



Lifelong learning for the family physician

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Lifelong learning has undergone significant change over the past decade. The Institute of Medicine report "Health Professions Education: A Bridge to Quality" recommended the transformation of continuing medical education to go far beyond traditional lectures to include innovative educational processes, continual learning, and the direct application of medical education to clinical outcomes. These recommendations have led to changes in medical school and resident education and assessment and have served as the basis for Osteopathic Continuous Certification and Maintenance of Licensure programs. The purpose of this paper is to present new developments in lifelong learning including a discussion of ideal elements of lifelong learning, challenges to lifelong learning principles, and the role of technology in the process of lifelong learning.

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Most young physicians soon learn that graduation from medical school is the beginning of a self-directed lifelong learning process in which there are no textbooks, no lesson plans, and no professors to fall back on. Lifelong learning involves finding and implementing solutions to everyday problems encountered in the clinic, emergency department, surgical suite, or hospital ward, and then retaining that knowledge for future patient care scenarios.¹ Thus, lifelong learning is a dynamic process by which physicians continually update their medical knowledge and skills to optimize patient care.

Elements of effective lifelong learning

Considered historically as an integral part of medical practice, self-directed, lifelong learning really did not begin to become commonplace until the 1920s with the development of formal Continuing Medical Education (CME) programs.

In the 1970s, prescribed CME requirements for licensure, credentialing, and specialty recertification were beginning to be established and implemented.² By the 1990s, experts had begun to critically assess lifelong learning techniques to determine their relative effectiveness on improving the medical practice of physicians. Research revealed that the traditional CME lecture format was informative but fell far short in improving knowledge and practices.³ Hammond and Collins found that when learners took the initiative, with the support and collaboration of others, students not only learned more effectively but gained a sense of social awareness and responsibility and took personal responsibility for their own learning.⁴ The knowledge that education could affect practice behavior led to a comprehensive evaluation of physician lifelong learning by the Institute of Medicine as chronicled in the report "Health Professions Education: A Bridge to Quality."⁵ This report concluded that medical education should go beyond the periodic acquisition of knowledge and skills to become a continuous process that includes multiple medical competencies^{5,6} that lead to measurable patient outcomes. Table 1 lists the ideal elements of lifelong learning medical education programs as outlined in this report.

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Table 1 Elements of lifelong learning medical education programs—Summary of Health Professions Education: A Bridge to Quality report

Traditional	Recommended
Periodic lectures and assessment	Continuous Assessment
Knowledge- and skills-based	Address multiple competencies (i.e., AOA/ACGME competencies or the Institute of Medicine's 6 aims of medicine)
Focused on single-physician learner	Focus learning on interdisciplinary medical teams as well as physician
Lecture-based	Use multiple educational models that encourage active learner participation
Outcomes measured by determination of new knowledge acquired (i.e., quiz)	Measure outcomes based on patient outcomes or direct application of knowledge or skill to patient care

As a result of this report, programs have been developed to help support these concepts in medical education. Both osteopathic and allopathic medical students must now participate in performance evaluations at the second level of national board testing to assess the actual delivery of medical skills and knowledge at the bedside. Evaluation includes not just medical knowledge but the ability to synthesize medical information into a differential diagnosis and medical plan, as well as physician-patient communication and the ability to communicate to peers through a medical record. Both the American Osteopathic Association (AOA) and Accreditation Council for Graduate Medical Education (ACGME) adopted formal policies for graduate medical education that mandates the integration of medical competencies in resident education. Graduate medical programs are encouraged to measure education in these areas by multiple methods including tests, chart reviews, 360-degree evaluations, formal clinical assessment, and medical simulation.

Osteopathic Continuous Certification (OCC) and Maintenance of Certification (MOC) are the new processes proposed to replace previous certification programs. In addition to focusing on continuous education and assessment (vs. periodic recertification), OCC/MOC emphasizes self-assessment and performance improvement as a means to integrate learning with patient care. Maintenance of Licensure (MOL) is a parallel process aimed at physicians who are not currently board-certified or are not required to undergo ongoing certification (i.e., "one-time" certification). Again the goal is to encourage physicians to take an active role in educational programs that continuously improve patient care.⁷

As medical education continues to evolve, it is hoped that these learning principles will be adopted into a continuous process from medical school to clinical practice.

