



# The Future of Continuing Medical Education (CME) Technology

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## Introduction

In the first quarter of 2000 alone, an estimated 41 million Americans accessed the Internet for health care information and services; and this number is projected to reach 88 million by 2005. If nothing else, this phenomenon could bring an onslaught of well-informed (or ill-informed) patients swarming into medical offices to seek solace and treatment. As medical resources and physicians themselves become increasingly stressed by this onslaught as well as by other changes in the health care delivery system, the need to prove the value of continuing medical education (CME) becomes crucial. The value of CME can be shown by directly linking it to three measurable events: clinical outcomes, positive changes in physician behavior, and improved quality of care.

## Interactive CME

To be effective, CME must be practical, effective, efficient, easily accessible, and directly related to clinicians' daily lives. CME must also be convenient, present current information, use actual cases, and demonstrate useful methods for solving problems. New theories of learning suggest that, unlike didactic sessions (which seldom change physician performance), interactive CME sessions that enhance participant activity and that provide an opportunity to practice skills can effect change.<sup>1</sup> Given that the effectiveness of CME is both difficult to develop and

difficult to prove,<sup>2</sup> medical educators face a challenge: How can they help to introduce the burgeoning number of technologic advances, especially given increasing demand for accountability in medical outcomes and in cost-effectiveness? Holly Atkinson, MD—trained in internal medicine and now intimately involved with a "dot com" (ie, Internet-based) company—has noted that while physicians practice "laying-off" of hands as technology advances, patients are demanding "laying-on" of hands: Educators face an inherent challenge "to address the contradiction in training physicians in the latest, greatest, fastest technology while helping them keep sight of what is humanistic and spiritual" (Holly Atkinson, MD, personal communication, 2000).<sup>3</sup>

As we move from the "teacher-centered" model of learning to the "learner-centered" model, we must make this model both relevant to the workplace and inherently motivating. Indeed, self-directed, life-long learning becomes increasingly important as we struggle to keep pace with changes both in the health care industry and in health care itself. Developments in use of audiotapes, videotapes, CD-ROMs, teleconferencing, and e-mail are converging to make Internet-based CME more than just replication of a didactic session. Distance education has become more sophisticated as it becomes more interactive, more widely delivered as a "just-in-time" product, and highly rel-

evant to actual problems faced by clinicians.<sup>3</sup> Moreover, physicians have a new need to learn skills that have not been included in traditional medical curricula (skills such as cultural competency, alternative medicine, interpersonal communication, and shared decision making) in addition to the need for both professional competence and professional survival skills (eg, improved management skills and teamwork; familiarity with marketplace economics, clinical guidelines, and formularies; methods of delivering patient care by telephone; and computer literacy).

We describe several Internet-based CME initiatives being undertaken within the Kaiser Permanente (KP) system and that are establishing KP as a national leader in this type of CME activity.

## Videoconferences

Kaiser Permanente has one of the largest privately owned videoconference networks in the country. In Northern California, KP has been producing interactive, live videoconferences for more than ten years; 53 regional videoconferences were produced in 1999 alone, and many more videoconferences are both developed and broadcast locally. Regional videoconferences are broadcast live to locations in Northern California and Southern California, and all KP Regions can receive these live programs. KP currently offers regular videoconference series in alterna-

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tive health, geriatric medicine, medical ethics, musculoskeletal medicine, neurology, pediatrics, podiatry, medical research, and risk management as well as the monthly program, "*Permanente Medicine Today*." In addition to special videoconferences, these regular series provide education specifically directed to primary care physicians, specialists, and nonphysician clinicians.

Evaluation of all KP videoconferences was completed in 1999 and resulted in some changes in the regular series. For example, all programs were renamed with an overall series title ("*Permanente Medicine*") in addition to the specialty topic (eg, "Geriatrics," "Alternative Medicine"); this renaming was designed to indicate more clearly integration of programs into KP's CME program. Results of a survey conducted by KP showed that audiences preferred case presentations, interactivity, and practical informa-

tion. Because KP physicians told evaluators that they liked demonstrations and role-playing activities, those elements are now incorporated whenever appropriate. Use of a panel of presenters instead of the typical format—a single lecturer—has enhanced viewers' ability to "connect" with the program and provides a showcase for KP's wealth of internal experts.

