

Internet and Continuing Medical Education

By

Alex Gandsas, MD¹ and Katherine McIntire, MD²

- 1- Department of Surgery. University of Kentucky, Lexington, KY.
- 2- Duke University, School of Medicine

Contact information:

Alex Gandsas, MD
Department of Surgery
University of Kentucky
800 Rose Street, Suite C-349
Lexington, KY – 40536 - USA
Tel: (859) 323-7637
E-mail: webmaster@laparoscopy.com

Abstract:

Keeping abreast of medical advances is an important, ongoing responsibility for medical professionals, one that categorizes physicians as lifelong students. In the United States, Continuing Medical Education (CME) is the bridge that connects basic research and the practicing physician who must fulfill credit requirements for licensure and board certification. Developments in multimedia technology and the Internet have made online CME courses possible, making the process of obtaining CME credits more efficient and convenient for physicians. Although first generation courses have been criticized for the lack of interactivity, new developments in multimedia technologies and broadband connectivity promise a new online learning experience where distant participants can communicate using voice or video channels. In addition, future online CME generations may incorporate virtual reality modules that will enable physicians to learn and practice procedural techniques as well as gain knowledge. Continued application of sophisticated technologies and continued content-development promises to add new dimensions to traditional learning and may identify online CME courses as a major medical education paradigm.

Introduction:

At least since the time of Sir William Osler¹, it has been recognized that a career in medicine means a lifetime of learning, a philosophy that represents a physician's commitment to patient care in an environment where new research developments continually evolve clinical practice standards. In the United States, Continuing Medical Education (CME) has become the official mechanism that brings advances in basic medical research to the practicing physician, and, over time, emerging technologies have

made critical changes in CME course formats that have improved accessibility and cost-effectiveness. This trend will continue well into the future as new technologies promise to add new dimensions to computer-based learning modules.

The CME concept has been institutionalized in the United States to ensure the quality of health care delivery. Over the past six decades, a growing number of American Medical Boards and societies have incorporated CME credit requirements for membership.^{1,2} The Accreditation Council for Continuing Medical Education was created in 1975, and, as of 1997, 24 out of 28 American specialty boards required that physicians earn CME credits to obtain certification and licensure.³ As a result, United States physicians must now engage in a lifetime pursuit of CME credits. However, earning required CME credits is no small feat given physicians' lifestyles, especially in academic settings where clinical, research and teaching responsibilities must be juggled.

Fortunately, new technologies have eased the burden, increasing the convenience, efficiency and cost-effectiveness of CME courses. Over time, technology has evolved CME course formats from the traditional didactic sessions held in vacation destinations to include more accessible, mass-distributed courses available on videotape, audiotape and CD-ROM. However, the Internet and computer-based technology perhaps have the greatest potential to improve CME offerings.

In recent years, widespread use of the Internet and new multimedia data communication technologies have created the first generation of on-line CME courses taught in virtual classrooms. While first generation courses are little more than recorded courses with the increased convenience of immediate accessibility, the industry is in its infancy, and technology is developing rapidly. Second generation courses may include

interfaces that allow user interactivity, allowing the experience to approximate the traditional “live” lecture, the current educational gold standard. The on-line experience will continue to be improved as new technology develops, and subsequent generations may include remote access to computer-based virtual reality programs that enable physicians to learn and practice procedural techniques. At some point in this evolution, more powerful handheld machines with wireless connectivity will become the norm, enhancing accessibility even further.

A concept that began as an annual anatomy refresher course for Venice physicians in the fourteenth century³, CME may be a mobile, interactive, tactile, on-line, virtual reality experience in the 21st century. Such new dimensions will give the on-line CME learning experience unique advantages over the traditional “live” experience, and may earn it the position as the new educational gold standard.

Emergence of On-line CME Courses:

In the early 1960s, the Advanced Research Projects Agency (ARPA), a division of the United States Defense Department, created the Internet. At that time, no one could have predicted the profound impact this high-speed communication network would have on society at large. The medical field was no exception, and the Internet was initially used solely to exchange scientific information. However, improvements in data transmission technology and computer hardware have expanded the role of the Internet to medical education.

The idea of creating virtual classrooms, including on-line CME courses, was born out of two major developments. Five years ago, the Internet underwent explosive growth when it became possible to deliver information using “high end multimedia formats,”

and, in the late 1990s, faster computer processors and updated networks enabled the transmission of streaming video/audio. Subsequently, academic institutions, non-profit organizations and the private sector recognized the potential for Internet-based, remote learning programs, and the first on-line CME courses emerged in 1996.⁴ These first generation on-line CME courses, offered mostly by Universities, are pre-recorded courses or text with illustrations that can be accessed instantaneously twenty-four hours a day from any computer connected to the Internet. Typically, a one-time fee ranging from five to fifteen dollars an hour is assessed, requiring the physician to make an on-line payment. As a result, course material can be mass distributed to a global audience at their convenience and to the point of care.

