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Publication Date
2000

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The Current Status of Online Continuing Medical Education

by

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THESIS

Submitted in partial satisfaction of the requirements for the degree of

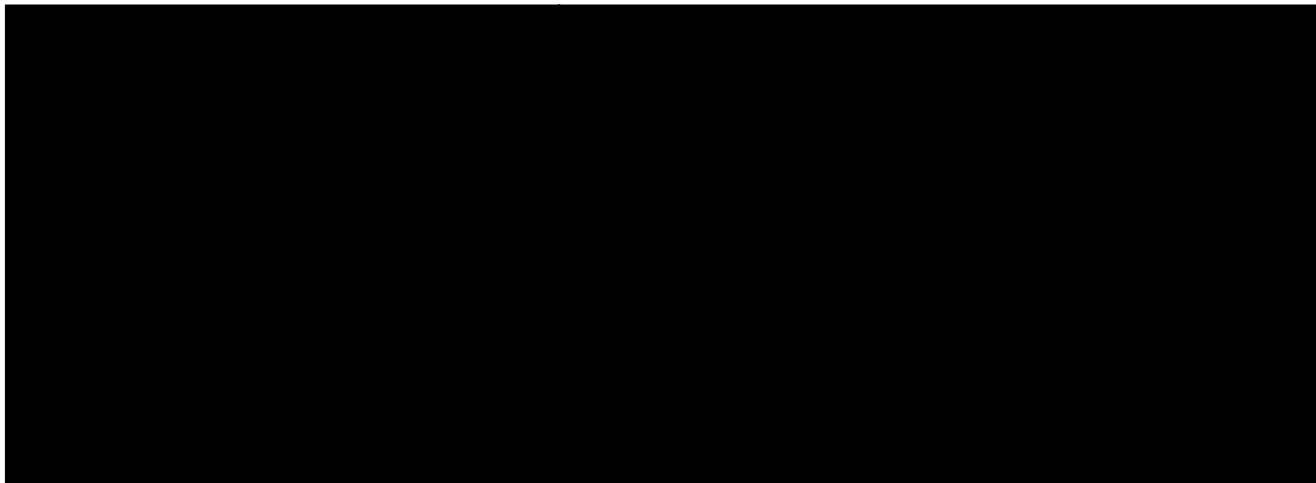MASTER OF SCIENCE

in

Medical Information Science

in the

GRADUATE DIVISION

of the

UNIVERSITY OF CALIFORNIA

San Francisco

. . . .
Date   University Librarian

Degree Conferred: . . . .

This thesis is dedicated to my wife, Sally, who has

always encouraged me to pursue my dreams.

Acknowledgements

I gratefully acknowledge the help of the following teachers, fellow students and friends:

C. Anthony Hunt, PhD.

Suzanne Bakken, R.N., DNSc.

Laleh Khonsari, PhD.

William Holzemer, R.N., PhD.

David Irby, PhD.

James Grout

Larry A. Sklar, PhD.

Enrique Terrazas, M.D.

Jorge Cuadros, O.D.

Robert Layne, M.D.

John M. (Skip) Harris, Jr., M.D.

Francesca Luconi

Carol Cheng

The Current Status of Online Continuing Medical Education

Bernard M. Sklar, M.D.

Abstract

The purpose of this report is to address the following questions regarding online continuing medical education (CME) sites: How many online CME sites exist, and how many courses and credit hours of CME do they offer? For which medical specialties is online CME available, and in what numbers and proportions? What are the dominant types of instruction found in online CME? What proportion of sites is affiliated with medical schools or universities? How much does online CME cost? Where do the sites find financial support? How do sites vary in size? How do the sites promote and advertise their offerings? How many physicians are visiting online CME sites, participating in courses and obtaining CME credit from those courses?

The number of sites offering online CME is growing steadily, from 18 in December 1997 to 96 in February 2000. These 96 sites offer over 3000 hours of CME.

Sixty-four percent of the sites offered instruction aimed at primary care physicians, 76% aimed at specialists and subspecialists and 18% offered instruction to many or most specialties.

Twenty-eight percent offered text-only instruction; 38% text and graphics instruction; 23% slide-audio instruction; 7% slide-video instruction, 7% guideline-based; 4% question-answer instruction; and 17% offered interactive instruction.

Forty-four percent of sites had instruction that was created and/or sponsored by

universities or medical schools. 69% of the sites were free or cost $10 or less per credit hour, while only 15% cost $20 or more per hour.

Thirty-five percent of sites were supported by commercial companies; 42% by universities or medical schools; 6% by governmental agencies; 9% by medical associations or specialty societies; 5% by insurance or managed care companies; and 58% were (at least partially) supported by user fees.

Three sites offered greater than 100 hours of credit. Twenty-five sites offered 4 or fewer credit hours of instruction. The remainder of the sites fall in between these extremes.

A survey sent to the sites indicated a slight upward trend in physician usage. The ACCME Annual Report shows growth in online CME participation from 1997 to 1998. Physicians' use of online CME is increasing slowly.

CME sites are merging. The larger sites are forming relationships with the smaller sites to co-market their products. There is a marked discrepancy between the number of physician-visitors to an online CME site and the number who actually take the courses for credit.

Most online CME offerings do not make use of the unique ability of the computer to offer multiple paths to learning new material and the computer's capacity for interactive responses.

Online CME will continue to grow in usage and will be combined with other

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Introduction

The past several decades have brought about a number of changes in medical education resulting from the introduction of newer technology into the educational process. The newest arrival to the changes brought about by technology is the use of the Internet in medical education.

Beginning in 1995, there have been a growing number of attempts to use the Internet to deliver continuing medical education (CME) to physicians. Although many educators and developers of online predict a rosy future for online CME, Internet CME has to date been used by only a tiny fraction of American physicians.

Because of the potential widespread use of the Internet as a vehicle for delivering CME, it was decided to undertake a descriptive analysis of the current status of CME. This analysis should be most useful to researchers in CME and online CME, creators of CME and online CME and those individuals or companies who may see CME or online CME as an investment opportunity.

In Review of Literature, the emergence of online CME as a convergence of several trends is put forth; these trends include developments in the theory and practice of distance education, new theories of how practicing physicians learn and developments in continuing medical education; several previous studies of online CME are discussed; similarities and differences between non-online CME and online CME are outlined; theories of effective online instruction are reviewed; multimedia, simulation and interactivity in online CME are discussed; the newer tendency towards combinations of modalities in CME is emphasized; the review of literature is concluded with a discussion

of attempts to measure and enforce the quality of medical information presented on the Internet.

In Method, the compilation of a list of most current online CME sites is described; the construction of a database created from the information in that list is explained; the construction of a prototype database and search engine that will allow physicians to search for online CME by course is delineated; a review of previous versions of the online CME list and comparison with the present list is given; and a physician-usage survey is presented.

In Results, a sample entry from the list of online CME sites is shown; the growth in the number of online CME sites is illustrated; the results of the analysis of the online CME site database is presented; and the physician-usage survey results are given.

In Discussion, the rapid growth of online CME sites and courses is reviewed; the growing gap between large sites and small sites is discussed; the slow growth in the numbers of users is presented; ideas are suggested to explain the discrepancy between the number of visitors to online CME sites and the number of credits awarded; and there is a brief discussion of the uses of educational theory by creators of online CME.

In Conclusions and Predictions, the growth and consolidation of online CME is discussed; a set of predictions is put forth. These predictions include: greater use of principles of instructional technology and greater use of the "team approach" in the production of online CME courses; changes in the ways CME is monitored and paid for; requirements that CME be shown to be effective; and combinations of online CME with

Review of Literature

The emergence of online CME is described as a convergence of several trends; these trends include developments in the theory and practice of distance education, new theories of how practicing physicians learn and developments in continuing medical education; several previous studies of online CME are discussed; similarities and differences between non-online CME and online CME are outlined; theories of effective online instruction are reviewed; multimedia, simulation and interactivity in online CME is discussed as is the newer tendency towards combinations of modalities in CME; the review of literature is concluded with a discussion of attempts to measure and enforce the quality of medical information presented on the Internet.

Convergence of trends

The emergence of online CME results from the convergence of a number of trends in distance education, in theories of how practicing physicians learn, and in physicians' use of computer and Internet technology.

Theory and Practice in Distance Education

Distance education has been practiced for at least 100 years. At first, it was called "home study" or "correspondence school." Text-based lessons and assignments were sent by surface mail and students returned their completed assignments in the same way.

During the twentieth century, as more adults wanted to increase their work-related skills, the number of schools and the number of students increased. With development of technology such as audiotape, videotape, CD-ROMs, teleconferencing and email, distance education has become more sophisticated.

Some of the developments in distance education in fields other than medicine and health care are presented. Most of the examples cited are concerned with education at the University undergraduate level or education aimed at helping working professionals upgrade their skills. A list of the Internet addresses mentioned in this and other sections is found in Table 1.

Table 1: World Wide Web Sites Mentioned in this Report

AAFP Home Study Self-Assessment	http://www.aafp.org/hssa/
AAFP Video CME	http://www.aafp.org/cme/videocme/
AAPM&R	http://www.aapmr.org/cme.htm
Accreditation Council for Continuing Medical Education (ACCME)	http://www.accme.org
ACP/ASIM	http://cpsc.acponline.org/
Alcohol Problems/Psychosocial	http://webct.dal.ca/webct/public/show_courses?930327060
Altavista	http://www.altavista.com
American Board of Internal Medicine	http://www.abim.org/subspec/subspage.htm
American Board of Medical Specialties	http://www.abms.org/addrs.html
American Journal of Distance Educ.	http://www.ed.psu.edu/ACSDE/
Annotated List of Online CME Sites	http://www.netcantina.com/bernardsklar/cmelist.html
ArcMesa	www.arcmesa.com
Audio-Digest Foundation	http://www.audio-digest.org/
Cancer Control Journal (Moffitt)	http://www.moffitt.usf.edu/providers/ccj/
Cardean University	http://www.cardean.com/overview_acadcon.shtml
CardioVillage	http://www.cardiovillage.com
Case Study in Cong. Heart Failure	http://winthrop.chfcme.com/
CMEWeb	http://www.cmeweb.com/
CME-WebCredits	http://www.cme-webcredits.org/main_CmeCourses.html
Current CME Reviews	http://www.cme-reviews.com/
Cyberounds	http://www.cyberounds.com
EPIC	http://www.med.unc.edu/epic/
Excite	http://www.excite.com
Google	http://www.google.com
Health on the Net Code of Conduct	http://www.hon.ch/HONcode/Conduct.html
HealthStream	http://www.healthstreamuniversity.com
Interactive Patient	http://medicus.marshall.edu/mainmenu.htm
Johns Hopkins Saturday Rounds	http://www.broadcast.com/edu/jhmr/listen/
Lycos	http://www.lycos.com
MedConnect Family Practice	http://207.87.8.124/finalhtm/medicine/cme.shtml
Medical Matrix	http://www.medmatrix.org/
MedRisk Online	https://www.medrisk.com/cme/pub/catalog.html
Medscape	http://www.medscape.com
MMWR	http://198.246.96.71/internetcet/cetapp.asp
Netscape	http://www.netscape.com
NIH	http://odp.od.nih.gov/consensus/cme/cme.htm
NorthernLight	http://www.northernlight.com
OMEN-TV	http://omen.med.ohio-state.edu
OMEN Online	http://omen.med.ohio-state.edu/omen-cme/index.htm
Open University	http://www.open.ac.uk/about/
Opera Plus	http://www.arcmesa.com/pdf/opera.htm
Pain.com	http://www.pain.com
Pediatric Grand Rounds	http://www.unmc.edu/Pediatrics/GrandRounds/
RSNA EJ	http://ej.rsna.org/
Stanford Medical Informatics	http://scpd.stanford.edu/pd/online.html
UMLS Knowledge Source Server	http://umlsks.nlm.nih.gov/
University of Phoenix	http://www.uophx.edu/
University of Washington	http://uwcme.org/courses/courseindx.html
Virtual Education Gazette	http://www.geteducated.com/
Virtual Hospital (U. of Iowa)	http://www.vh.org/Providers/CME/CMEHome.html
Virtual Lecture Hall	http://www.vlh.com
Yahoo	http://www.yahoo.com

The oldest of the large distance education organizations, the Open University of
the United Kingdom, admitted its first students in 1971. It is the United Kingdom's
largest university, with over 200,000 students and customers in 1997/98. The Open
University represents 21% of all part-time higher education students in the United
Kingdom.

Courses are available throughout Europe and, by means of partnership agreements
with other institutions, in many other parts of the world. Over 24,000 learners are
studying Open University courses outside the United Kingdom.

Two thirds of students are aged between 25 and 44, but students can enter at the
age of 18. Nearly all Open University students are part-time and about 70% of
undergraduate students remain in full-time employment throughout their studies. More
than 40,000 students study interactively on-line with the Open University, at home and in
the workplace. (Open University, 1999)

University of Phoenix offers doctoral, graduate and undergraduate degree
programs as well as certificate programs to working professionals around the world. Most
of the programs are "live" at 85 campuses and learning centers located throughout the
U.S., the Commonwealth of Puerto Rico, and Vancouver British Columbia.

A recent visit to the online area of the University of Phoenix web site indicates
the following online programs:

Associate of Arts in General Studies; Bachelor of Science in Business: Accounting,

Administration, Management, Project Management, Marketing, and Information

Systems; Bachelor of Science in Information Technology: Database Management,

Networks and Telecommunications, Programming and Operating Systems, Systems

Analysis, and Web Management; and Bachelor of Science in Nursing. They also offer Master of Arts in Education/ Curriculum and Technology; Organizational Management; Business Administration; Accounting, Technology Management and Global Management; Computer Information Systems; Nursing; and Doctor of Management in Organizational Leadership.

In the University of Phoenix Online Program communication is

Many-to-many rather than one-to-one. Each class shares its own group mailbox, which serves as an "electronic classroom." Each class uses a group forum where students put their work and ideas before classmates for comment. This upgrades the quality of most work before its more formal, academic review by the instructor.

The Online program is organized around the needs of working professionals. "Each online class lasts five or six weeks... Students devote an average of fifteen to twenty hours a week to their studies."

