

Original Article

On-Site to On-Line: Barriers to the Use of Computers for Continuing Education

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Abstract

Background: Continuing education/continuing medical education (CE/CME) programs that adopt self-directed, computer-based instruction formats via the Internet or CD-ROM can ease the demands placed on clinicians who are required by licensing boards to accumulate CE/CME credits as part of their career-long learning. Despite the benefits and availability of computer-based instruction, on-site programs still dominate current CE/CME delivery modes. In order to increase the use of computer-based CE/CME programs, it is important to identify the barriers that inhibit their use.

Method: A survey was conducted to assess the practices, preferences, and barriers to use of CE/CME delivery methods among physicians, nurse practitioners, and physician assistants in Nevada.

Results: Of 3,213 surveys sent, 1,120 were completed and returned for an overall response rate of 35%. In-person conferences (93%) and print-based methods (66%) were the most frequently reported methods of acquiring CE/CME. The majority of respondents had access to computer-based technologies. Respondents with more years in clinical practice were less likely to have access to or to use computer-based technologies. The top three preferred CE/CME delivery modes, in rank order, were in-person conferences, print-based self-study, and CD-ROM. The least preferred method of receiving CE/CME was interactive audioconference (telephone conference calls). "Not knowing how" was the most frequently reported reason for not using the Internet for computer-based training and the second most frequent reason for not using a CD-ROM.

Implications: Program planners may wish to offer training in new technologies during on-site conferences, provide CD-ROMs as take-home instructional materials, or promote technology awareness in other ways to help clinicians prepare for changes in the electronic delivery of health care and education.

Key Words: Access, barriers, computer, continuing education (CE), continuing medical education (CME)

Background

The primary aim of continuing education/continuing medical education (CE/CME) is to keep clinicians abreast of new developments in the med-

ical field in order to enhance their skills and ultimately to improve patient care.¹ The most successful modes of CE/CME are those that accurately assess and address the specific needs of clinicians and that involve them actively in the learning

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process.²⁻⁴ Today, there is increasing interest in the development of computer-based delivery methods for CE/CME programs. This is not surprising as computer-based modes are active, self-directed, and participatory and provide instant feedback.^{5,6}

Many technologically advanced methods have been developed and adapted for CE/CME,² particularly computer-assisted instruction using CD-ROM or the Internet. Computer-based delivery, along with other technologically advanced methods such as live satellite conferencing and compressed videoconferencing, provides participants with many advantages over traditional methods for the delivery of CE/CME. Computer-based methods, as opposed to traditional in-person conferences, offer participants the advantages of convenience, reduced costs, continually updated information, reduced time away from the workplace, and a format that allows learning to occur at the individual's pace.^{2,4,5,7} CE/CME programs that adopt self-directed, computer-based instruction formats via the Internet or CD-ROM can ease the demands placed on clinicians who are required by licensing boards to accumulate CE/CME credits as part of their career-long learning.

As of January 2000, 90 Websites that offer CME have been identified,⁸ a clear indication that CE programs are becoming increasingly popular on the Internet. Despite the benefits and availability of computer-based instruction, passive modes of learning or those that are not self-directed still dominate current CE/CME efforts.⁵ If clinicians are to be convinced to take advantage of computer-based modes of receiving CE/CME, it will be necessary to identify their current use patterns, evaluate their intent to begin using computer-based instruction, and identify the barriers that inhibit use of new technology.

Method

A survey was conducted to assess the practices, preferences, and barriers to use of CE/CME delivery methods among physicians, nurse practitioners, and physician assistants in Nevada. The sampling frame included all licensed clinicians in

these three fields. In addition to demographic information, methods of obtaining CE/CME in the past year by these clinicians were examined.

The content of the questionnaire was adapted from a previous survey designed by the Francis J. Curry National Tuberculosis Center to assess distance learning preferences and capabilities of five physician specialties in 10 states.⁹ To ease the time commitment of respondents, the questionnaire was brief (two pages in length) and contained mostly closed-end questions. A panel of experts in the fields of medical education, CME, and education technology reviewed the questionnaire for content validity. The survey was pilot tested and minor changes were made to ensure clarity and a logical flow of questions.