Many authors have acknowledged the potential power of distant learning programs.^{4,5} Specifically, on-line CME courses represent a cost-effective, convenient option and one that affords physicians much flexibility when fulfilling credit requirements. Physicians can select the subject, the speaker, the pace of the course, and the location where they learn. Importantly, research has identified on-line CME courses as an efficacious teaching tool that many physicians like. Recently, the American Cancer Society and Medical Directives, Inc reported that on-line course takers demonstrated a greater improvement in knowledge than physicians who attended the same course presented in the traditional “live” format.⁶ In addition, a 1999 e-mail survey of Midwest physicians conducted by the University of Wisconsin reported that 85% of the respondents favored on-line courses, a result that lead the University to offer on-line clinical and administrative courses.⁷

Considering the research statistics and the theoretical advantages, it is no surprise that on-line CME offerings are expanding. From 1997 to 1999, the number of on-line CME courses increased by 110% and the number of CME websites increased by 58% (see Table 1).^{8,9} As a result, there is a growing selection in a variety of specialty areas. As the on-line CME supply continues to grow, physicians will have a broader selection, affording them even greater flexibility in how they fulfill CME credit requirements.

Trends in On-Line CME Usage:

The supply of on-line CME courses is increasing in an environment where an increasing number of physicians are computer savvy and take advantage of Internet resources. However, despite the ripe environment and the recognized power of on-line learning, studies show that while physician usage is increasing, existing CME courses remain underutilized.

Over the last five years, the proportion of physician Internet users has increased significantly from 3% in 1995 to almost 80% in 1999.¹⁰ A Medical Association Marketing Group survey of American Medical Association physicians also reported a 15% increase in on-line physicians from 1997 to 1999.⁸ However, the majority of these “MD surfers” are not taking advantage of on-line CME courses. Surveys conducted at two major medical meetings revealed that physicians still receive the majority of their credits from lectures and out-of-town conferences and that less than five percent of credits are earned online.⁴

Research has pinpointed several issues that may explain why physicians are reluctant to use this valuable resource. Major shortcomings of first generation on-line CME courses include access problems, the lack of interactivity, a perceived lack of

sufficient computer skills and a mistrust of e-commerce. Because CME courses operate on a fee-for-view basis, course content is secured behind firewalls where it can only be accessed via log-in/password protocols. As a result, course content is invisible to search engines, and it can be difficult for physicians to locate specific courses related to their specialty. In addition, according to a 1999 survey of Pediatricians and Family Physicians, 22% of the respondents reported that they would be unwilling to use online CME due to the impersonal nature of the experience and thus preferred live sessions.¹¹ Another study found that some physicians are uncomfortable with the logistics involved in connecting to and using the Internet and that they did not feel they had the time to learn these skills.⁴ Finally, a number of physicians are reluctant to use any Internet resource that requires online payment.⁹

Many of these problems have simple solutions. Informational billboards describing the title and content of CME courses can be posted on the Internet and would be visible to search engines. Equipping such billboards with the appropriate links would further facilitate the matching of physicians with relevant CME courses. Connecting to and using the Internet requires minimal skill, and one study reported that, once shown how to use this resource, the majority of physicians were willing to try online CME courses. The technology exists to incorporate some degree of interactivity into online courses. Readily available web interfaces including instant messaging, web telephony, discussion forums or chatrooms can be used create a two-way communication channel, more closely simulating live formats. In fact, some CME sites have already incorporated chat interfaces embedded into webpages that allow interaction while slide presentations or other multimedia content (video/slides/sounds) is played.

However, despite the shortcomings, projections for future on-line CME utilization are still optimistic. Studies predict that the number of physicians seeking on-line CME credits will increase from an actual 2% in 2000 to 50% over the next several years.⁸ Perhaps improvements on existing formats (creating the second generation) and interventions to improve access and Internet skills will also increase demand to match the supply. Computer-based CME courses clearly have tremendous potential, which will expand as technology advances.

Future directions for on-line course development:

Existing technology is continually being improved and new technologies are always on the horizon. As these are applied to improve on-line education modules, each subsequent generation of CME courses become a more powerful teaching tool, possibly rendering live sessions obsolete.