As part of KP's integration of videoconferences into our CME curriculum, we have worked with the KP Northern California Region departments of Quality and Utilization, Pharmacy and Therapeutics, Medical-Legal, and with Physicians-in-Chief to plan programs. In many cases, videoconferences are part of implementing a larger effort, such as introduction of clinical guidelines. KP has also featured programs on organizational imperatives such as use of hospitalists, redesign of primary care, and use of group medical visits.

All KP Regional videoconferences are recorded, and all videotapes are available for later viewing. For many of these programs, CME credit is available. (For more information on videoconferencing, see article on page 58.)

### CD-ROM

The KP Regional Multimedia Communications Department has produced two interactive, multimedia CD-ROMs: one on shoulder pain (Figure 1) and one on low back pain. For both these CD-ROMs, content was developed by KP physicians. The CD-ROM on low back pain is based on the popular clinical guidelines developed in the KP Northern California Region and made widely available throughout the KP organization. The CD-ROM includes sections on anatomy, patient medical history and physical examination, laboratory tests, diagnosis, case management, appropriateness of medical or surgical referral, and case studies of actual patients with typical symptoms. These KP CD-ROMs are unique among educational CD-ROMs because they are easy to navigate and because their use of multimedia effectively demonstrates examination and injection techniques. Moreover, because the user interface in these CD-ROMs is so easily navigated, they can be used for "just-in-time" reference. More than 1000 copies of the CD-ROM on shoulder pain have been distributed nationally, and the CD-ROM on low back pain is currently available for sale (through MultiMedia Communications, Kaiser Permanente California) for \$5.00.

Jointly with an outside company, KP is developing a CD-ROM on dermatology for primary care physicians. This product uses a diagnostic algorithm developed by an academic dermatologist who has

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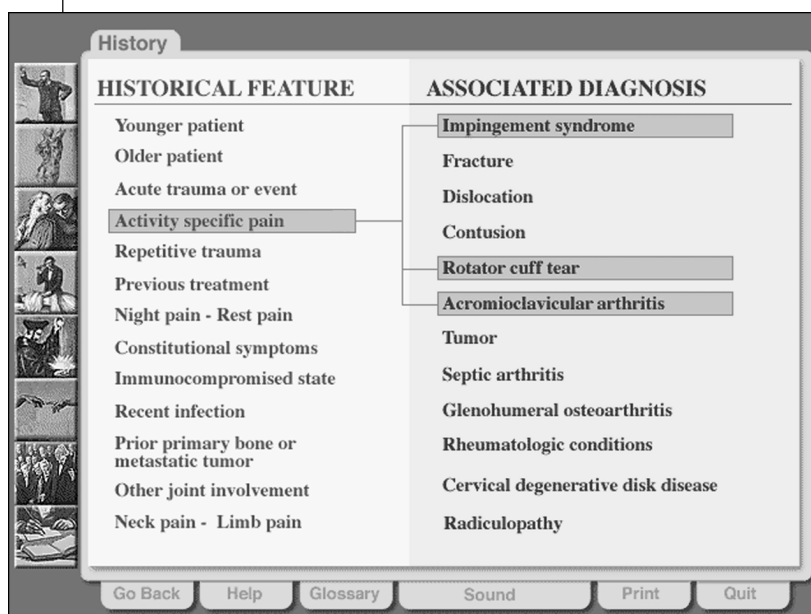


Figure 1. Sample of learner-centered physician education: Kaiser Permanente CD-ROM, Shoulder Program for diagnosis and treatment of shoulder problems.

(Source: The Shoulder, Version 2. Musculoskeletal Reference Series. The Permanente Medical Group, Inc Physician Education and Development Department, Oakland, California, 1996.)

used it for several years.<sup>4</sup> The content is based on the clinical skill summaries developed in the KP Northern California Region by a group of dermatologists and primary care physicians and approved by departments in both those specialties. The CD-ROM also uses a multimedia format and actual cases. This product is scheduled to become available by February, 2001.

### Internet-Based Learning

Use of Internet-based learning has rapidly spread to all industries and encompasses all types of content and professions. Recent proliferation of Internet-based CME programs has been sponsored by academic institutions, professional societies, pharmaceutical companies, and “dot com” health care companies.