Teaching students how to develop self-study habits can prepare them for learning after graduating. Adopting medical student and medical resident assessment processes to practicing physician education may help physicians measure educational outcomes based on patient care and outcomes.

Challenges to lifelong learning

Physician self-assessment of educational needs is considered the cornerstone to lifelong learning. Each specialty and individual practice demands a variety of skills, necessitating each physician to develop skills in medical knowledge and skills assessment. Self-assessment can prove challenging, however. Without proper training in self-assessment, physicians tend to identify need based on what they enjoy or already know.⁸ This may reflect the negative aspect of medical school and residency training that tends to belittle students for admitting "I don't know." Unfortunately physicians have been conditioned to focus more on what they do well and not on what needs improvement.

Striving to improve can also hinder the educational process. Learning often involves initial failure, followed by re-evaluation and eventual success. Physicians have been trained to excel, often to the point they do not want to admit to their mistakes or take on new learning challenges. This tendency presents a unique challenge to performance improvement education. The goal of performance improvement education is to connect practice improvement with medical education. If physicians fear failure, they may not be willing to take on difficult performance improvement activities, or they may discount the knowledge learned from an activity that does not initially improve performance.⁹

Physicians must also learn how to evaluate the true effectiveness of new medical knowledge in actual patient care. Physicians sometimes rely on anecdotal evidence (i.e., personal experience in one case) to develop generalizations to all patients with a similar medical issue. Although what works for one patient may work for others, physicians need to develop skills in the critical evaluation of medical outcomes to determine whether their own observations reflect the more general population.¹⁰

Conversely, physicians may quickly abandon an effective medical strategy on the basis of one negative outcome. One study by Cairney et al. found that negative reinforcement by preceptors of the application of evidenced-based medicine discouraged its use by residents.¹¹ Physicians must learn how to evaluate the patient outcomes of a particular medical process or knowledge application worked for their patient, and how to systematically apply medical evidence in clinical practice.

First, lifelong learning cannot be an expensive or an obtrusive process. There is some concern that as models for OCC/MOC and MOL are developed, they will be viewed simply as new revenue streams for medical educators. Sec-

Table 2 Challenges to lifelong learning

Requirement	Challenge
Self-assessment of educational needs	Physicians may not be skilled in the identification of educational needs
Evaluation of the impact of medical education of clinical outcomes	Physicians may not be skilled in how to measure clinical outcomes related to medical education
Adopting "new" medical knowledge and skills to clinical practice	Physicians must learn to overcome historical biases to changes in clinical practice
Comprehensive ongoing physician education and assessment	Cost to physician and fear process will require extended periods of time away from practice

ond, they cannot require physicians to take extended leaves from clinical practice to complete. It is hoped that medical school and residency educators will work with specialty colleges, state licensing boards, and national board examiners to share resources and skills to develop lifelong learning programs that are effective, efficient, and readily accessible. A summary of the challenges to lifelong learning is listed in [Table 2](#).

Innovations in physician educational needs self-assessment

One method of improving physician self-assessment of educational needs is for physicians to "audit" their clinical performance against performance benchmarks. In this process, outside organizations such as the Agency for Healthcare Research and Quality (AHRQ) or specialty colleges identify both the quality measure and the recommended standard.¹² Physicians then compare their own performance against these standards to determine possible educational need and identify educational programs to improve clinical performance.

Tools that may assist in the audit process include the AOA Clinical Assessment Program (CAP),¹³ the AHRQ Consumer Assessment of Healthcare Providers and Systems (CAHPS) patient survey instrument,¹⁴ and the ACGME Assessment Toolbox.¹⁵ The CAP program is designed to allow providers to assess their clinical performance against national standards in diabetes, coronary artery disease, and women's health screening. The CAHPS instrument can be used to evaluate patient experiences both in ambulatory and facility environments. The ACGME Assessment Toolbox was designed to assess residents in postgraduate training. Tools include performance checklists, the 360-degree evaluation, and chart review. All of these instruments are designed to assist physicians in the performance of an audit of their own practice and provide tools for them to compare

practice results with national benchmarks. Results can help identify areas of need for future education and improvement.