The web site of the University of Phoenix Online Program site describes a typical course:

Typically, on the first day of the week the instructor sends introductory information on the week's topic and confirms the assignments, such as reading from the textbook, completing a case study, or preparing a paper...The instructor also posts a short lecture or elaborates on the material, and provides discussion questions related to the topic. Throughout the week you work on your reading and assignments on your own... You use the computer conferencing system to participate in the class discussion and ask questions/receive feedback. When your assignments are due, you send them to your instructor online; s/he grades them and sends them back to you with comments.

A more recent trend is that traditional and prestigious universities are now beginning distance education programs. Cardean University is a consortium of five universities: Columbia University, The University of Chicago, Stanford University, The London School of Economics and Political Science and Carnegie Mellon University, created to provide graduate business education online. In its statement of purpose, Cardean says,

(we are) committed to advancing the way businesses and individuals learn. Developments in cognitive science and technology have created an unprecedented opportunity to shape an entirely new learning community. Unlike much distance learning, Cardean is a highly involving, highly motivating environment that features:

Student-centered design. Much traditional education is built around instructors' needs. We've inverted that model and built Cardean to serve the needs of learners. Students learn anytime and anyplace. Moreover, Cardean courses are self-paced, allowing students to progress at their own speed. Students' individual styles, interests, and schedules will shape their own personalized paths to learning

Real-world relevance. In the real world, learning occurs when you set out to solve a problem. Cardean courses emulate this approach to learning. For the most part, they are structured around real-world business projects. This model is not only inherently motivating; it also ensures that Cardean knowledge is highly relevant in the workplace.

Collaboration. Cardean learning stimulates interaction. Using collaborative tools such as threaded discussions, chat, and e-mail, students can interact with faculty and other students as often as they want. This not only provides them with a learning support network, it also furnishes them with a wide variety of perspectives and a strong sense of underlying community— hallmarks of most successful business environments.

There are several journals devoted to distance education. The American Journal of Distance Education publishes a monthly print journal that "acts as a forum for criticism and debate about research in and the practice of distance education in the Americas."

The Virtual Education Gazette, an online newsletter, is published by Distance Learning Consultants & Industry Analysts; it offers a monthly review of new developments and distance education courses.

Distance education is not without critics: Phipps and Merisotis (1999), in their review of studies of distance education, conclude, "Existing research is inadequate to draw conclusions on the effectiveness of distance education."

Teaching at an Internet Distance (1999) is the product of a series of meetings held at the University of Illinois in 1998 and 1999 to "study the pedagogy of online learning, to examine what (makes) good teaching, whether in the classroom or online, and to suggest how online teaching and learning can be done with high quality." The seminar focused almost entirely on pedagogy, and sought to "identify what made teaching to be good teaching, whether in the classroom or online."

The seminar concluded that

> Online teaching and learning can be done with high quality if new approaches are employed which compensate for the limitations of technology, and if professors make the effort to create and maintain the human touch of attentiveness to their students.... Online courses... can be used in undergraduate education, continuing education, and in advanced degree programs.... Participants concluded that the "ongoing physical and even emotional interaction between teacher and students, and among students themselves, was an integral part of a university education.

Moore (1999) compares the business strategies of distance education providers to the retail service industry. He states

> Using the retailing model, we may perceive suppliers of distance education as choosing among the following strategies: 1) the distance education superstore; 2) the distance education chain store; 3) the distance education boutique; 4) the distance education cooperative; 5) corporate alliances: and 6) the distance education consultancy.

Moore (1999) says, "In considering which business strategy to adopt, distance education institutions and their faculties must ask themselves"

- Are we clear and confident about our comparative advantage? (i.e. What is it that we can supply better than anyone else?)

- Do we have a policy to develop those areas in which we have an advantage and to drop those activities that distract resources from them?

- Do we know our current as well as our potential competitors, particularly those in geographically distant places, and is there a strategy for responding to them?

- If we adopt a superstore or specialty store strategy, have we put in place the necessary organizational resources and infrastructure?

- If we adopt a cooperative or corporate partnership strategy, who will be our partners, and in which markets will we compete?

- If we consider a consultancy approach, do we have the budget and administrative core to successfully locate and manage the resulting virtual course team?

- If we are to compete in the global market with students in different states and countries, do we have an adequate system to support interaction for handling assignments and providing learner support?

- How are faculty and support staff trained for the strategy we adopt! How are they monitored?

- Do we have a pay and reward structure consistent with a non-traditional strategy?

- Is there a plan for developing an institutional culture that is supportive of whatever distance education strategy is adopted?

New Theories Of How Practicing Physicians Learn

There has been a marked movement away from the "teacher-centered" model of how adults learn best to a "learner-centered" model. This movement has been felt in continuing medical education as well.

Merriam (1996), in a review of adult learning theories, finds "a number of implications for the education of health professionals. The first is to

> develop self-directed learners. No amount of academic preparation, undergraduate or graduate, or CPE will be able to keep pace with changes in the health field. Professionals must take it upon themselves to be lifelong learners, to engage in learning projects to stay current.

A second major implication is that, "the more significant learning is that which is situated in the context of adult life, in 'authentic' activity." Some of these activities are "apprenticeships, reflective practicums, internships, mentorships and case study instructional methodologies."

Fox and Bennett (1998) identify two models of physicians' practice-based learning. The first model, which they call "self-directed learning," consists of 3 stages:

- Stage 1—learning is directed toward understanding and estimating personal levels of need to learn in order to adopt a change in practice

- Stage 2—energies are applied to learning the new competencies needed to practise differently

- Stage 3—learning is organised around the problems of using new skills, altering the practice environment, or adapting the new way of practice to increase the goodness of fit.

Fox and Bennett (1998) go on to say

In each of the three stages (of self-directed learning), the learner identifies and utilises resources drawn from three broad categories: human resources, especially colleagues and coworkers; material resources, especially journals and other sources of information; and formal continuing education programmes, such as national specialty society programmes. Because the selection and use of resources is under the control of the learner, the "curriculum" is self-directed - it is developed and managed by the learner.

The second model is called "organisational learning." Fox and Bennett (1998) note that

doctors also learn from their work with patients, on teams with other healthcare professionals, and in consultation with colleagues. Within the culture of health care, each setting from primary care to tertiary referral units represents a unique organisation with a personality shaped by beliefs, norms, and ways of thinking, learning, and adjusting behaviour to changes in the environment.

Fox and Bennett (1998) conclude that, in the future, CME providers (will)

- Facilitate self directed learning by providing for self assessment, the acquisition of knowledge and skills, and the opportunity to reflect on clinical performance

- Offer high quality individual and group education that provides authoritative information, knowledge, and skills based on expertise and evidence, (and)

- Assist healthcare delivery systems to develop and practise organisational learning

Trends in Continuing Medical Education

Physicians have been confronted with the need to keep their knowledge current for many hundreds of years. Ell (1992) describes a CME system practiced in Venice from 1300 to 1800. Practitioners were required to attend a yearly refresher course in anatomy in order to renew their licenses.

Uhl (1992) reports the "expanding interest in CME during this century" and divides that interest into four stages:

1. The thesis put forth around the turn of the century by the master clinician Sir William Osler that physicians, in order to retain their competence to practice, must be lifelong students.

2. The innovative postgraduate study courses introduced by university educators during the 1930s, in which the content of the courses was designed to relate to the individual needs of practicing physicians.

3. The post-world war explosion in medical science and in specialization, creating new imperatives for the profession to provide continuing education, both locally and at university centers.

4. The influence exerted by educators during the 1960s and later, who applied the principles of War learning - identifying needs, listing objectives, evaluating outcomes - to the field of postgraduate education for physicians.

In the United States, no formal attempts at requiring CME were documented until 1932, when the American Association of Medical Colleges first proposed mandatory CME. After several decades of discussion and debate, in 1947 the American Academy of General Practice began to require 150 hours of CME every 3 years as a condition for membership. The American Medical Association (AMA) began the Physician's Recognition Award (PRA) in 1969 (AMA, 1999). New Mexico became the first state to

pass a bill authorizing its Board of Medical Examiners to require CME for license renewal in 1971.

In 1975, the Accreditation Council for Continuing Medical Education (ACCME) was formed as a consortium of seven organizations which all have interests in CME (ACCME, 1999). Since that time, the AMA and the ACCME have played major roles in the development and accreditation of CME.

In the 1960's, as CME was developing, physician participation in these educational activities was encouraged but not required. Over the past four decades, there has been a major movement in the direction of making proof of obtaining CME credits a requirement for physicians. Increasingly, proof of CME is required for state licensure, specialty board certification and recertification, specialty society membership, hospital privileges, and payment for services by insurance companies and other payors. In a 1995 survey, the AMA found that thirty-one states required proof of CME for relicensure; by 1997, twenty-four specialty boards had made CME a requirement for certification or recertification (AMA, 1999b)

Formal CME has burgeoned along with these requirements. In 1997 (ACCME, 1998), providers produced 49,563 ACCME-accredited activities totaling 544,366 credit hours. There were 3,842,236 MD registrants for these activities.

In 1998 (ACCME, 1999), providers produced 61,929 ACCME-accredited activities totaling 590,301 credit hours. There were 3,662,701 MD registrants for these activities.

The overwhelming majority of CME activities have been of the "live" or "home study" (not online). In 1998, about 80% of all CME was obtained in live sessions, and 19% was obtained in home study, while only about 1% was obtained online.

Developments in Physicians' Use of Computers and the Internet

Khonsari (1996) studied the readiness of Florida physicians to use computer-based programs to conduct CME. She found that

> respondents' attitudes were systematically related to age, majority of practice, level of board certification, years of practice, location of practice, level of experience and familiarity with computer applications, specifically computer-based distance CME, and their preferred methods of receiving information. On average, respondents' attitudes were slightly to moderately positive toward computer-based CME.

Kripilani, Cooper, Weinberg and Laufman (1997) reported on a 1995 survey of primary care physicians about their preferences for computer-assisted CME. Although they had only 102 respondents to their survey, Kripilani et al. concluded, "Most physicians are currently interested in computer-assisted CME."

Olson (1999) studied the preferences of pediatricians and family practitioners for CME distance modalities in Illinois, Iowa, Michigan, Minnesota and Wisconsin.

While 78.4% of Olson's respondents indicated they had used or were willing to use distance education, 21.6% stated they were unwilling to use "any" distance education methods. The **most common reasons given were:**

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prefer "live" interaction; too impersonal; need flexibility in scheduling; lack computer skills; simpler ways available (journals, conferences); alternatives readily available; and don't want to pay for CME.

Olson concluded that there is a significant level of interest among Pediatricians/Family Physicians in using distance education technologies for CME. Physicians who are more likely to be interested in distance education are relatively close to traditional sources of comprehensive CME programming, live in areas that are more urban than rural and are less than 55 years of age. He also concluded that cost is a primary factor in the acceptability of CME programming offered via distance technology. An additional conclusion was that recovering costs of delivering high quality CME programming offered at a distance by fees charged participants requires a target audience that goes beyond the regional level.

The University of Wisconsin (1999) did an email survey of 4870 physicians in Iowa, Illinois, Indiana, Michigan, Minnesota, North Dakota, South Dakota, and Wisconsin. The Wisconsin online survey included seven questions:

> age of participant; specialty; current access to internet; if not connected, would earning CME credits online be an incentive to get hooked up; interest level in earning accredited hours on the internet; topics physicians were most interested in taking online; and how many CME hours were earned within the past year.

Of the 3008 physicians contacted, plus 17 physicians who saw the survey on their web site, 112 physicians (3.7%) answered the survey. Of these, 84%, mostly in the 41-60 year age range, were interested in taking courses online. Primary care physicians showed the greatest response rate (about 40%). The topics most commonly suggested included:

administration (business practices, managed care, faculty development), pharmacology, and cardiovascular medicine. Physicians stated that they had earned an average of 57.63 credits in the past year.

Some of their conclusions are: Despite the low (3.7%) response, they considered the results important due to the total number who responded. They found the overwhelming interest in administrative courses (about 27%) to be of particular interest. Based on this survey, the University of Wisconsin decided to start an online CME program.

Lundberg (2000) listed these percentages of physicians who know how to use the Internet: 1995, 3%; 1996, 15%; 1997, 32%; 1998, 60% and 1999, 80%.

Surveys of Online CME Sites

Peterson (1999) searched the Internet between July 1 and August 31, 1998, for sites offering online CME. He identified 53 sites offering online CME, but was able to access instructional material at only 39 sites. Peterson was mainly concerned with issues of quality of the web sites and with the issue of whether the Internet might allow commercial sites to gain ascendance over the University-sponsored sites. Peterson concluded, "as of 1998, universities may be losing their traditional leadership in CME using the new Internet medium. Many sites offering CME do not meet minimal standards for quality control."

Erickson (1999) discussed the MedicalMeetings.com Seventh Annual Physician Preferences In CME Survey in January 2000. Medical Meetings mailed 1,000 surveys with a dollar incentive enclosed. They received 160 usable responses, for a 16 percent

response rate. They also posted the survey to their corporate Web site, and sent e-mails to a list of 5,000 physicians.

While most of the Medical Meetings survey concerned the more general questions of physician preferences, it made several observations regarding online CME. Women physicians appeared to have very little interest in online CME. While 14 percent of their "male respondents are using electronic media as an option for obtaining CME," and earning about 7% of their CME credits that way, not a single woman physician reported using an online product. Since the percentage of women respondents increased from 17% (in 1994) to 30% (in 1999), this led to a reduction in the percent of all physicians (using online CME) from 19% to 14%. This is an apparent, but not real, decrease, since all other reports showed the actual numbers of (online) courses taken to be steeply increasing.

All providers of ACCME-accredited CME must file an annual report of their activities with the ACCME. The ACCME then publishes an annual compilation derived from these reports. This report encompasses all CME, whether live or "enduring materials," and includes courses, regularly scheduled conferences, journals and Internet.

The 1997 report (ACCME, 1998) shows that in 1997, Internet CME accounted for 166 activities (0.33% of total activities), 1,299 credit hours (0.24% of total credit-hours) and 13,115 physician-registrants (0.34% of physician-registrants).

The 1998 report (ACCME, 1999) shows that in 1998, Internet CME accounted for 1516 activities (2.45% of total activities), 5,357 credit hours (0.9% of total credit-hours) and 37,879 physician-registrants (1.03% of physician-registrants).

The 1999 report will be available in mid-summer, 2000.

Comparison of Online CME to Traditional CME

The vast majority of CME credits are still earned using the older, more traditional, forms of instruction. In this section, the traditional forms of CME are described and each of these traditional forms is compared and contrasted with its online counterpart.