Technology enabling interactivity exists, and it is only a matter of time before second generation online CME courses will be offered that incorporate this technology, more closely simulating the live experience while preserving the convenience of delivery to the point of care. Broadband Internet connectivity, which allows the transmission of large amounts of data, is rapidly becoming available in the United States. According to a recent Federal Communications Commission (FCC) report, the number of installed high-speed lines increased from 2.7 million in 1999 to 7.1 million at the end of 2000. Currently, in the United States, cable modem users total 3.6 million while DSL users account for 2 million.⁽¹⁰⁾ Thus, it is not difficult to imagine that these keyboard based modules will soon be replaced with IP (Internet Protocol) videoconference interfaces

where user will be able to ask verbal questions in real time from their own computer terminal.¹²

By integrating fast Internet access and computer-generated simulated worlds, subsequent generations of on-line CME courses may incorporate a tactile dimension, integrating knowledge and practical training. On-line training in procedural techniques can be accomplished by combining Virtual Reality Markup Language (VRML) protocols with haptics devices that allow users to “feel” and “touch” objects. For example, at the University of Kentucky, a virtual reality simulator (ImmersaDesk, Fakespace Inc.) equipped with a force feedback device (PhantomTM) simulates trocar insertion for a laparoscopic cholecystectomy and is used to teach medical students and surgical residents. This exercise, although practiced using the virtual reality machine, can actually be practiced (with almost no delay) from a remote location as long as all computers are linked through a high-speed network. Developing a generation of on-line CME courses incorporating this technology will allow physicians to learn and practice technical skills from their desktops.

Wireless connectivity will give even more flexibility to physicians who seek online CME credits “on the road,” adding more choices in the location where they learn. Downloading on-line CME courses into a handheld computer equipped with fast, wireless Internet access will free physicians from their desktop computers and other wired infrastructures. Again, this technology exists and it is only a matter of time before it becomes commonplace.

Continually evolving new generations of on-line CME courses by applying new Internet and computer-based technologies promises to add new dimensions to the online

learning experience. However, given the complexity of designing compelling and efficient on-line educational programs, the real challenge is not on the technology or tools used, but on the content offered. Websites offering CME courses must contain a sufficiently large library of materials, including courses relevant to each specialty and a variety of formats to choose from. In addition, CME programs must provide physician consumers with global authorities on a particular topic, and each curriculum must be accredited by an academic institution and/or by the ACCME (www.ACCME.org). Such diligence in technology and content development may define on-line, computer-based learning as the new gold standard.

Table 1: Alphabetical List of Sites Offering Online CME Courses

Name of Site	Courses	Credit-Hours
AAFP Monographs	2	4
AAPM&R EMG Case-of-the-Month Series	34	34
Academy of Medicine of New Jersey	3	4.5
ACC'99 CME Online Conference Summaries	4	10
Age Related Macular Degeneration	1	1
Alcohol Problems: Psychosocial Issues	1	12
AMA Archives	4	8
American Academy of Orthopaedic Surgeons	2	6
American Medical Association Online CME Courses	6	12
American Psychiatric Association	3	15
American Society of Clinical Oncology	4	4
Annenberg Center for Health Sciences	3	1
ArcMesa Educators	54	207
Association of Reproductive Health Professionals	3	3
Asthma Diagnosis and Management (Cine-Med, Inc.)	2	8
Attention Deficit Hyperactivity Disorder (AD/HD)	1	2
Baylor College of Medicine	5	4
Bipolar Disorders Letter	4	6
Breastfeeding Basics	1	1
Cancer Control Moffitt Cancer Center	12	48
CardioVillage	1	3
Children's Hospital	2	2
Chronic Venous Insufficiency	1	2
Cleveland Clinic Journal of Medicine	19	21
CLIA and the Physician's Office Laboratory	13	20
Clinical Puzzles Online Course	12	18
CME@The University of Wisconsin-Madison	1	2
CME-CE.COM	26	40
CMEWeb	15	15
CME-WebCredits	3	21
Controversies in Acromegaly	1	1.5
Controversies in Cardiology	3	3
Current CME Reviews	36	72
Cyberounds	50	50
Ed Credits	11	24
Essentials of Immunology Online	1	18
Expert Preceptor Interactive Curriculum (EPIC)	1	20
Frontiers in Biomedicine	40	60
Frontiers in Clinical Genetics	15	22
HealthGate	30	47
HealthStreamUniversity.com	415	830
HeartInfo Cholesterol Management	1	1
Helix Continuing Medical Education	2	2
Hematology/Oncology Board Review	1	65
Interactive Patient	1	1
Interactive Testing in Psychiatry (ITP)	7	7
Johns Hopkins Saturday Medicine Rounds	49	49
Journal of Clinical Psychiatry	5	5
Legal Medicine	9	45
MCP Hahnemann University	11	16