In recent years, physician self-assessment of educational needs and integration of learning with practice improvement have been encouraged through Performance Improvement CME activities (PICME).¹⁶ The process includes: (1) Identification of a performance measure to evaluate clinical performance (i.e., how often a foot examination is done in the physician's diabetic patient population); (2) data collection and analysis regarding current performance; (3) development of a plan to improve performance; and (4) re-evaluation of performance through data collection and reflection on why (or why not) the intervention improved performance. The process often involves a literature review to assist with the development of effective interventional strategies.

Physicians are encouraged to use evidenced-based resources to develop effective performance improvement (PI) interventions. The focus of PI activities should include the educational process, not just practice outcomes. Failure to improve a clinical performance issue can provide as much education to the physician as an improvement in performance and should not discourage physicians from participating in PI educational activities. [Table 3](#) lists resources for physician educational needs self-assessment.

Technology and lifelong learning

Technological advances have made lifelong learning not only effective, but efficient and readily accessible to the practicing physician.¹⁷ Technological advances include the development of distance-learning technology (i.e., live and recorded Web-based presentations), multimedia education (e.g., videos, slide presentation, recorded narration, interactive questions and quizzes), medical simulation, and the development of Internet-based medical information. These developments can make medical education readily available at any time and any place regardless of schedule or practice location. In addition, the electronic nature of these resources means they can be updated readily much more quickly than print media. Finally, these advances can promote a variety of learning methods and styles, making medical education much more effective for a diverse group of learners.

Point of care learning (PoCL) is an example of how technology has been used to develop an effective lifelong program. PoCL is the process of answering a clinical question or researching a medical issue at the time of patient care.¹⁸ Three factors have made this process readily available and efficient at the time of care: (1) Development of evidence-based resources readily available on the internet (i.e., UpToDate, Cochrane reviews); (2) development of smart phone- and smart pad-based devices that make Internet-based resources readily available at the time of a patient visit; and (3) development of searchable Internet-

Table 3 Physician educational needs self-assessment resources

Self assessment process	Resources
Auditing tools	AOA Clinical Assessment Program (CAP) http://cap.osteopathic.org/ AHRQ Consumer Assessment of Healthcare Providers and Systems (CAHPS) patient survey instrument https://www.cahps.ahrq.gov/default.asp ACGME assessment toolbox http://www.acgme.org/outcome/assess/assHome.asp
Quality measures and guidelines	QualityNet http://www.qualitynet.org/ HealthTeamWorks Guidelines and Supplemental Materials http://www.healthteamworks.org/guidelines/guidelines.html AHRQ National Guideline Clearinghouse http://www.guideline.gov/

based journal databases (i.e., PubMed, Google Scholar, MEDLINE) that allow for rapid access to the most current medical information. Although searching for medical information itself is not necessarily an educational experience, formal PoCL consists of four components: (1) Identification of a medical question/issue related to direct patient care; (2) identification of an evidenced-based medical resource to answer the question (which may include a formal literature search); (3) critical review of that medical resource as it pertains to a patient's care; and (4) reflection on the clinical outcome of the application of that medical information to patient outcome (i.e., did it help, why or why not, how would I use this information in future cases?). The American Medical Association has developed guidelines and resources to assist in the PoCL process to ensure that it truly supports lifelong learning.¹⁶

Simulation in medical education has gained increasing interest in the past few years with the recognition that simulation in airplane pilot training can serve to educate and train without putting others at risk.^{19,20} Medical simulation can provide students a means to practice new techniques before applying them to a real patient. Simulation not only provides a means of learning a specific skill or technique, but it can provide a student the possibility of applying a newly learned skill in a variety of settings such as the emergency department, medical ward, outpatient clinic, or in the field. Simulation can also provide an opportunity for interdisciplinary teams to practice response to a medical scenario and practice intercommunication skills.