Many physicians attend meetings at their local hospital. Typically these meetings consist of a lecture discussing a medical condition or a procedure. Sometimes the lectures may be based on a case of a real or simulated patient (this kind of meeting is often called "grand rounds"). Typically the lecturer talks for 40-45 minutes and leaves time for a 5-10 minute question and answer period at the end. The speaker may simply talk without any audiovisual aids or just using a chalkboard. More typically he or she uses slides or overheads. Sometimes the speaker may distribute a handout to use for future reference. There is generally no pre-lecture or post-lecture test of knowledge. Physicians earn credit by putting their names on a signup sheet. The instruction is primarily "teacher-centered"; the lecturer has a set of pre-determined points to make and expects that these are the points that the listeners need to learn.

Although the live "teacher-centered" lecture remains the dominant form of CME, it has been difficult to prove that this form of CME results in any change in the physician-student's practice behavior (Davis et al., 1999)

However there can be important non-academic benefits of attending such a presentation. The physician-student may learn that the lecturer, often a physician who practices in the same or nearby community, has an interest in seeing patients with the disease presented or performing the procedure discussed. The usual reward for the
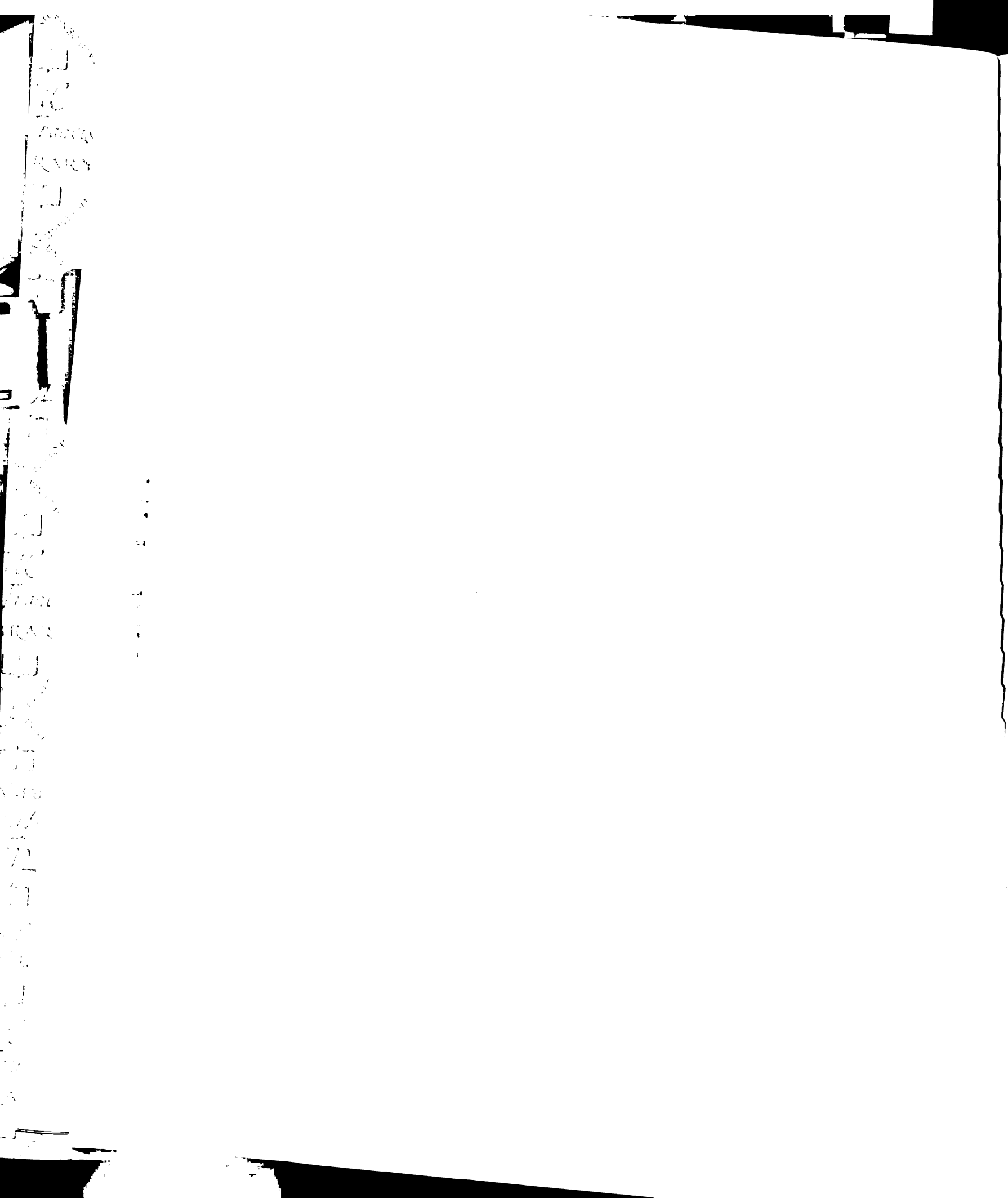
speaker is the spread of his or her reputation and the possibility of future referrals. Another advantage of attending these meetings is social; the physician gets to see old friends, make new friends and learn what is happening at the hospital and in the local medical community.

Physicians can participate in lecture-based meetings at their specialty society's monthly regional dinner meeting or at drug company-sponsored evening or weekend talks. The format at these meetings is generally the same as at the hospital meetings.

Much of online CME is organized in the same manner as the hospital meetings, specialty society meetings and drug company-sponsored conferences. The student "attends" a lecture on the Internet either by reading a text or text-and-graphics article, or looking at and listening to a slide-audio presentation or slide-video presentation. Sometimes there is a post-instruction test; sometimes the physician must merely state his or her opinion as to the quality or relevance of the instruction.

There are some potential advantages of "attending" online CME lectures (compared to the live local lectures). Given an efficient and comprehensive online CME search engine, the user could select a presentation on almost any medical topic from the best expert in that medical area. The physician could "attend" this lecture in the evening or over the weekend and view or listen repeatedly to those parts of the presentation that are most interesting or most difficult. The major disadvantage to "attending" a lecture on the Internet is the loss of the social relationships that occur in the live setting. Also, online CME lectures share the general disadvantage of the lecture-based, "teacher-centered" approach.

The extended live course or conference is an enlarged version of the local hospital lectures. These meetings may occupy half a day to a full week. Typically a physician attends 4-6 hours a day of lectures. The topics at most of these meetings are generally relevant to the physician's specialty. The arrangements are generally better than at the local hospital; slides are polished; audio-visual arrangements are more solid; there is often a syllabus that the physician can take home and study later. The speakers and topics have been chosen by a committee of leaders in the field based on their beliefs about what their members need to learn. Research (see Studies of Effectiveness below) has shown that these lecture-based conferences are not effective in changing physician performance. There may be however, some less tangible benefits: the physician may achieve rest and recreation away from practice concerns; he or she may return to work feeling refreshed and invigorated.

Medscape offers an experience that attempts to emulate the multi-day single specialty meeting in its conference summary section. These summaries are generally text-based and cover one to two hours of instruction per conference day. Users need to take a test to obtain CME credit. Earning CME by remote asynchronous "attendance" has the same advantages and disadvantages as those described for the individual one-hour lectures but with the added advantages of saving travel time and the costs of travel, hotel and conference registration. Sometimes conference speakers are videotaped and their presentations placed on the Internet as online CME.

Audio and video teleconferences take place at the hospital or the clinic on a scheduled basis. Many groups of physicians in widely scattered areas watch and listen to a live lecture or discussion by experts in the field. Near the end of the presentation, a few
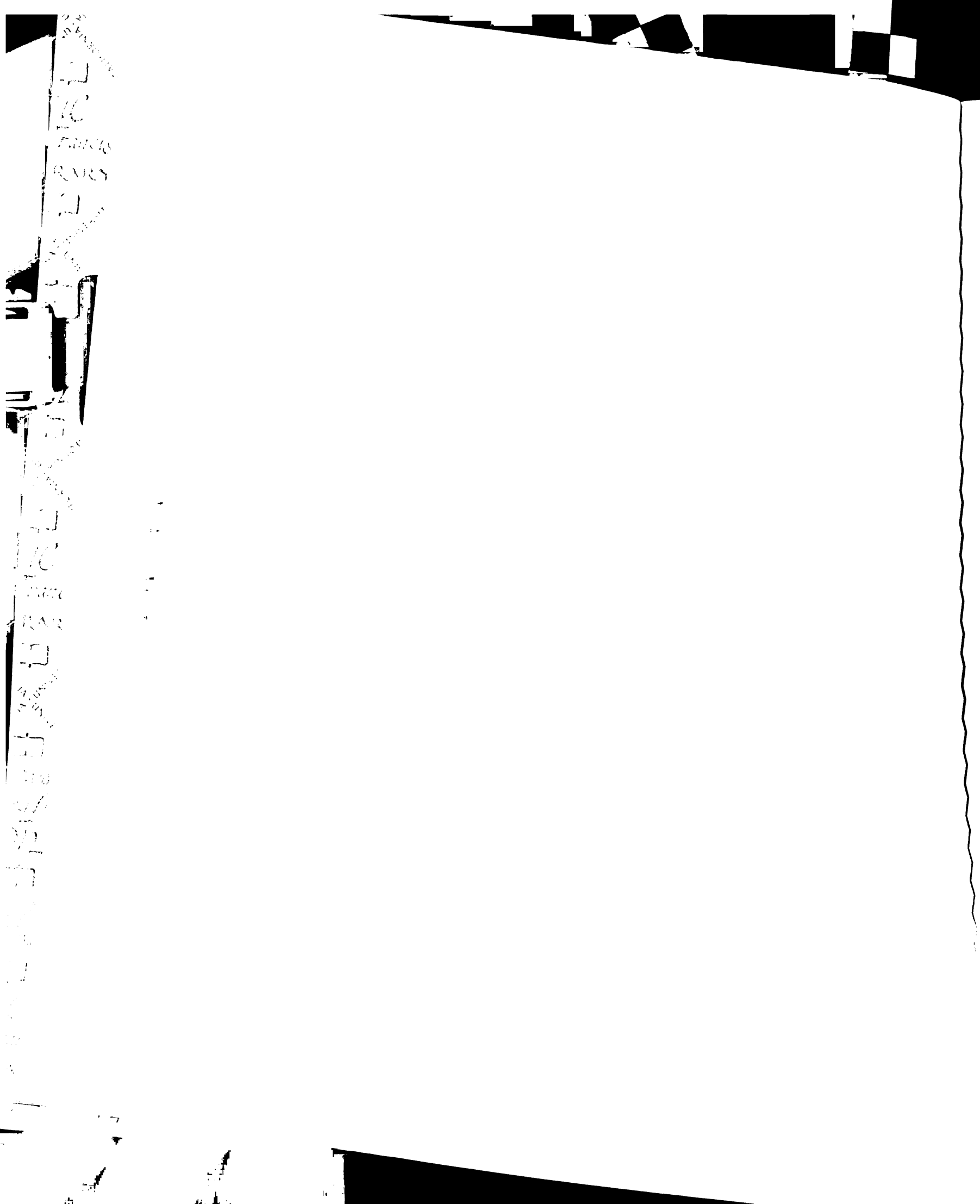
questions are taken from the local sites. This format is essentially the same as the hospital lecture except that the students are participating by audio or video. A good example of video teleconferencing is OMEN-TV from Ohio State University. If the video teleconference is recorded and converted for the Internet, e.g., OMEN Online, it can then become online CME.

Non-online home study CME courses vary widely in goals, length, expense, goals of instruction, medium of delivery and type of instruction. These courses range from one-hour text-based articles to one-hour videotapes on a single topic to 100-hour text, audio and CD-ROM board recertification reviews. Some examples of home study courses are AAFP Home Study Self-Assessment (text), Audio-Digest (audiotapes), AAFP Video CME (videotapes) and ArcMesa OPERA (CD-ROM).

The main similarity of these courses to online CME is that they tend to be pursued at home in the unscheduled hours of a physician's day; they are generally solitary; and the user can proceed at his or her own pace. The non-online home study CME courses, especially the more extensive ones, often require more of a commitment of time and money (25 to 100 hours and $250-$1000) than the typical online courses. Some of the non-online home study courses are organized as question/answer type of instruction or as the interactive type.

Physicians may also attend procedure-oriented courses, where the primary goal is to learn how to perform a particular surgical operation or examination such as colposcopy, sigmoidoscopy, or application of casts and braces.
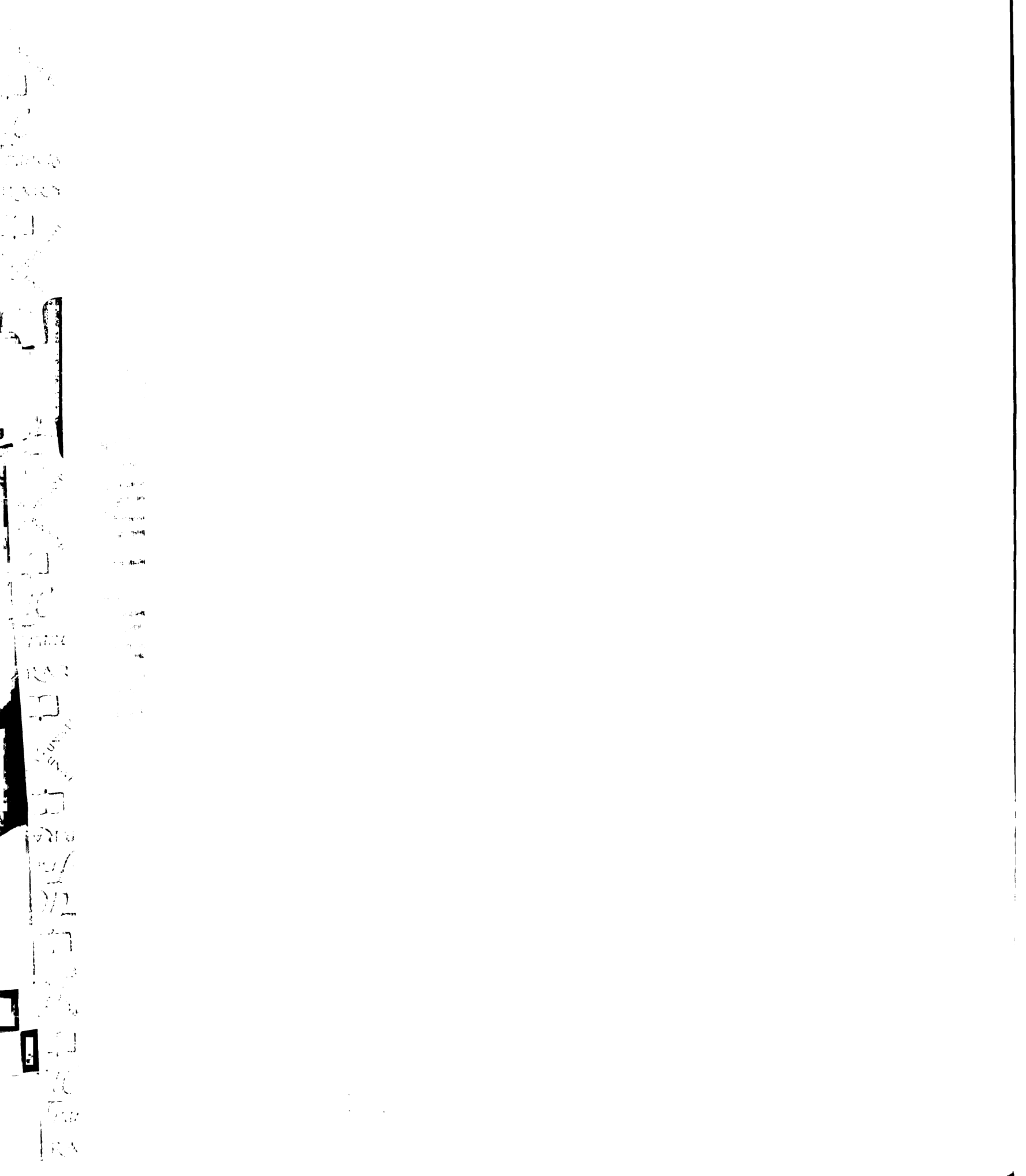
Theories of Effective Online Instruction

Ritchie and Hoffman (1997) describe seven elements that should be incorporated into the design of web-based instruction. These are: motivating the learner; identifying what is to be learned; reminding learners of past knowledge; requiring active involvement; providing guidance and feedback; testing; and providing enrichment and remediation.