A typical Internet-based CME program involves direct transfer of text or slide presentations onto a Web site. The content provider is usually a physician posting his or her latest lecture or article on the Internet. Physicians who view the Web site can simply read the text or slides, answer a few evaluation questions, and obtain CME credit.

In contrast to this unidirectional, single-format method of delivering CME programs, KP’s approach to high-quality, Internet-based CME is an anomaly in the CME industry. To address KP physicians’ demand for more flexibility in educational programs, KP has developed Internet-based CME programs available only on a password-protected Internet site, “Permanente Knowledge Connection” the URL for which is <http://pkc.kp.org>. This site is accessible day or night from either a home or office setting. Five programs are available on the Permanente

Knowledge Connection: “Asthma,” “Congestive Heart Failure,” “Coronary Artery Disease,” “Depression” and “Diabetes” (Figure 2). Another six programs are being developed and are scheduled for release before the end of 2001.

KP’s Internet-based programs are based on KP guidelines (national and TPMG) that were developed using an evidence-based approach. Use of evidence-based content with intensive program review by a team of physicians, technical experts, and education consultants results in an Internet-based educational program of high quality. In addition, instead of using embedded links to reference citations, KP’s Internet-based CME programs provide direct links

to the actual guidelines on which the CME programs are based. KP physicians have reported that this easy access to information has assisted them with both learning and retention.

To emphasize the educational content, KP has designed programs using principles of adult learning theory. Interactivity is maximized by using realistic patient cases to encourage application of concepts and recommendations in the guidelines. For auditory and visual learners, KP is beginning to use audiostreaming and hopes to use videostreaming when its underlying technology improves. However, believing that multimedia should enhance—and not distract

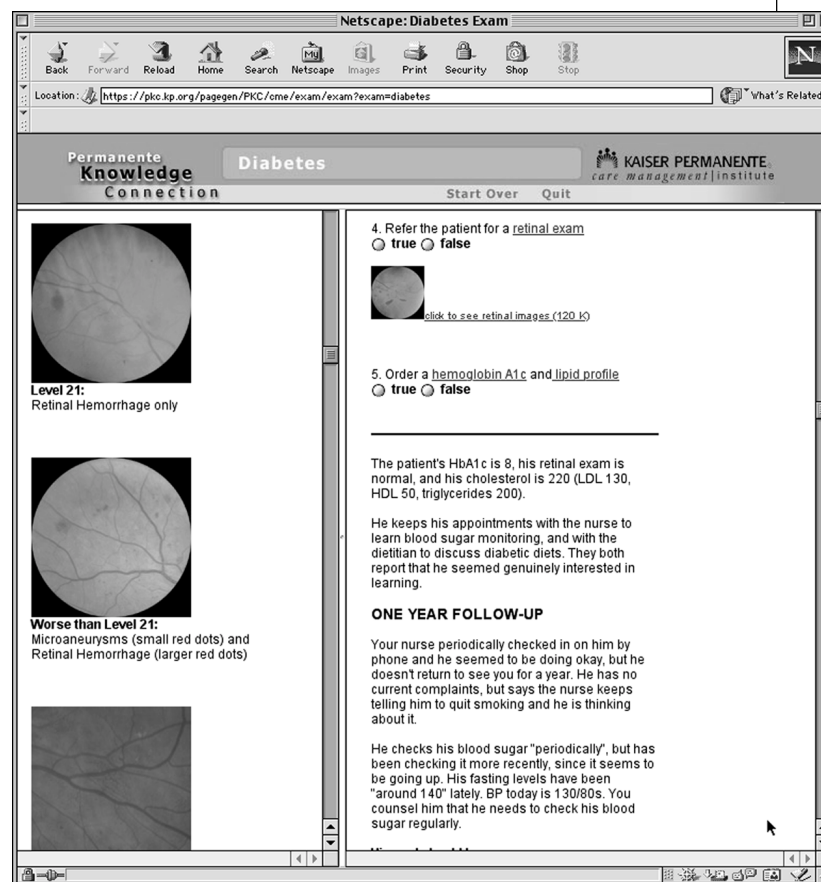


Figure 2. Additional sample of learner-centered physician education: Permanente Knowledge Connection Web site area, Diabetes Program. (Source: <http://pkc.kp.org/>)

**The physician orders medication directly from her handheld computer, which calculates the correct dosage on the basis of the patient's weight (already stored in the database).**

from—the learning process, KP is cautious in using multimedia enhancements to CME programs. A judicious amount of multimedia is used to support learning the guidelines; for example, multimedia can be effectively used to teach screening for diabetic retinopathy or diagnosis of diabetic neuropathy. We believe that KP's Internet-based programs deliberately avoid the trap of overusing the available multimedia enhancements commonly used by other Internet-based education programs.