In November 1998, the survey was mailed (with a stamped return envelope) to all licensed physicians, nurse practitioners, and physician assistants in Nevada. To increase the response rate, clinicians were informed that they would be entered into a drawing to win a laptop computer if they returned the survey by a set deadline. The initial mailing of the questionnaire was followed by a reminder postcard 3 weeks later and a second survey 6 weeks after the initial mailing of the survey.

Data collection was completed by January 1999. Data were analyzed using SPSS for Windows (Version 10). Independent t-tests were conducted to compare differences between means.

Results

In the first mailing, a total of 3,213 surveys was sent. Of these, 1,120 were completed and returned for an overall response rate of 35%. Response rates by clinician category were 33% for physicians, 54% for advanced nurse practitioners, and 28% for physician assistants. The majority of respondents were male (73%), and the average number of years in practice for all respondents was 15.

Participation by respondents in the various delivery methods of CE/CME in the 12 months preceding the survey is summarized in Table 1. The traditional methods of acquiring CE/CME through

Table 1 CE/CME Delivery Modes Used from December 1997 through December 1998

Delivery Mode	%
In-person conference	93
Print-based (journal review)	66
Audiocassette self-study	33
Interactive audio (telephone conference)	27
Live satellite conference	22
Interactive videoconference	20
Videocassette self-study	18
Computer-based via CD-ROM	18
Computer-based via Internet	13

in-person conferences (93%) and print-based methods (66%) were the most frequently reported. Computer-based modes of delivery, which included CD-ROM (18%) and the Internet (13%), were the least reported.

The majority of respondents had access to computer-based technologies that included home computers (87%), CD-ROM (76%), the World Wide Web through the Internet (74%), office computer (72%), and electronic mail (71%). Independent t-tests were conducted to determine if any significant differences existed between the mean years of clinical practice of respondents who use computer-based methods often or to a moderate extent and those who seldom use or have no access to computer-based methods. An alpha level of .05 was set for all statistical com-

parisons. Per the results listed in Table 2, respondents with more years in clinical practice were less likely to have access to or to use computer-based technologies.

From a list of nine types of CE delivery modes, respondents were asked to select their top three preferences. Scores were assigned to each preference. First preferences were assigned a score of 3, second preferences a score of 2, and third preferences a score of 1. Any mode not selected as a preference was given a score of 0. Mean scores were calculated for each delivery mode and are listed in rank order in Table 3. Examining the top three preferences, in-person conference was the most preferred method of CE/CME delivery, followed by print-based self-study and CD-ROM. The least preferred method of receiving CE/CME was interactive audioconference (telephone conference calls).

Barriers to the use of computer-based learning technologies were tabulated and are reported in Table 4. "Not knowing how" was the most frequently reported reason for not using the Internet for computer-based training and the second most frequently reported reason for not using a CD-ROM.

Discussion

It is evident that computer delivery modes provide a vehicle for delivering up-to-date medical information in a timely, responsive, and convenient

Table 2 Clinician Use of Computer-Based Technology by Mean Number of Years in Practice

Technology	Clinicians Indicating That They Often or Moderately Use Computers Technologies			Clinicians Indicating Limited Use or No Access to Computers Technologies		
	n	Mean	SD	n	Mean	SD
Office computer	511	15.4	11.3	582	15.1	12.7
Home computer*	773	14.7	11.5	330	17.0	13.3
World Wide Web†	607	13.9	11.0	483	17.0	12.9
CD-ROM†	517	13.6	10.8	566	16.6	12.7
Internet electronic mail†	577	13.6	11.0	511	17.0	12.6

*p < .01; †p < .001.