Reeves and Reeves (1997) present "a model of interactive learning via the World Wide Web based upon research and theory in instructional technology, cognitive science, and adult education." The proposed model

> includes ten dimensions of interactive learning on the World Wide Web, including (1) pedagogical philosophy, (2) learning theory, (3) goal orientation, (4) task orientation, (5) source of motivation, (6) teacher role, (7) metacognitive support, (8) collaborative learning, (9) cultural sensitivity, and (10) structural flexibility. This set of ten dimensions is by no means exhaustive, and enhancements to strengthen its utility are expected. Nonetheless, this model addresses a fundamental misunderstanding, i.e., *what is unique about WBI (web-based-instruction) is not its rich mix of media features such as text, graphics, sound, animation, and video, nor its linkages to information resources around the globe, but the pedagogical dimensions that WBI can be designed to deliver* (emphasis added). In short, the World Wide Web is only a vehicle for these dimensions. Although WBI may be more efficient or less costly than other vehicles, it is the learning dimensions that will determine its ultimate effectiveness and worth.

Multimedia, Simulation and Interactivity in Online CME

The vast majority of current online CME offerings are of the "teacher-centered, disease-centered lecture" type. This is true whether the instruction is by text, text or

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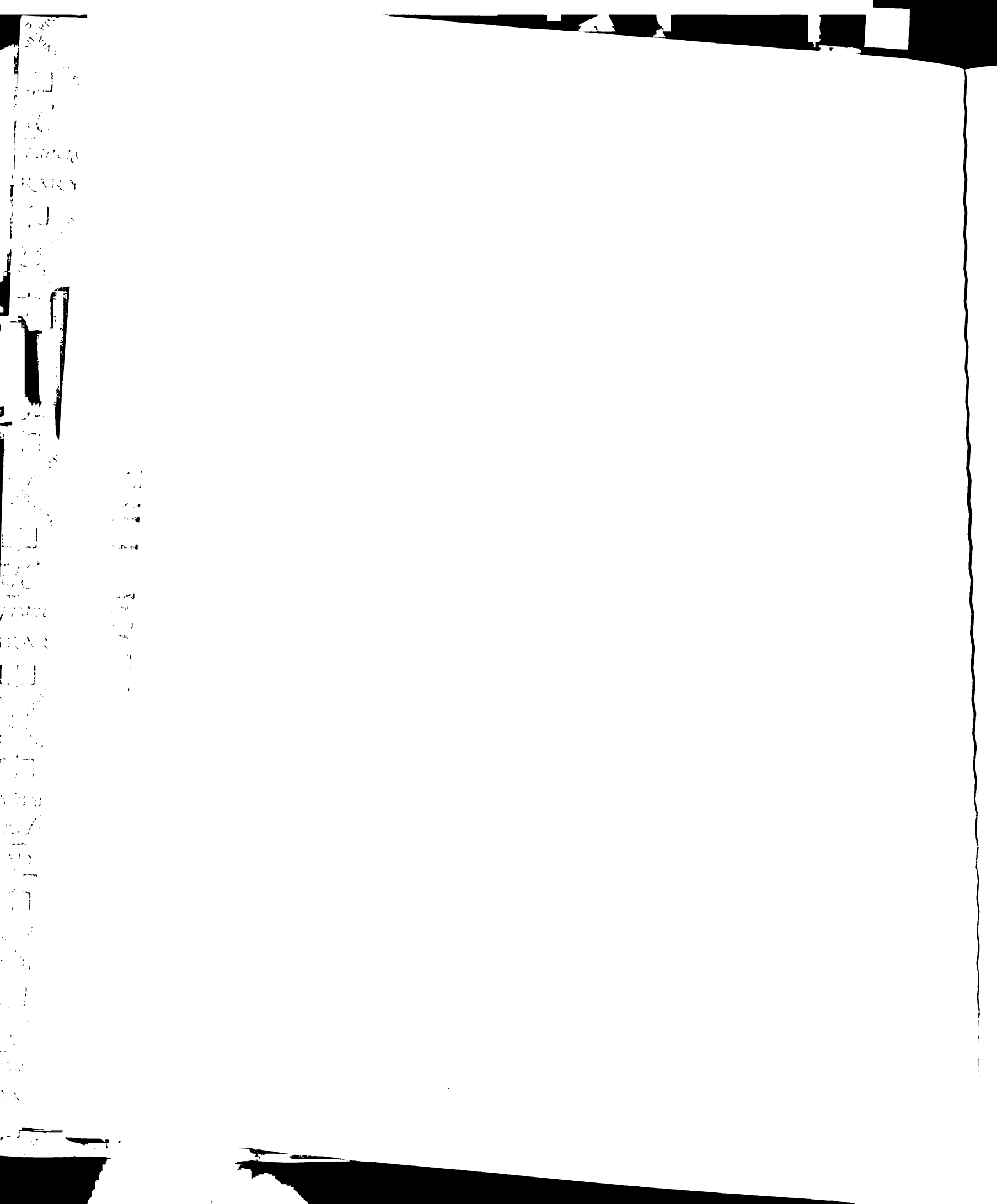
graphics, slide-audio or slide-video. The present study reveals that only 17% of the online CME sites reviewed offered case-based interactive instruction and 4% offered interactive question/answer instruction.

There are, however, some notable exceptions to this rule. One of the earliest (1995) case simulations on the Internet is The Interactive Patient, Case #1 by Marshall University School of Medicine; unfortunately there have been no additional cases since 1995.

In an example from e-core family practice at the Virtual Lecture Hall, the learner is presented with a realistic case scenario, e.g., a "32 year old woman with depression". After a brief case description, the program presents the user with choices of how to proceed (Appendix E). If the physician makes an incorrect choice (Appendix F), the program gives an "incorrect" response and asks the user to try again. When the physician finally gets the correct answer, the program presents more information about depression and how to treat it most effectively. In addition the program presents a bar graph showing how other physicians have responded to this question (Appendix G).

In an online CME about asthma from MedConnect Family Practice, the program presents a brief description of a teenager with wheezing. Before the student can proceed, the program presents three multiple-choice questions. For each question, the student is presented with a "Correct!" box for the correct answer, and with an explanation and instruction for an incorrect answer.

In a third example using interactive sound and graphics, Case Study of Congestive Heart Failure, the program presents the case of a sixty-one year old man with
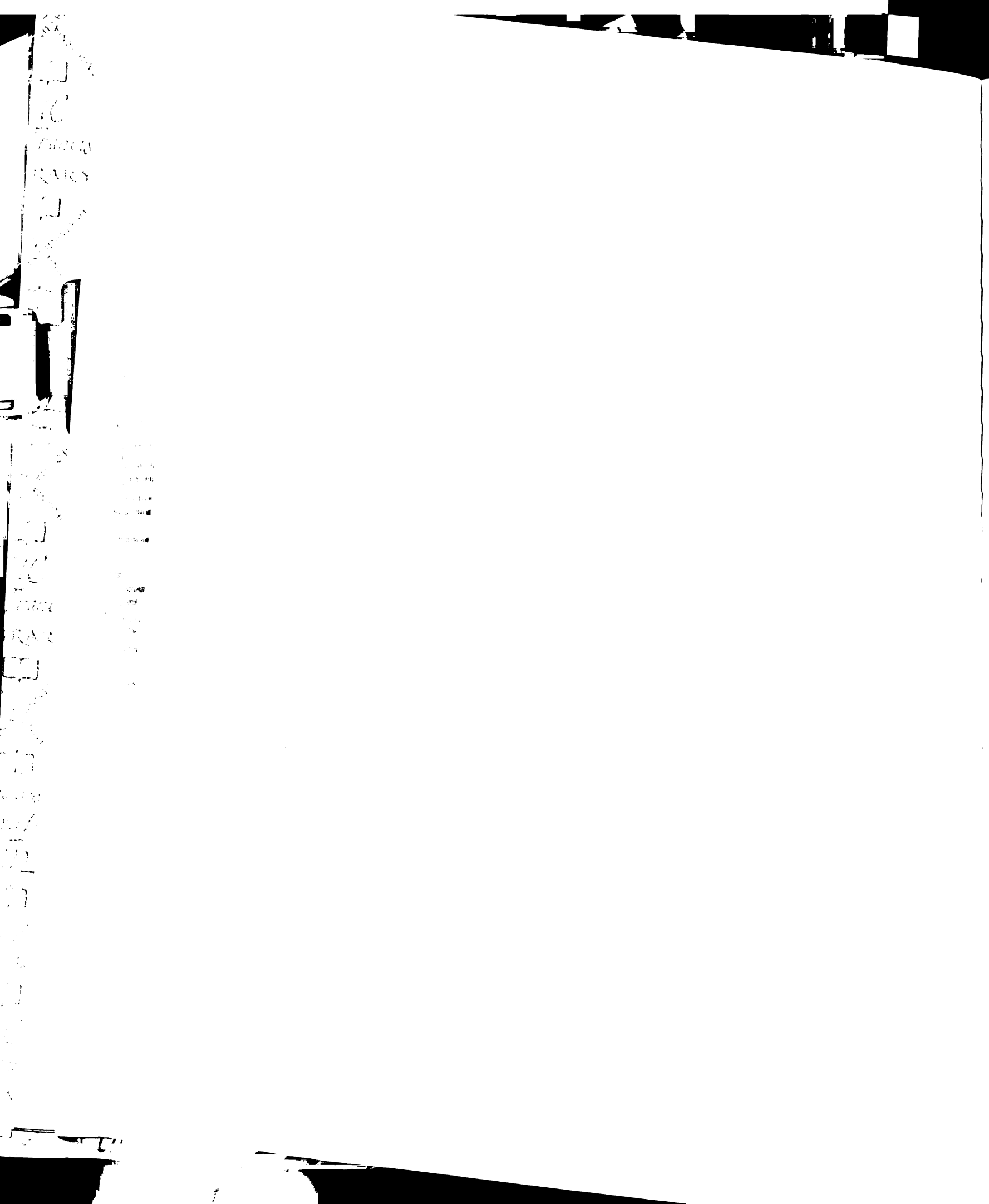
shortness of breath. After the presentation of a brief case history, the user performs a physical examination, chooses laboratory tests, views results of laboratory tests with comments and goes on to other aspects of treatment and follow-up. At each step, the program gives feedback to the user.

A recent addition to online CME utilizing interactivity, multimedia and simulation in the teaching of cardiology, can be found at CardioVillage, sponsored by the University of Virginia. This site offers a pre-instruction test, multimedia tutorials, literature review, case simulations, board review and a post-instruction test.