KP's Internet-based CME programs are unique because they

offer a “clicks-and-bricks” approach—tangible resources are available in addition to those available on the Internet. Whereas many other Internet-based CME programs offer only medical content, KP provides an integrated approach to its education: Within KP, Internet-based education is supported by use of clinical practice tools such as speed-charting forms and quick-reference cards. System enhancements accessible at the facility level (eg, Internet-based formulary, clinical skill summaries, and clinical guidelines) allow KP physicians to use these Internet-based databases to reinforce and strengthen the content of KP's Internet-based CME programs.

### Future Applications

One possible future scenario: A physician using a computer to review her schedule sees that she will soon see a patient for skin rash and hyperlipidemia. She clicks on an option labeled “diagnosis” and is taken to the “Dermatology Step by Step” CD-ROM (maintained on her server), which guides her through a diagnostic algorithm. Having developed a clearer idea of how to approach the problem and knowing she can return to the CD-ROM for information on treatment after the diagnosis is made, the physician visits the Permanente Knowledge Connection Web site for the latest guideline for treating hyperlipidemia. Later, as she is working in her office, she connects to a discussion of dermatology issues on a live Web cast on the Internet as part of the *Permanente Medicine Today* videoconference series. After watching the program, the physician completes charting for her patients: As she records the diagnosis of hyperlipidemia, the computer automatically shows a

list of medications. The physician clicks on her first choice and is taken to the pharmacy site, which describes dosages, interactions, contraindications, and formulary status for the drug selected. The physician's computer logs the time and locations for all her Internet searches and provides her with a summary that she then sends electronically to her local CME office for credit.

Another possible scenario: A hospital-based physician is seeing a patient with renal failure. Instead of walking to the nursing station computer at the other end of the floor to check laboratory tests done in the past 24 hours, the physician takes her handheld computer from her pocket to check the patient's latest laboratory results by wireless local area network (LAN) (Figure 3). The physician orders medication directly from her handheld computer, which calculates the correct dosage on the basis of the patient's weight (already stored in the database). The order for medication is then transmitted directly to the pharmacy.

The physician then considers prescribing one other medication and enters its name into the handheld computer. Immediately, an icon flashes to warn of a clinically significant complication associated with this therapy. The physician clicks the “Guideline” icon on her entry screen and is shown an algorithm that helps her to determine her next steps. She also recalls that a discussion group by physicians about therapy for renal failure is on the Permanente Knowledge Connection Web site—which she can access from her handheld computer. She logs onto the site to find out what her colleagues are discussing. Curious about one physician's comments,

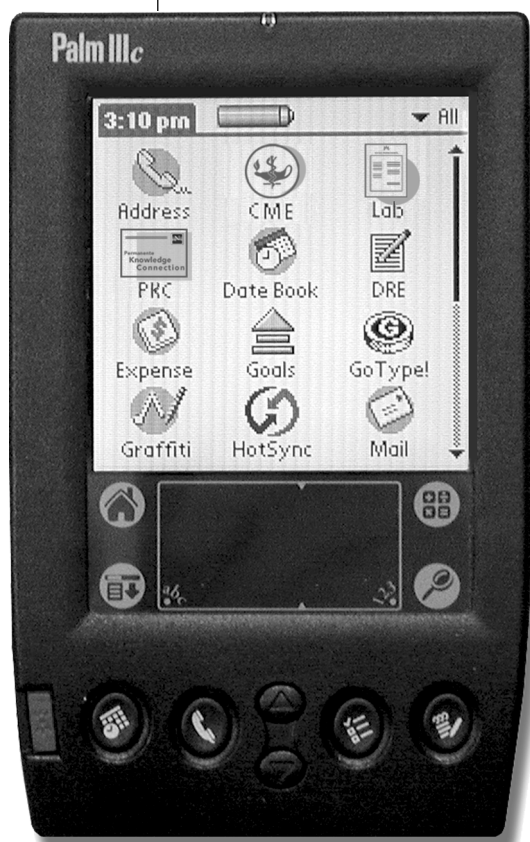


Figure 3. Futuristic idea of clinician's handheld computer-assisted access to data via wireless local area network: PalmPilot® entry screen with custom Kaiser Permanente icons added.