Table 1 – Alphabetical List of Sites Offering Online CME Courses, Continued

Name of Site	Courses	Credit-Hours
Medbytes	22	22
MedConnect Emergency Medicine	24	24
MedConnect Family Practice	10	15
MedConnect Managed Care	3	5
MedConnect Neurology	3	3
MedEd Interactive	12	32
Medical Matrix Symposia on the Web	3	5
Medicine & Behavior Continuing Education	6	9
MediCom of Princeton	3	4
Medivision Virtual Online Training	30	45
MedRisk Online	8	45
Medscape CME Center	470	470
MedWatch	1	1
Meniscus Grand Rounds Online	1	1
MMWR Continuing Education Programs	9	18
Neurology and the Internet	1	3
New Course Education	1	1
NIH Consensus Statements	12	12
Overactive Bladder	1	3
Pain.com	40	41
Pediatric Grand Rounds	50	50
Posterior Lumbar Interbody Fusion (PLIF) Procedures	1	4
PowerPak Communications	2	5
Primary	43	43
Primary Care Medical Education	3	3
Psychiatric Times	12	18
Pulmonary and Critical Care Update	24	24
Radiological Society of North America	14	16
Society of Nuclear Medicine	4	4
Stanford Medical Informatics	1	25
Stanford Radiology Online CME	15	16
Texas Medical Association	5	5
Texas Medical Association Stroke Project	1	3
The Doctor's Dilemma	1	15
University of Washington Online CME	5	10
University of Alabama at Birmingham	16	16
University of Florida	5	5
University of Oklahoma College of Medicine	25	25
University of Pennsylvania	1	1
University of Texas Southwestern Online	4	6
UPMC (University of Pittsburgh Medical Center)	2	7
Virtual Dermatology (Indiana University)	1	3
Virtual Gastrointestinal Endoscopic Biopsy Course	1	10
Virtual Hospital (University of Iowa)	30	30
Virtual Lecture Hall	16	63
Virtual World Congress Chest Diseases 1997	1	21
Totals	1874	3060

References:

1. Uhl, HS. A Brief History of Continuing Medical Education in Rosof A. B. & Felch WC (Eds). In: Continuing Medical Education: A premier. Westport, CT: Praeger.1992:8-14.
2. CME Resource Guide. Specialty Board with CME Requirements. American Medical Association. Available at: <http://www.ama-assn.org/cmeselec/cmeres/cme-5.htm#table3>. Accessed on October 8, 2001.
3. Ell SR. Five hundred years of specialty certification and compulsory continuing medical education. Venice 1300-1801. JAMA. 1984 Feb 10;251(6):752-3.
4. Peterson MW, Galvin JR, Dayton C. et al. Realizing the promise: delivering pulmonary continuing medical education over the Internet. Chest. 1999;115(5):1429-36.
5. Gandsas A, Draper K, Chekan E, et al. Laparoscopy and the Internet. Surg Endosc. 2001; 15:1044-1048.
6. Neveleff DJ. Physicians Find Quality CME on CDs and Online. Available at: http://www.qualityindicator.com/cgi-bin/article.cgi?article_id=822 Accessed on October 18, 2001.
7. CME Will Go On-line. University of Wisconsin Medical School, Office of CME. Available at: http://www.cme.wisc.edu/survey_results/surveyresults.html Accessed on October 8, 2001
8. Greene J. Getting CME credit online. American Medical News. Available at: http://www.ama-assn.org/sci-pubs/amnews/pick_00/prsa1127.htm Accessed on October 18, 2001
9. Sklar BM. The Current Status of On Line Continuos Medical Education. Available at: <http://www.netcantina.com/mastersthesis/> . Accessed on October 9, 2001.
10. Lundberg, G. The Future of Medical Practice on the Internet, Speech presented February 8, 2000 at the eHealthcare Conference in Scottsdale, Arizona. Available at <http://www.medscape.com/Medscape/GeneralMedicine/audio/mass/glundberg3.ram> Access on October 8, 2001.
11. Olson CA. Distance Education Preferences of Midwestern Pediatricians and Family Physicians: A Market Survey. Available at: <http://www.pediatrics.wisc.edu/education/cmestudy>. Accessed on October 8, 2001.
12. Miller M. The Broadband Boom. PC Magazine. 2001; 20(17): 8.