Studies of Effectiveness of CME

Davis and his group at the University of Toronto have been collecting and analyzing randomized controlled studies of the effectiveness (in changing physician behavior) of many forms of CME (not online) for many years. In their most recent review (Davis et al, 1999), they state, "Our data show...evidence that interactive CME sessions that enhance participant activity and provide the opportunity to practice skills can effect change in professional practice and, on occasion, health care outcomes." They also write, "didactic sessions do not appear to be effective in changing physician performance." Davis et al. go on to say,

> (instructions) that used *interactive* techniques such as *case discussion, role-play, or*
> *hands-on practice sessions* were generally more effective changing those outcomes...
> (and) sessions that were *sequenced* also appeared to have more impact. (Instruction is
> more effective when it is) *learner-centered, active rather than passive, relevant to the*
> *learner's needs, engaging, and reinforcing.*
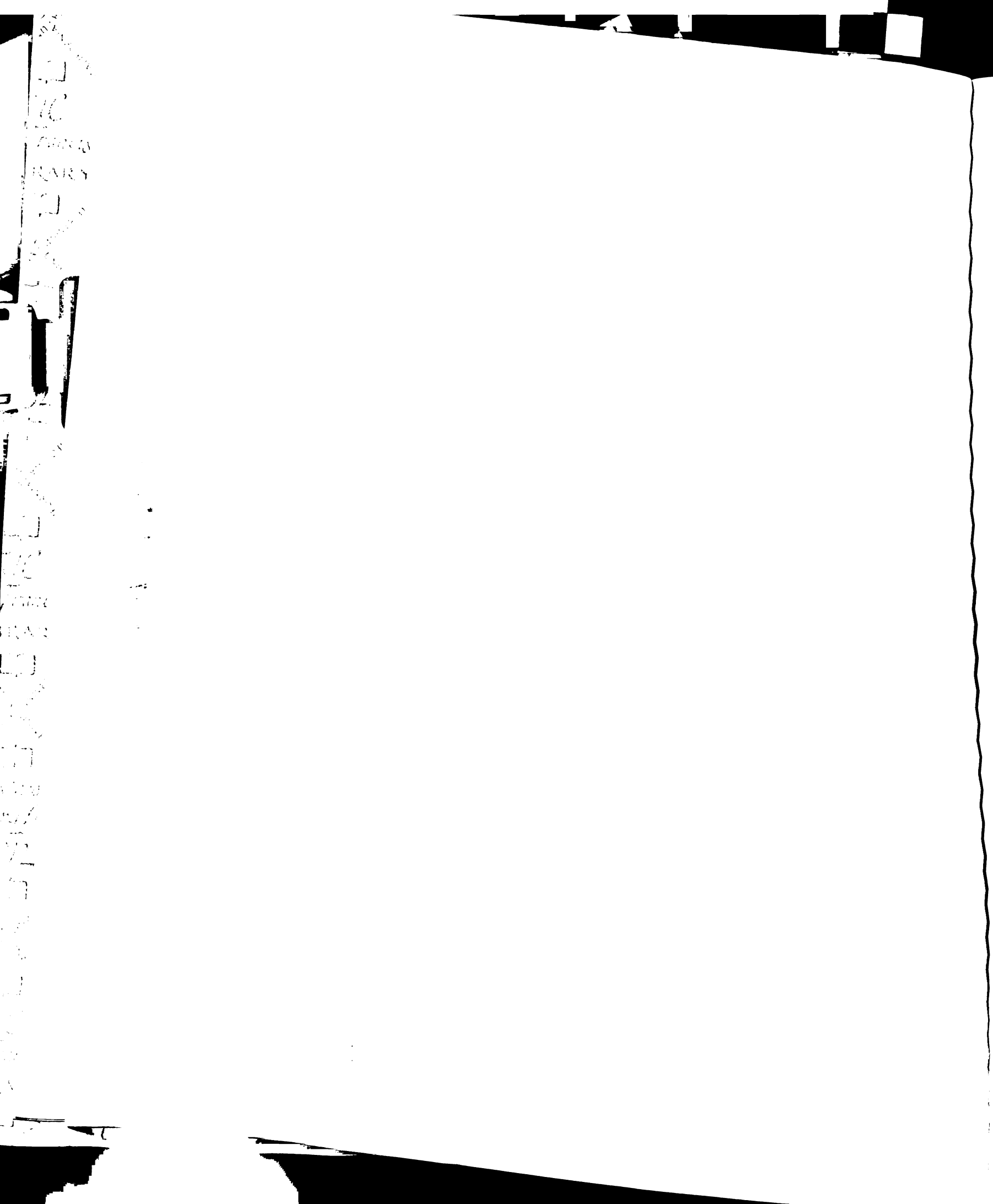
Davis et al. also found that, "the learn-work-learn opportunities afforded by *sequenced sessions*, in which education may be translated into practice and reinforced (or discussed) at a further session, may explain the success of sequenced interventions."

Bero et al. (1998) discuss some of the issues involved in transforming medical diagnosis and treatment guidelines into practice. They performed a meta-analysis of research into the effectiveness of interventions to promote behavioural change among health professionals. They found these "consistently effective interventions:"

> Educational outreach visits (for prescribing in North America); reminders (manual or computerised); multifaceted interventions (a combination that includes two or more of the following: audit and feedback, reminders, local consensus processes, or marketing); (and) interactive educational meetings (participation of healthcare providers in workshops that include discussion or practice)

Interventions of "variable effectiveness" were found to include

> audit and feedback (or any summary of clinical performance); the use of local opinion leaders (practitioners identified by their colleagues as influential); local consensus processes (inclusion of participating practitioners in discussions to ensure that they agree that the chosen clinical problem is important and the approach to managing the problem is appropriate); and patient mediated interventions (any intervention aimed at changing the performance of healthcare providers for which specific information was sought from or given to patients)

Bero et al. **further found that** interventions having "little or no effect" included "educational materials (distribution of recommendations for clinical care, including clinical practice guidelines, audiovisual materials, and electronic publications) and didactic educational meetings (such as lectures)."
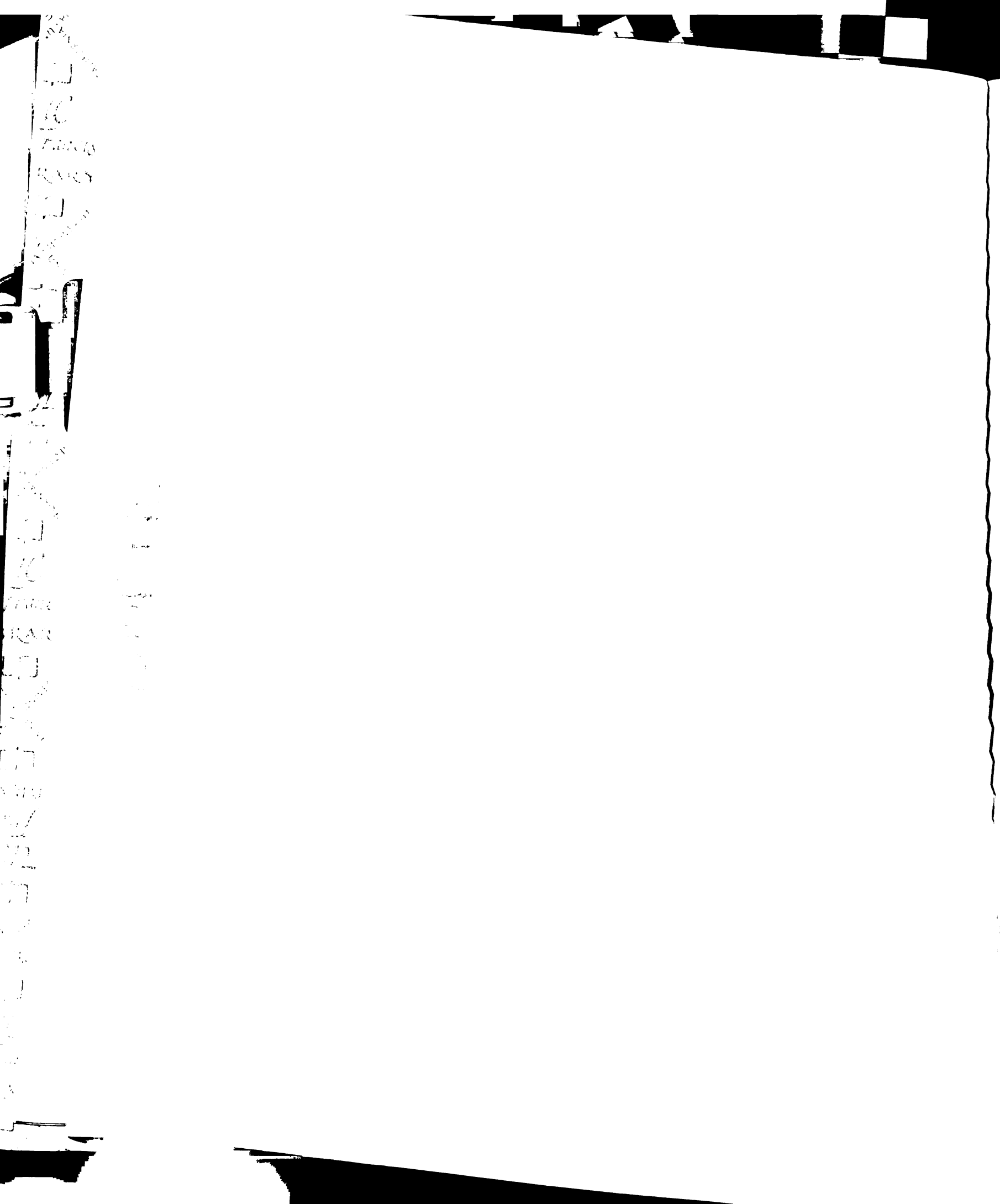
Combinations of CME Instructional Modalities

Studies such as those by Davis et al. and Bero et al. have contributed to a growing belief that effective CME should involve combinations of learning modalities, opportunities to practice and repeat learning activities and institutional change.

Lane (1997) describes a "multimethod package" of interventions in a study designed to "increase primary care physician adherence to national guidelines for breast cancer screening." The package included "formal CME conferences, a physician newsletter, breast examination skills training, a breast cancer CME monograph, a 'question-of-the-month' at hospital staff meetings, and primary care office visits." Physicians in the multimethod intervention group had a much greater increase in compliance with the recommended practices than did physicians in the control group.

Emphasizing the importance of institutional participation in effective CME, Lewis (1998) describes the intense involvement of management in planning and putting a CME program to help doctors learn to take sexual histories in AIDS-related clinical scenarios. Lewis believes that effective CME requires "a motivated learner," "a competent teacher and/or an effective intervention" and "the elimination of structural barriers."

Barnes (1998) envisions a "fully-integrated practice-learning environment." In this model,

> (continuing medical) education...will be driven by and measured by clinical performance...practitioners will systematically analyze clinical, financial, and patient satisfaction information, determining the impacts of educational interventions by objective measurement of patient outcomes. *A variety of educational resources will be*

made available to accommodate individual information needs, learning styles,

motivation, and commitment to change practice behaviors (emphasis added). Training

programs will be developed to support the specific competencies required for practice,

including both clinical and non-clinical skills. Strategies will be devised for

implementing the varied mandates and recommendations being imposed on the medical

profession by payers, health care networks, and public health agencies.

Barnes goes on to predict that

In the practice-learning environment, a physician will begin an educational activity ... by

reflecting on his or her practice performance. Information systems will ... (supply)

aggregated, trended, and benchmarked data reflecting clinical outcomes, resource

utilization, and patient satisfaction. Of particular significance will be the incorporation of

feedback from managed care networks and quality improvement programs, measuring the

data against national outcomes (from HEDIS and other databases) as well as in terms of

compliance with practice guidelines and other standards for care. Information systems

must...offer the type of information that will assist physicians in clarifying and making

the best use of learning opportunities; facilitating the choice of the most effective

information resources; and determining the subsequent effect of the learning intervention.

Barnes mentions three examples of "innovative projects (which) demonstrate how

information technology can support an expanded view of CME." They are the Canadian

Maintenance of Competence Program (MOCOMP), which

encourages physicians to reflect on practice in order to develop structured plans for

learning. Using the PC Diary software on which the program is based, practitioners

record issues that they would like to learn more about. Before proceeding with an

educational intervention, the computer program prompts the physician to determine the

stimulus or event that caused him or her to identify the issue as well as the anticipated

impact that the subsequent learning activity will have on physician's practice. Over time,
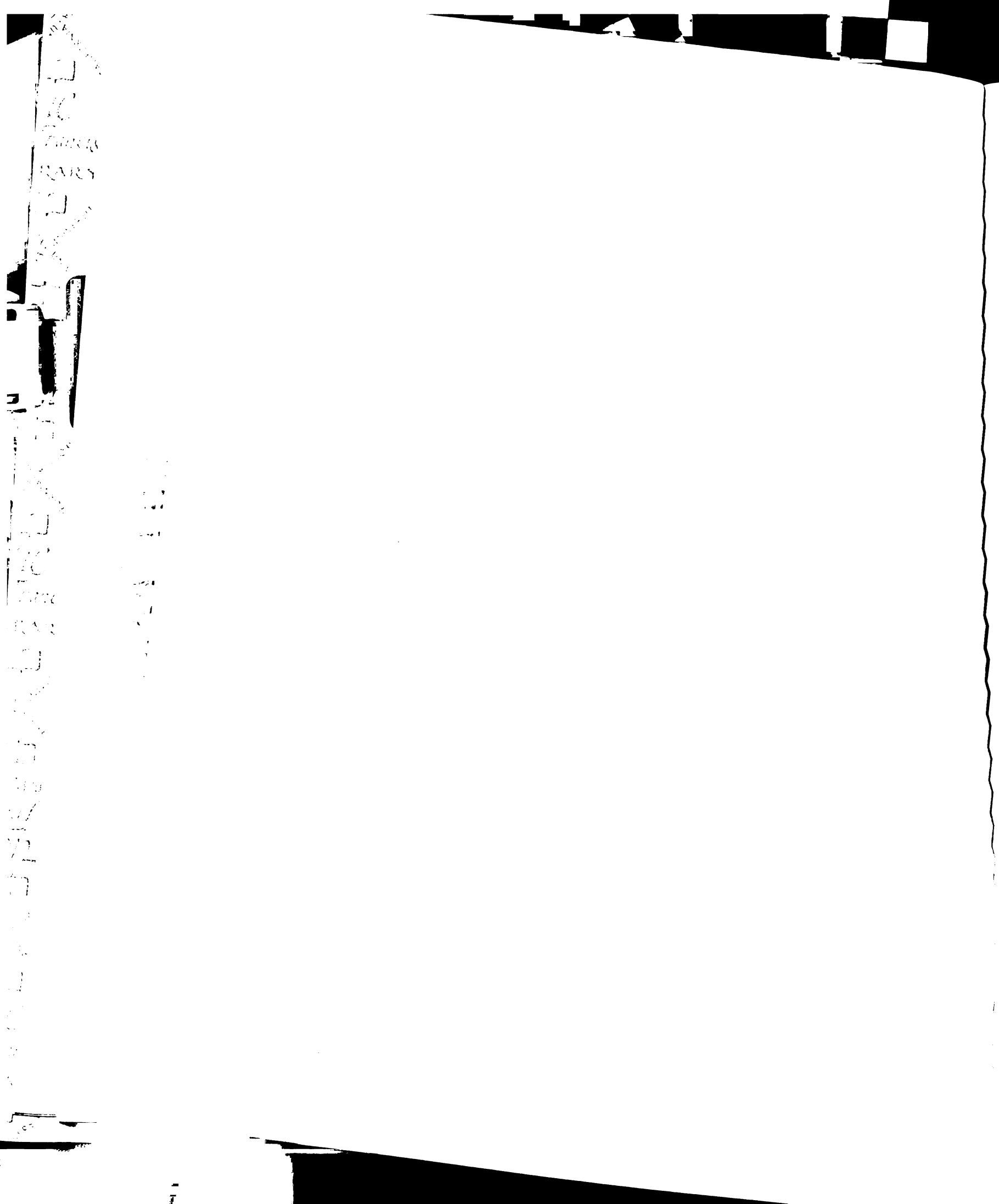
the database becomes a learning portfolio. By requiring that physicians reflect on learning issues and define the intended outcomes, the learning activities are more focused, intentional, and systematic. Physicians report that using the PC Diary software gives them a sense of control over their CME planning and also decreases their sense of information overload.