(Source: mockup produced by MultiMedia Communications, Kaiser Permanente California.)

she accesses his phone number from the discussion group database and calls him for a consultation.

In addition, she does a quick MEDLINE search on renal failure and downloads several full-text articles that she has selected for future reading. Her handheld computer tracks the time spent conducting literature searches and viewing guidelines and pharmacy databases, so the physician clicks on the "CME" icon to automatically report to her facility's CME office the amount of time spent on the research.

### Conclusion

In an earlier report on the possibility of Internet-based CME, Chow and Tan<sup>5</sup> postulated that several years might pass before a new type of technology penetrates an existing organizational culture sufficiently to become commonplace and perceived as useful. In only four years, Internet use by physicians—for CME or for other purposes—has skyrocketed from 3 percent (in 1995) to 80 percent (in 1999). The number of Web sites offering online CME has grown steadily from 18 (in late 1997) to

more than 100 (in 2000), although quality and relevance of these sites vary.<sup>6</sup> Most physicians are currently interested in computer-assisted CME, but they have been slow to accept this mode of education for several reasons: lack of accommodation to change, fear of the unknown, lack of time, reluctance to master a new modality, aversion to noninteractive education, and insufficient relevance of many Internet-based CME offerings. Fox and Bennett<sup>7</sup> identified two models of practice-based physician's learning: one model centers on self-directed learning which is developed and managed by the learner; the other model centers on a form of organizational learning, in which physicians can learn from patients, from peers, and from team colleagues. The authors<sup>7</sup> conclude that CME providers of the future will facilitate self-directed learning by providing opportunities for self-assessment and acquisition of knowledge and skills; high-quality individual and group education based on expertise and evidence; and assistance to health care delivery systems in developing and practicing organizational learning.

Medical educators are thus presented with both an opportunity and a challenge as CME enters the newest high-technology era. ♦

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### References

1. Davis D, O'Brien MA, Freemantle N, Wolf FM, Mazmanian P, Taylor-Vaisey A. Impact of formal continuing medical education: do conferences, workshops, rounds and other traditional continuing education activities change physician behavior or health care outcomes? *JAMA* 1999 Sep 1;282(9):867-74.
2. Tan KM, Casebeer LL. Needs assessment of learning outcome evaluation skills among continuing medical education providers. *J Continuing Educ Health Professions* 1998 Fall;18(4):206-12.
3. Havens C. The practice. In: Biddle S, Huffman B, Moore D, editors. *The practice of CME: putting evidence into action.* (in press under the auspices of the Alliance for Continuing Medical Education).
4. Lynch PJ, Edminster SC. Dermatology for the nondermatologist: a problem-oriented system. *Ann Emerg Med* 1984 Aug;13(8):603-6.
5. Chow YC, Tan KM. Regional electronic board system: three years of experience with continuing medical education. *J Continuing Educ Health Professions* 1994;14(3):166-72.
6. Sklar BM. *The current status of online continuing medical education [dissertation].* San Francisco (CA): University of California, San Francisco; 2000. On the World Wide Web (accessed Oct. 2, 2000): <http://www.netcantina.com/mastersthesis/>
7. Fox RD, Bennett NL. Learning and change: implications for continuing medical education. *Br Med J* 1998 Feb 7;316(7129):466-8.

**For information, or to order the Kaiser Permanente CD-ROMs on back or shoulder pain, contact:**

**MulitiMedia Library  
1950 Franklin St, 3rd Floor  
Oakland, CA 94612  
510-987-4991 or 8-427-4991  
MultiMedia.Library@kp.org**

**Cost is \$5.00 per CD-ROM (includes shipping and tax);  
Checks should be made payable to KFHP.**