High-tech simulators, such as anesthesia or obstetrical simulators, are best used to simulate complex procedures and complex medical scenarios. Low-tech simulators, such as advanced cardiac life support, basic cardiac life support, or suturing simulators, are ideal for providing training in common procedures to large numbers of students. Both high-tech and low-tech simulation can be self-contained learning experiences or used in a process called *simulation in situ*. Simulation in situ consists of creating a mock medical scenario in an actual medical setting where a simulator is used to represent an actual patient. Simulation in situ

provides an opportunity for interdisciplinary teams to practice an emergent medical scenario in a real medical setting, including the practice of emergency procedures and techniques.²¹ Simulation in situ is ideal for preparing teams to respond to respiratory arrests, obstetrical emergencies, acute traumas, and cardiac arrest.

Computer-based simulators are programs that can provide multimedia education for a number of medical scenarios. Programs usually consist of case presentations, didactic education, and videos of procedural skills.²² Computer-based simulation can be used to train students before actual clinical practice or as a pre-educational module for more formal simulation. Table 4 summarizes technology-based resources for medical education.

Although technology can help support lifelong learning, it is not without its critics. Technology-based learning may be efficient and accessible, but it does not easily lend itself to interactive physician discussion. CME lectures and conferences not only provide a venue for case discussion but may also provide an opportunity to develop skills in peer-to-peer communication and professional development. There is also concern that patient care may "lose the human element," being distilled simply to a series of computer-based decision-making models. Reliance on computers or smartphone technology at the time of patient care may also interfere with direct physician-patient interaction. In addition, rural physicians may have limited high-speed Internet access or reliable smartphone signals.

Programs in lifelong learning: Osteopathic Continuous Certification

The OCC program was developed to combine many of the elements of lifelong learning listed here into a comprehensive educational process.²³ The five elements of OCC are: (1) Maintenance of an unrestricted medical license, (2) continuing medical education, (3) cognitive assessment, (4) practice performance assessment and improvement, and (5)

Table 4 Technology and lifelong learning

Technology	Advantages	Limitations
Web-based presentations	Readily available to learner; may be available anytime if recorded	May limit learner participation in educational experience
Web-based evidence-based medicine resources	Readily available, especially with smartphone technology; easy to keep updated	May make medical care “cookbook”; physicians must still be able to “critically appraise” resource; should not interfere with patient-provider dialog
Web-based journal databases	Rapid access to searchable journal databases	Not all full-text journals available without a fee; physicians may get “caught-up” in literature search and lose track of time
Multimedia education	Can provide multiple educational formats including procedural videos, slide shows, and interactive questions/quizzes; very good for preparing for a medical procedure or process	Can sometimes overwhelm the learner (too much input); requires training in multimedia production; limited use for PoCL education
Simulation	High-tech simulators can simulate high-risk procedures and scenarios; low-tech simulators can help teach common procedures and provide preparation for high-tech simulation	High-tech simulators can be very costly and require specialized training staff; physicians may find it difficult to immerse themselves into simulation

continuous AOA membership. This process is to be implemented by January 1, 2013. The goal of this program is to promote lifelong learning through a continuous process of education, assessment, and application of learning to the delivery of optimal patient care. This process parallels the MOC process developed by the American Board of Medical Specialties.²⁴ Osteopathic physicians who currently possess lifetime certification are not required to participate in this program but are encouraged to do so as a means to facilitate lifelong learning. Osteopathic physicians who have time-limited certification will find the process to mirror current certification processes, with the addition of a performance improvement CME activity. For many physicians, this performance improvement activity can be undertaken as an integral part of the daily practice of medicine. Each osteopathic certifying board is currently developing specific guidelines and tools for the OCC process.

Future directions in lifelong learning

Over the past decade, there has been a significant push to train students in techniques that will enable them to be lifelong learners. These changes have generated new interest in the development of medical education systems that will be applicable to the practicing physician. To be truly effective, lifelong learning programs must reflect the complexities of clinical practice and incorporate the needs and preferences of physicians. They must also be cost-effective and readily available to the actively practicing physician.

Future developments and challenges to lifelong learning will include defining the role of assessment in medical education and how to make lifelong learning and continuous practice improvement seamless. Both conversations can serve to improve the efficacy and safety of medical care

delivery, even as new medical information and technology continue to evolve in the coming decades.

The authors welcome any comments or feedback on this article and on the topic of lifelong learning.

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