The Stanford Health Information Network for Education (SHINE)

offers an integrated collection of core content, including texts, pharmaceutical databases, a differential diagnosis system, a bibliographic database, national consensus statements and guidelines, online journals, multimedia resources, and custom-developed educational activities, all of which can be accessed through a unified interface on the Internet. The system permits a user to distribute a query simultaneously to different types of resources (such as texts, guidelines, and journals), providing a consolidated search. SHINE will have the capability of supporting teleconsultations with colleagues through the use of e-mail or videoconferencing. The system can also track a physician's use of the various resources and support the development of learning portfolios.

Barnes' third example comes from the University of Indiana where Jay and colleagues

have developed several computer simulation programs to encourage physicians to modify their practice behaviors, to evaluate the relative costs and benefits of various types of clinical interventions, and to determine the implications of patient demographics and physician practice patterns on the costs and outcomes of care. Physicians, individually or in groups, can use these programs to assess the implications of various approaches to patient care and to choose optimal courses of action. Being able to assess the likely impacts of various interventions in several perspectives, such as clinical outcomes and cost, can help providers begin to make rational decisions regarding resource allocation. The computer simulations, by presenting all possible outcomes, including unexpected
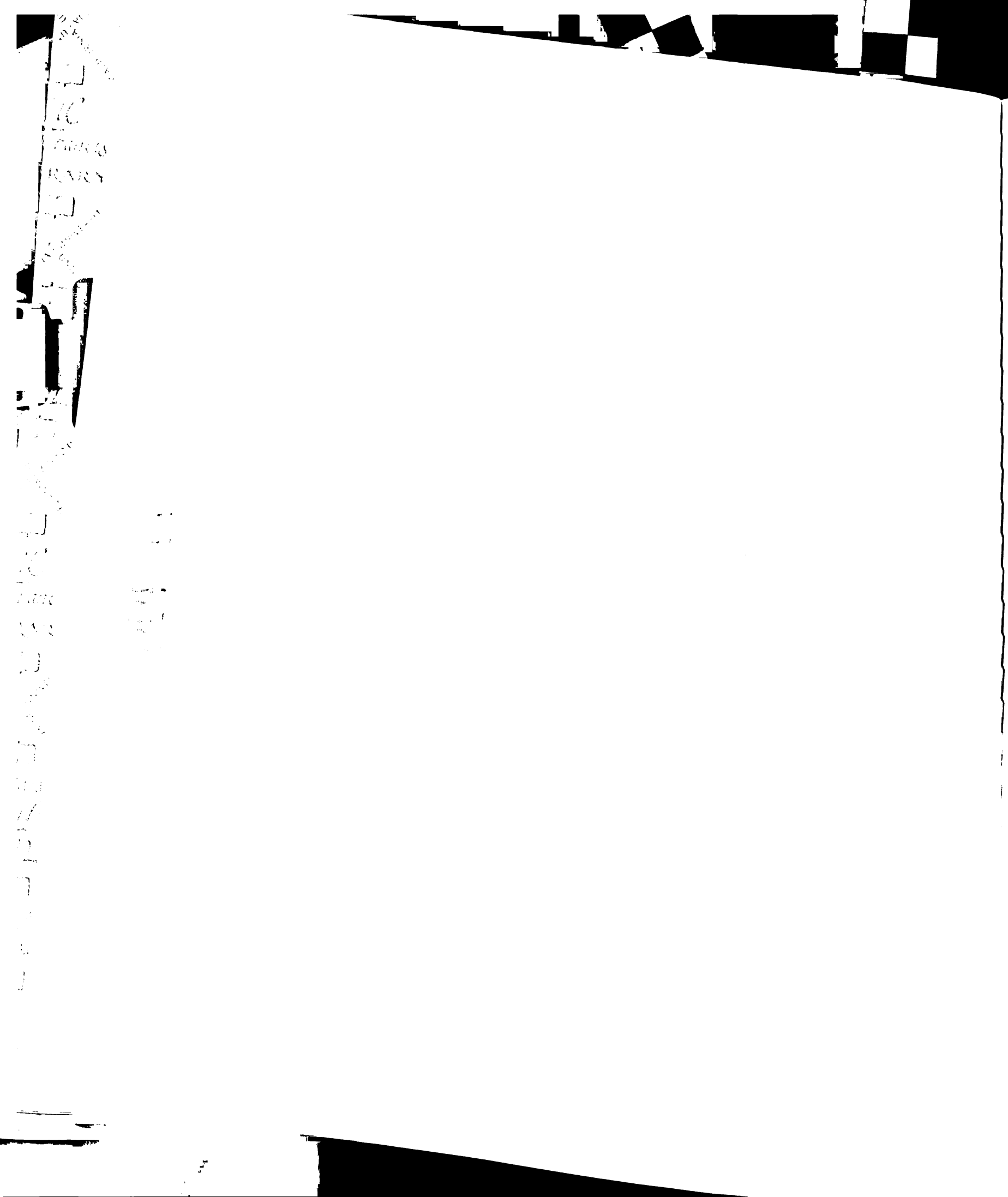
ones, can also help users to identify additional learning needs. The simulation models can be applied to quality improvement efforts, health services planning, and business planning.

Barnes concludes, "The 'killer app' for improving physician performance will involve integrating these types of applications with clinical information systems, which will allow physicians to move between practice and learning through a single interface."

Quality of Medical Information and CME on the Internet

Several groups have proposed guidelines for medical information intended for consumers on the Internet. Among these is the Health on the Net Foundation (1997) whose Code of Conduct includes the principles of authority, complementarity, confidentiality, attribution, justifiability, transparency of authorship, transparency of sponsorship and honesty in advertising and editorial policy. (Table 2).

Table 2 - Principles of HON Code of Conduct –Adapted with Permission of HON

1. Authority
Any medical or health advice provided and hosted on this site will only be given by medically trained and qualified professionals unless a clear statement is made that a piece of advice offered is from a non-medically qualified individual or organization.

2. Complementarity
The information provided on this site is designed to support, not replace, the relationship that exists between a patient/site visitor and his/her existing physician.

3. Confidentiality
Confidentiality of data relating to individual patients and visitors to a medical/health Web site, including their identity, is respected by this Web site. The Web site owners undertake to honour or exceed the legal requirements of medical/health information privacy that apply in the country and state where the Web site and mirror sites are located.

4. Attribution
Where appropriate, information contained on this site will be supported by clear references to source data and, where possible, have specific HTML links to that data. The date when a clinical page was last modified will be clearly displayed (e.g. at the bottom of the page).

5. Justifiability
Any claims relating to the benefits/performance of a specific treatment, commercial product or service will be supported by appropriate, balanced evidence in the manner outlined above in Principle 4.

6. Transparency of authorship
The designers of this Web site will seek to provide information in the clearest possible manner and provide contact addresses for visitors that seek further information or support. The Webmaster will display his/her E-mail address clearly throughout the Web site.

7. Transparency of sponsorship
Support for this Web site will be clearly identified, including the identities of commercial and non-commercial organisations that have contributed funding, services or material for the site.

8. Honesty in advertising & editorial policy
If advertising is a source of funding it will be clearly stated. A brief description of the advertising policy adopted by the Web site owners will be displayed on the site. Advertising and other promotional material will be presented to viewers in a manner and context that facilitates differentiation between it and the original material created by the institution operating the site.
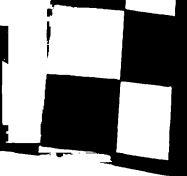
Jadad and Gagliardi (1998) found a total of 47 different systems intended to rate health information presented on the Internet, but concluded, "It is unclear... whether they should exist in the first place, whether they measure what they claim to measure, or whether they lead to more good than harm."

Kim, Eng, Deering and Maxfield (1999) searched "world wide web sites and peer reviewed medical journals for explicit criteria for evaluating health related information on the web" and found "29 published rating tools and journal articles... that had explicit criteria for assessing health related web sites." They observed that

> the most frequently cited criteria were those dealing with content, design and aesthetics of site, disclosure of authors, sponsors, or developers, currency of information (includes frequency of update, freshness, maintenance of site), authority of source, ease of use, and accessibility and availability.

Medical Matrix has created a one to five "stars" ranking system for medical web sites to be used mainly by medical professionals (Table 3). In ranking each site, they consider peer review, application, media, feel, ease of access and dimension (Table 4).

Peterson (1999), in evaluating the quality of 39 online CME sites, used the set of standards proposed by Silberg, Lundberg and Musacchio (1997). These eight standards include requiring registration by the user, identification of the author, provision of clear published references for the content, disclosure of sponsorship, date-stamped pages, whether or not there is peer-review, testing of the user and feedback.

To date, this writer has found no widely accepted standard for quality of Internet CME sites.
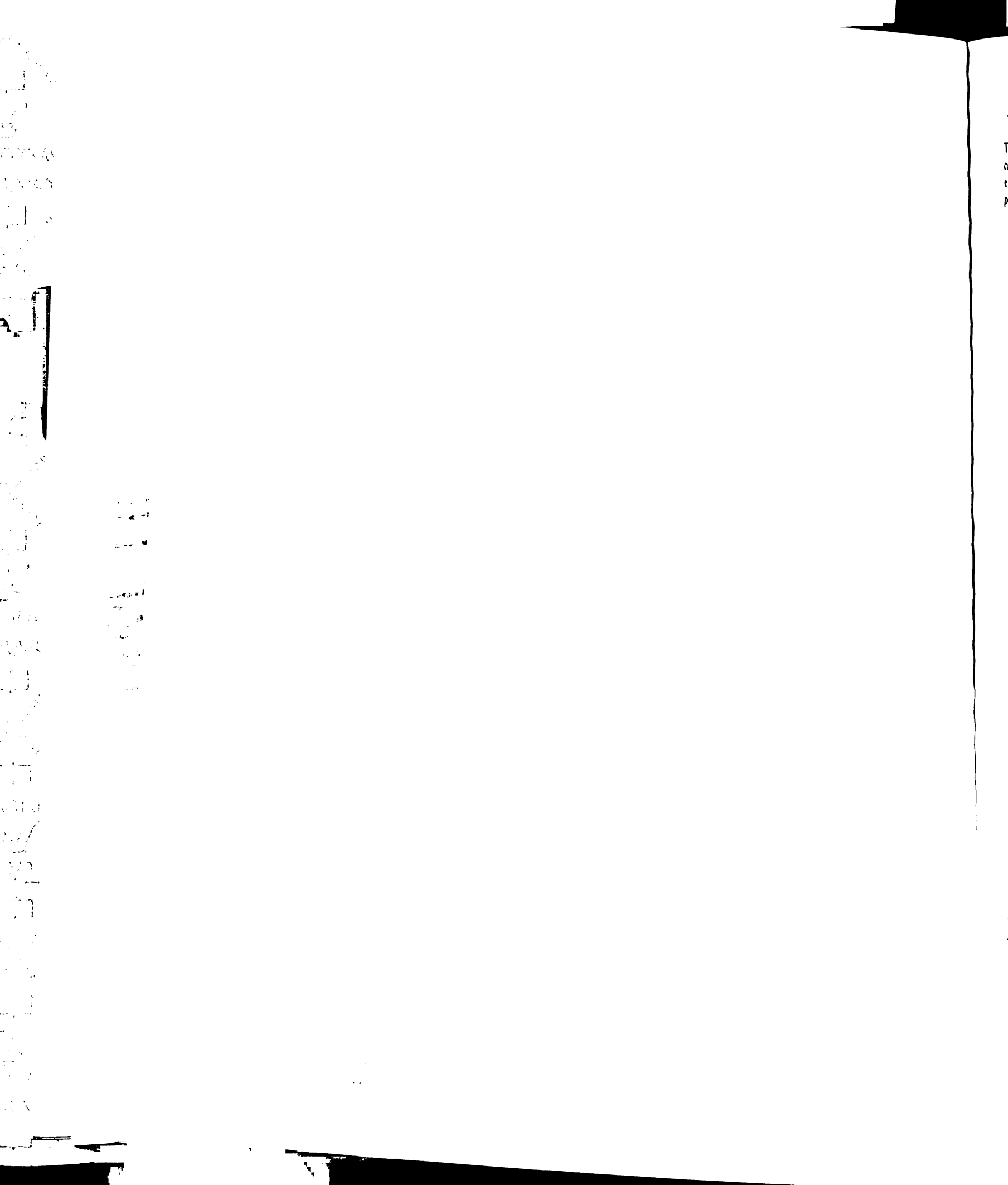
Table 3 - Medical Matrix Star System –Adapted with Permission from Medical Matrix

The Medical Matrix Project assigns ranks to Internet resources based on their utility for point-of-care clinical application. Quality, peer review, full content, multimedia features, and unrestricted access are emphasized in the rankings. To ensure that the ranks are applied systematically, and as objectively as possible, they are based on the following ranking system:

Ranking System

  * Suitable clinical content, well-authored and maintained. (1-10 points)
  ** A valuable resource for improving general knowledge in the discipline, or other outstanding features, such as multimedia. (11-20 points)
  *** One of the best of specialty category/subcategory and a valuable place to go. (21-30 points)
  **** Outstanding site across all categories and a premier web page for the discipline. (31-40 points)
  ***** An award winning site for Medical Internet. (41-50 points)

Table 4 - Medical Matrix Resource Evaluation Form –Adapted with permission from Medical Matrix

1. PEER REVIEW:
Previously evaluated, verifiable, endorsed, dated, current, referenced. (1-20 points)

2. APPLICATION:
Ability to enhance the knowledge database of the target clinician or specialist at the point of care. (1-10 points)

3. MEDIA:
Text, hypertext, or use of multimedia: images, video, sound in the context of the resource (e.g.: image database). (1-5 points)

4. FEEL:
Search features, navigation tools, composition, advanced HTML tools, and integration within a larger database. (1-5 points)

5. EASE OF ACCESS:
Clinical content highlighted, reliability and speed of the link, bytes to the page. (1-5 points)

6. DIMENSION:
Size, effort, and importance to the discipline. (1-5 points)

Method

A descriptive study design was used to address these research questions:

(1) How many online CME sites exist, and how many courses and credit hours of CME do they offer?