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Table 3 Preferred Modes of CE/CME Delivery in Rank Order by Mean Score (n = 940)

Delivery Mode	Mean	SD
In-person conference	2.30	1.09
Print-based self-study	0.99	1.10
Computer-based CD-ROM	0.56	0.89
Interactive videoconference	0.48	0.84
Computer-based Internet	0.46	0.83
Audiocassette self-study	0.45	0.87
Videotape self-study	0.29	0.68
Live satellite conference	0.20	0.60
Interactive audioconference	0.15	0.49

manner. However, our data show that in the 12 months preceding the survey, traditional methods of acquiring CE/CME were used much more frequently than computer-based methods. The reasons for the limited use of computers cannot be explained entirely by lack of access. Clearly, the clinicians surveyed in this study had computers with Internet access and/or CD-ROM available either at home or in the workplace. In another study, similar high rates of access were found among physicians in 10 states, in which 74% of the respondents reported having access to a computer at work and 83% reported owning a home computer.⁹ The most frequently reported reason for not using the computer for CE/CME was a lack of knowledge about how to use the Internet or a CD-ROM. Our data indicate that lack of adequate

computer skills may be the primary factor in discouraging the use of computer-based methods rather than a lack of a preference for the new technologies. Further evidence supporting the lack of computer skills by respondents is provided by the finding that more than 75% of respondents would be interested in receiving instruction on the use of Internet and CD-ROM methods for CE/CME. Clinician age may be an additional factor influencing computer use. This hypothesis is supported by the finding that clinicians who indicated often to moderate use of either CD-ROM or the Internet had significantly fewer years of practice than those reporting very limited use or having no access to computers.

The barriers to using advanced technology for CE/CME are not insurmountable. Indeed, lack of skill appears to be the main obstacle to increased use rather than rejection of computer-based methodologies. Opportunities for clinicians to learn skills in computer-based CE/CME methods should be provided. The need to provide such training will undoubtedly lessen as new clinicians enter the profession, already proficient in these technologically advanced methods for CE/CME. Program planners can take advantage of the popularity of on-site programs by promoting new technologies and providing training at traditional on-site conferences. For example, an on-site conference could be complemented by a take-home CD-ROM, or program planners could incorporate sessions on accessing Web-

Table 4 Barriers to the Use of Computer-Based Learning Technology

Barrier	Computer-Based Training via the Internet		Computer-Based Training via CD-ROM	
	Frequency	%	Frequency	%
Too difficult to use	53	4.7	28	2.5
Too expensive	57	5.1	153	13.7
Too time consuming	106	9.5	75	6.7
Prefer in-person instruction	191	17.1	202	18.1
Not interested	77	6.9	65	5.8
Don't know what it is	54	4.8	40	3.6
Don't know how to use	228	20.4	172	15.4

based CME. Promoting awareness and understanding among clinicians regarding the many advantages of using computers for acquiring CE/CME will help to overcome many of the obstacles to their use. As on-line and CD-ROM CE/CME offerings become more prominent, clinicians will undoubtedly become more aware of their potential savings of time and money. Clinicians should also be made aware of another important advantage, beyond the ease of acquiring CE/CME. Competent computer-based skills will help prepare them for the profound changes likely to occur in the way in which health care will be delivered in the 21st century. "E-visits" to health professionals from health consumers, knowledgeable themselves in computer use and technology, may soon be as commonplace as the office visit in the approaching technologically advanced health care delivery system.¹⁰

Limitations of the study were inherent in the self-administered questionnaire in which the accuracy of responses could not be verified. Additionally, although the return rate was excellent for a sample of clinicians, a more substantial return would nonetheless have been desirable. Insufficient data were collected to determine if respondents differed from nonrespondents in regard to key variables. Finally, although Nevada is considered mainly metropolitan, it is characterized by vast rural areas with scattered communities perhaps not representative of other states.

Findings from this study should support planners in committing resources to developing computer-based methodologies. On-site education will continue to serve the purpose of bringing colleagues together to further their education and to engage them in the important and necessary dialogue that is required to produce advances in their respective fields. In the long term, CE/CME delivered via advanced technology will surely find its place as more programs become available and more clinicians increase their competency in using these programs. Until that time, skills training will enable today's clinician to use this innovative technology and will speed its acceptance in the future.

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