurons for which I was studying, but when I asked, “You don’t have fasciculations, do you? You know — muscle twitching?” his affirmative answer stopped me

cold. I had just heard another lecture on ALS, in which my neurophysiology professor had described lower motor neuron disease with dry, clinical detachment and opined that ALS is perhaps the worst of all diseases, because cognition remains intact while the body fails. A patient ultimately becomes “locked in” — fully aware but unable to communicate.

My father saw a neurologist within the next few weeks, and a full laboratory and imaging work-up ensued, complete with a brain MRI, a lumbar puncture, electromyography, and a sural nerve biopsy. Meanwhile, I vigorously researched alternative diagnoses in the medical school library. In those days of photocopying of printed articles, before computer use became widespread, I pulled journal after journal from the bookshelves in a quest to find a better diagnosis to explain my father’s symptoms. He had so much faith in me. I was determined to change his fate by doing an exhaustive search of the medical literature. This could not possibly be ALS. Dad was only 50 years old.

When I prodded him for more information, he told me he might have been bitten by a tick on a recent trip to the northeast. He said he’d developed a bull’s-eye-shaped rash on his elbow less