(2) For which medical specialties is online CME available, and in what numbers and proportions?

(3) What are the dominant types of instruction found in online CME?

(4) What proportion of sites is affiliated with medical schools or universities?

(5) How much does online CME cost?

(6) Where do the sites find financial support?

(7) How do sites vary in size?

(8) How do the sites promote and advertise their offerings?

(9) How many physicians are visiting online CME sites, participating in courses and obtaining CME credit from those courses?

Creation of the online CME list

Beginning in August 1997, and at approximately three-month intervals until February 2000, the Internet was searched for sites offering CME accredited by the ACCME. The search string used at each of the search portals was "+online +continuing +medical +education." During each quarterly search, the first 200 links from each portal site were followed as well as other promising links from those links. In the first two and half years, these major portals were searched: Altavista, Yahoo, Netscape, Lycos and Excite. Qualifying sites were added to the list named "Annotated List of Continuing Medical Education Sites" and posted on the Internet at http://www.medicalcomputingtoday.com.

With each quarterly search newly found sites were added to the list. The last search of the five portals named above was carried out in December 1999. In February

2000, an additional search of the first two hundred links from two new search portals, Google and Northern Light, was carried out. Also, when site owners or developers asked to be added to the list, those sites were visited and evaluated and added to the list when they met the criteria for inclusion.

Sites were selected for inclusion where the entire instructional process (except, in a few instances, accreditation and payment) could be conducted online. Sites were not included if they offered only promotion of other forms of CME, such as meetings, conferences, home study text, audio, video and CD-ROMs. In addition to searching for new sites every three months, each site on the list was revisited to be sure that it was still active; those sites which could not be found, where CME credit had expired, or where navigation through the site was judged to be too confusing to be followed, were deleted from the list.

Once a qualifying site was located, the following descriptive data was collected:

Name and Internet address (URL) of the Site.
Names of the Instructional Material(s).
Name of the Sponsoring Organization(s).
Type of Instruction (Text, text plus graphics, slide-audio lecture, video-lecture, question-answer format and interactive).
Number of Different Instructions offered.
Number of Units of CME credits offered.
Cost for CME credit.
Commercial Sponsorship.
Whether the site was functioning correctly.

In December 1999, the list was moved to its present location at http://www.netcantina.com/bernardsklar/cmelist.html. With subsequent quarterly reviews, additional notations have been made about when each site was last visited and when the instructional material was last updated. Direct links to many of the individual
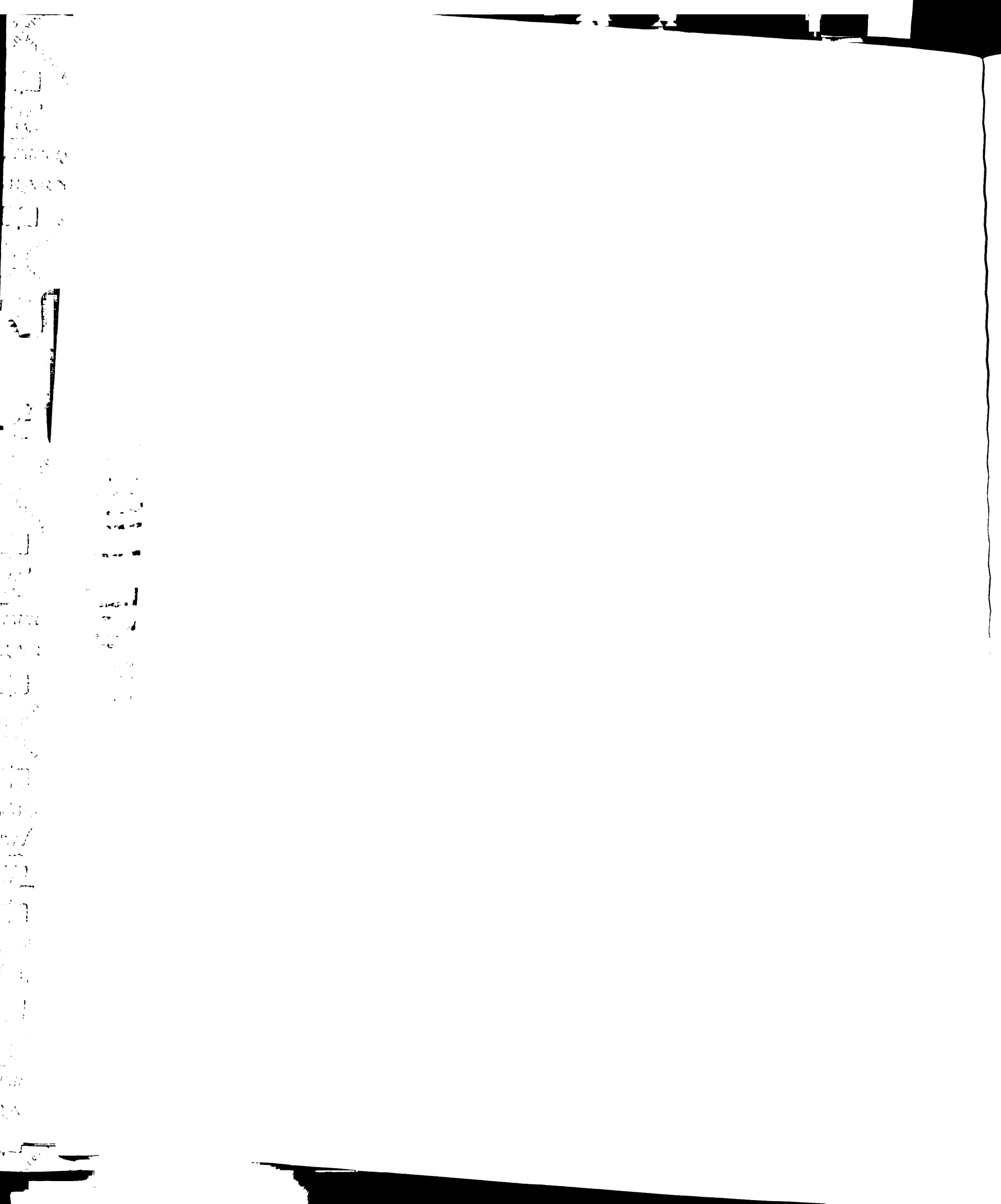
instructional courses have been added. The sites were described but not rated for the adequacy of instruction or the attractiveness of the presentation.

Creation of the Site Database

Using the data gathered from the cumulative searches described above and additional information described below, a database (Microsoft Access 2000) was developed and populated, designed to capture the salient features of each website offering online CME.

The following data items are included in the Site Database:
ID Number.
Name of Site.
Sponsoring or Accrediting Organization.
URL.
Number of Courses.
Number of Credit Hours.
Fee ($US) per Credit Hour (values in ranges 0, 1-4, 5, 6-9, 10, 11-14, 15, 16-19, 20, 21-24, 25, and 26+ entered with a drop-down box). Where there were several fee structures for members or non-members, the non-member fee was chosen. Where there were several fee structures according to whether the user paid for one course at a time or a fixed fee for a set of courses, the latter was chosen.
Date Last Visited.
Date Instructional Material Last Updated (by Site owners).

Yes/No Answers to these data items:
Does the site accept financial support from pharmaceutical or other commercial sponsors?
Is the site affiliated with a Medical School or University?
Is there Federal or State Governmental Support?
Is the site offered as a benefit for Specialty Society membership?
Is the site offered as a benefit to physician-members of a Managed Care Organization?
Is there support from a foundation?
Is the CME site part of a larger site offering other services to physicians?
Is the instruction required for licensure or accreditation?
Do the site managers use email to keep physician-users informed of additions or changes to their sites?

Yes/No Answers to these data items concerning type of instruction.
Is the instruction primarily:
Text-only?
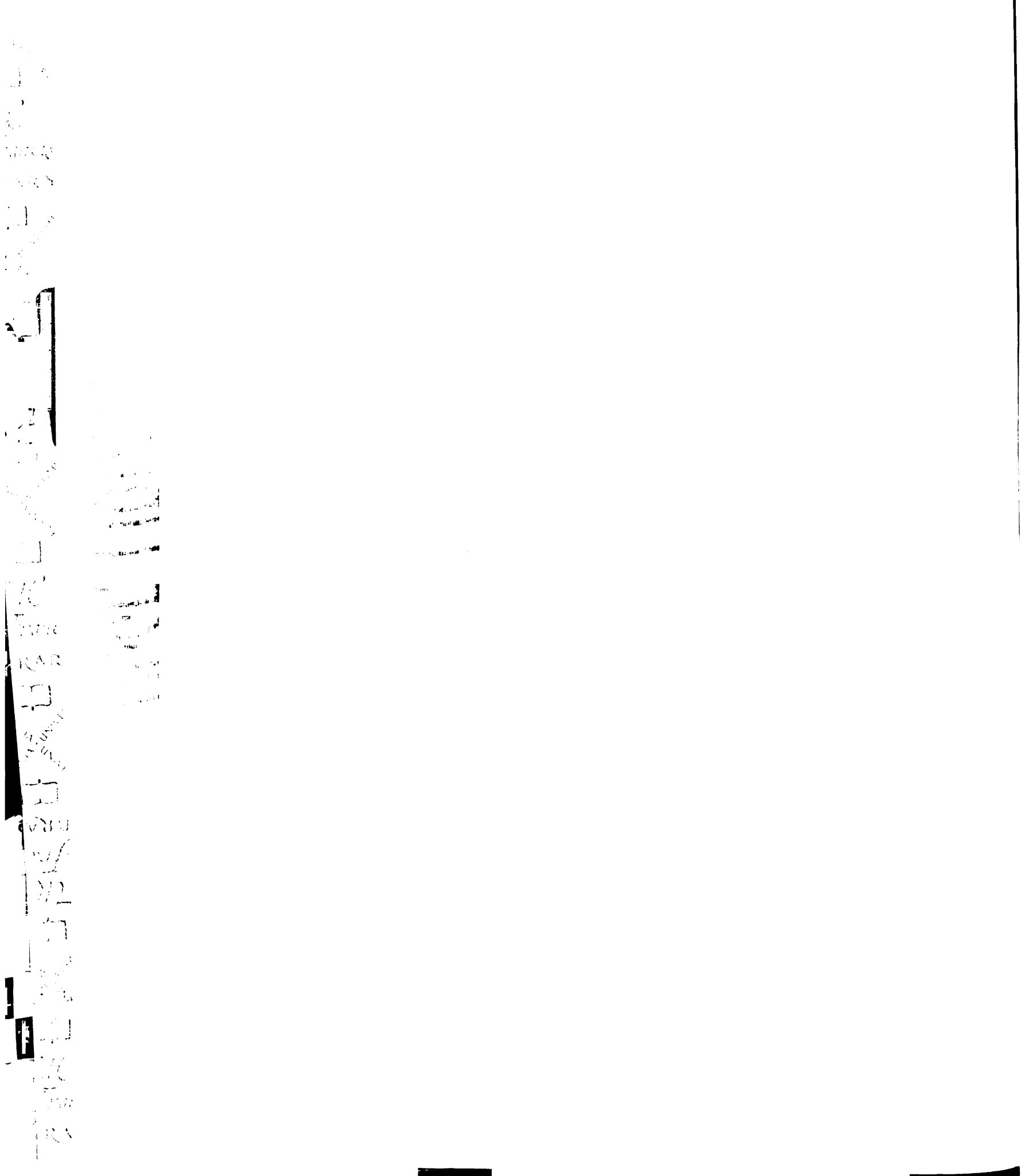
Text plus graphics?
Slide-Audio Lecture Format?
Video-Audio-Slide Lecture Format?
A presentation of guidelines?
Question/Answer Format?
Interactive?

Yes/No Answers to these data items:
Is there a stated or implied educational theory underlying the instruction?
Do the site managers appear to be trying to evaluate the effectiveness of the instruction?
Is the instruction approved for credit by the American Academy of Family Physicians (AAFP)?
Is the instruction approved for credit by the American College of Emergency Physicians (ACEP)?

Multiple possible Yes/No answers to data items about medical specialty.
Is the instruction oriented to the following specialty? (One or more choices):

Allergy/Immunology, Anesthesia, Basic Science/Research, Cardiology, Colon & Rectal Surgery, Critical Care, Dermatology, Emergency Medicine, Endocrinology, Family Practice, Gastroenterology, General Interest, Geriatrics, Hematology, Infectious Disease. Internal Medicine, Medical Genetics, Medical Informatics, Nephrology, Neurological Surgery, Neurology, Nuclear Medicine, Obstetrics/Gynecology, Oncology, Ophthalmology, Orthopedic Surgery, Otolaryngology, Pain Management, Pathology, Pediatrics, Physical Medicine & Rehabilitation, Plastic Surgery, Preventive Medicine, Psychiatry, Pulmonology, Radiology, Rheumatology, Sports Medicine, Surgery, Thoracic Surgery, Urology.

The names of the specialties are taken from the lists of specialties maintained by the American Board of Medical Specialties and the American Board of Internal Medicine List of Subspecialties.

A complete description of the site database is found in Appendix A. A copy of the site database (CME_Site_Attributes.mdb) is available by request.

Definitions of Types of Instruction

The types of online CME instruction were defined as belonging in seven categories: Text-only, text plus graphics, audio-slide lectures, audio-video-slide lectures, guideline-based, question-answer and interactive. Definitions of these types of instructions are shown in Table 5.

Most instructions fit into only one category. However, guideline-based, question-answer and interactive instructions utilized text or graphics (and, in some cases, audio or video) to present their instruction. Where the major thrust of the instruction was to present guidelines using any of those modalities, the instruction was classified under "guidelines." Where instruction was primarily question-answer using any of those modalities, it was called "question-answer." Where instruction was interactive using any of those modalities, it was said to be "interactive." Where there were several dominant types of instruction at a site, the site was listed as belonging to two different groups of instructional types.

Table 5 - Types of CME Instruction Defined

Type of Instruction	Definition of Type of Instruction
Text-Only	The instruction is very much like a journal or book chapter. Often, the instruction is many pages long, and students will often find it convenient to print the instruction and read it offline. An increasing number of sites use .pdf format for their text-based instruction. "Text-only" instruction may also include a few tables.
Text and Graphics	This kind of instruction is similar to Text-Only, but in addition to text and tables, there may be charts, drawings, photographs, x-ray pictures, pathology slides and animations. Many Text and Graphics sites present the user with a "thumbnail" of the graphic; to see the full graphic, the user must click on the thumbnail.
Slide-Audio Lecture	This kind of course attempts to simulate attendance at a live lecture. You see the speaker's slides. You hear the speaker's words. Sometimes you see "still" pictures of the speaker. Often you are able to pause the speaker or go back and listen and look at the slides again.
Slide-Audio-Video Lecture	Similar to slide-audio lecture, but you see video pictures of the speaker and sometimes of the content (e.g., a surgical procedure).
Guideline-Based	The main thrust of this kind of instruction is to describe and explain an evidence-based guideline or consensus statement. These instructions are usually text-based or text and graphics-based.
Question-Answer	The program asks the student a question or series of questions (usually multiple choice), and then gives immediate feedback about the answer and an explanation of the correct and incorrect choices with some (brief or extended) instruction about the topic. Typically 10-15 questions per credit unit.
Interactive	The program presents a "chunk" of instruction on the topic and then asks the user to give an answer or make some choices. Then the program gives positive or negative feedback and some additional information or teaching points before proceeding to the next set of questions or choices.

Analysis of the Site Database

The Site Database was queried to find answers to the research questions listed above. The results of the queries were transformed to Microsoft Excel spreadsheets in order to do calculations (sums and percentages). The Excel spreadsheets were then transformed to HTML tables (Microsoft FrontPage 2000) for the Internet version of this report and to Microsoft Word Tables for the paper version of the report. The Excel spreadsheets are available for inspection on request. The HTML tables are accessible at http://www.netcantina.com/mastersthesis.

Creation of the Course Database Prototype

A demonstration web-searchable database (Microsoft Access 2000) of Internet CME organized by course was created. The following data items are included in the Course Database:

ID Number.
Name of Course.
URL of Course.
Name of Parent Site.
URL of Parent Site.
Number of Credit Hours per course (values in increments of 0.5 hours entered from a drop-down box, with ability to enter values not found in the list.)

Fee (US$) per Credit Hour (values in ranges 0, 1-4, 5, 6-9, 10, 11-14, 15, 16-19, 20, 21-24, 25, and 26+ entered with a drop-down box). Where there were several fee structures for members or non-members, the non-member fee was chosen. Where there were several fee structures according to whether the user paid for one course at a time or a fixed fee for a set of courses, the latter was chosen.
Sponsoring or Accrediting Organization.
Date Course Posted or Revised.

Yes/No Answers to these data items:

Does the site accept financial support from pharmaceutical or other commercial sponsors?
Is the site affiliated with a Medical School or University?

Is there Federal or State Governmental Support?
Is the site offered as a benefit for Specialty Society membership?
Is the site offered as a benefit to physician-members of a Managed Care Organization?
Is the CME site part of a larger site offering other services to physicians?
Is the instruction required for licensure or accreditation?
Do the site managers use email to keep physician-users informed of additions or changes to their sites?

Yes/No Answers to data items about medical specialty (up to eight specialties accepted). The list of specialties is the same as for the Site Database.

Yes/No Answers to data items about medical conditions or procedures (up to six medical conditions or procedures may be chosen). The names of these medical conditions or procedures and their associated numerical codes are taken from the UMLS Knowledge Source Server list of unique identifiers. The names and unique identifiers are accessed from an abridged dropdown list of medical conditions or procedures derived from the UMLS Knowledge Source Server list.

Yes/No Answers to data items about Types of Instruction. The choices include Text-Only, Text-and-Graphics, Slide-Audio-Lecture, Video-Lecture, Guideline-Based, Question-and-Answer and Interactive. Up to 3 choices were made.

Yes/No Answers to data items about specialty board accreditation:
Is the instruction approved for credit by the American Academy of Family Physicians (AAFP)?
Is the instruction approved for credit by the American College of Emergency Physicians (ACEP)?

A course description (text input). Where available, the course description or list of objectives given by the author(s) was inserted. Where not available, a brief description was created based on an examination of the course material.Finally there is a space for comments to be made by the reviewer.

A more complete description of the Course Database is found in Appendix B. A copy of

the course database (CME_Site_Attributes.mdb) is available by request.

The prototype search engine is located at

http://www.netcantina.com/CMESearch/SelectBoxSearch2.html. An illustration of the

user request interface is shown in Appendix C. Searches by the website user yield this

information: Name of Site and Course, Course Description, Date Posted or Revised,

Sponsor, Credit Hours and Fee/Hour. The result of a sample search is shown in

Appendix D. At this time, this database is populated with only 45 courses, so most searches will yield empty results. Additional data items collected in the database will be made available to researchers on request.

Comparison of Previous Versions of the Online CME List with the Present List

In an attempt to quantify the growth of online CME, previous versions of the Online CME list were reviewed. The number of sites offering online CME beginning in September 1997 is compared to the number of sites found in the present version of the list.

The Physician Usage Survey

In December 1999, an email was sent to each online CME site offering ten or more credit hours asking for information about physician usage at their site. Email contact addresses were obtained from the contact information given at the site. The first email request is shown in Appendix C. About one month later a second email was sent to those contacts that had not responded to the first note. A copy of the second note is shown in Appendix D.
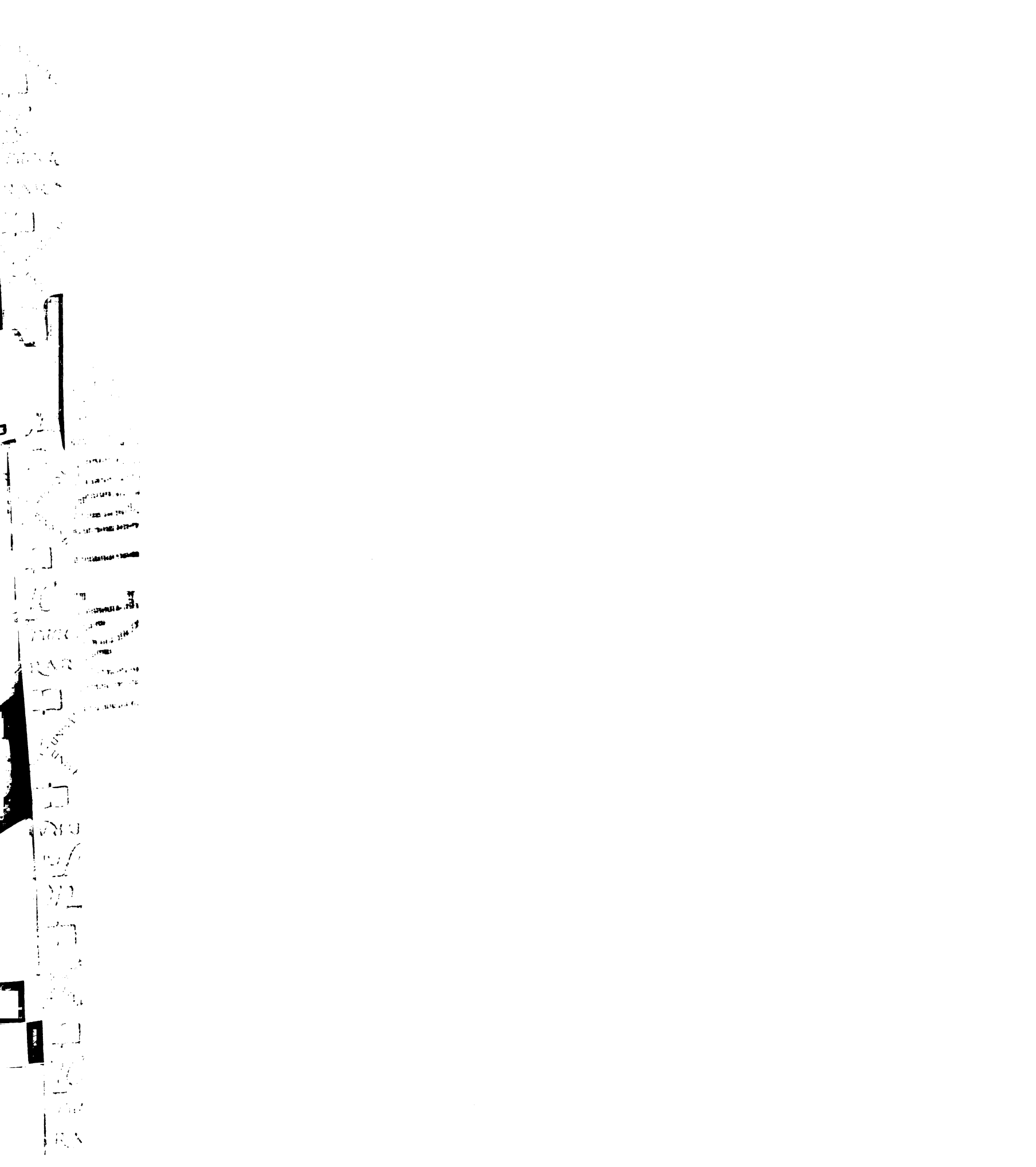
Results

In Results, a sample entry from the list of online CME sites is shown; the results of the analysis of the online CME site database is presented; the growth in the number of online CME sites is illustrated; and the physician-usage survey results are given.

The List of Online CME Sites

Links to ninety-six web sites offering ACCME-accredited online CME were made. An alphabetical list by site name of the sites was created with descriptions of the offerings at that site. A single example from the February 2000 list is shown:

American College of Physicians-American Society of Internal Medicine: Clinical Problem-Solving Cases Last visited....12/99. Credit hours...1.0 per case. Awarded by....ACP/ASIM. Cost................$50 for 24 credit hours or $75 for 48 hours. Educational material last updated.... 11/99.	**Two new interactive cases each month, aimed at internists. You begin by assessing the patient's condition, form differential diagnoses, make treatment decisions, order tests and follow patients through the resolution of their problems. As you complete each step in the process of solving patient problems, the program's interactive features allow you to compare your clinical decisions to those of expert authors. Before registering, you may try a demonstration case, "A 45-year-old woman with rash."**

The list is found on the Internet at http://www.netcantina.com/bernardsklar/cmelist.html.

Analysis of the Online CME Site Database

The Site Database was analyzed looking for answers to these questions:

(1) How many online CME sites exist, and how many courses and credit hours of CME do they offer?

(2) For which medical specialties is online CME available, and in what numbers and proportions?

(3) What are the dominant types of instruction found in online CME?

(4) What proportion of sites is affiliated with medical schools or universities?

(5) How much does online CME cost?

(6) Where do the sites find financial support?

(7) How do sites vary in size?

(8) How do the sites promote and advertise their offerings?

The results of these queries are shown:

(1) How Many Online CME Sites Exist, and How Many Courses and Credit Hours Of CME Do They Offer?

Ninety-six sites offering 1874 courses totaling 3064 credit hours of ACCME-accredited online CME were found. A course is a unit of instruction on a specific medical topic. Each course may offer from 0.5 hours to 65 hours of CME credit, but typical courses offer one to five credit hours. A list of numbers of courses and credit hours, by site, is shown in Table 6.

Table 6 - Alphabetical List of Sites with Numbers of Courses and Credits

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 6 - List of Sites with Numbers of Courses and Credits, 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

(2) Results by Medical Specialty:

Sixty-one (64%) of the sites offered instruction aimed at primary care physicians. Of the 96 sites, 57 (59%) offered instruction appropriate for Family Practice, 54(56%) for Internal Medicine, 16 (17%) for Pediatrics and 18 (19%) for Obstetrics/Gynecology). (These numbers total more than 96 and the percentages total more than 100% since the same course may be appropriate for many different specialties, and that one site may offer instruction aimed at different specialists).

Seventy-three (76%) of the sites offered instruction aimed at specialists and subspecialists. 17/96 (18%) of sites offered instruction aimed at Neurologists, 17 (18%) had instructions for psychiatrists, 15 (16%) for Cardiology, and 10 (10%) for Oncology.

Seventeen (18%) of sites offered instruction that of interest to many or most specialties. These included sites with topics such as pain management, medical ethics, and domestic violence and practice management. A complete listing of sites presented by medical specialty is shown in Table 7.

Table 7 - Number and Percent of Sites by Medical Specialty

	Number of Sites	Percent of sites
Primary Care Sites	61	64%
including		
Family Practice	57	59%
Internal Medicine	54	56%
Pediatrics	16	17%
Obstetrics/Gynecology	18	19%
Specialty Sites	73	76%
including		
Neurology	17	18%
Psychiatry	16	16%
Cardiology	15	16%
Oncology	10	10%
Infectious Disease	9	12%
Dermatology	7	7%
Gastroenterology	6	6%
Pulmonary	6	6%
Surgery	6	6%
General interest to all or most physicians (ethics, legal, practice management)	17	18%
Other specialties were found at 5 or fewer sites.		

(3) Types of Instruction:

The numerical analysis of the forms of instruction is shown:

Form of Instruction	Number of Sites	Percent of Sites
Text-Only	27	28
Text and Graphics	36	38
Slide-Audio Lecture	22	23
Slide-Audio-Video Lecture	7	7
Guideline-Based	7	7
Question-Answer	4	4
Interactive	16	17

(4) University or Medical School Affiliation

Forty-two of the ninety-six sites (44%) were produced and/or sponsored by universities or medical schools. In addition, many of the sites without specific university or medical school sponsorship indicated that university faculty members were engaged to create or review instruction.

(5) Fees for Instruction

Forty sites (42%) offered free instruction or instruction for less than $5 per credit hour. Thirty-two sites (34%) offered instruction for $5-15 per credit hour. Eighteen sites (19%) charged $15 or more per credit hour. A complete tabulation of fees is shown in Table 8.

Table 8 - Fee Structure of Online CME courses

Dominant or Average Fee	Number of Sites	Cumulative Price Structure	Cumulative Number of Sites	Cumulative Percent of sites
Free	38	Free	38	40
Less than $5 per unit	2	Less than $5 per unit	40	42
$5 per unit	6	$5 per unit or less	46	48
$6-9 per unit	11	$6-9 per unit or less	57	59
$10 per unit	9	$10 per unit or less	66	69
$11-14 per unit	6	$11-14 per unit or less	72	75
$15 per unit	6	$15 per unit or less	78	81
$16-19	4	$16-19 or less	82	85
$20	4	$20 or less	86	90
$21-24	1	$21-24 or less	87	91
$25	7	$25 or less	94	98
Greater than $25 per unit	2	Greater than $25 per unit or less	96	100

(6) Sources of financial support

Online CME sites receive financial support from one or several sources: commercial sponsors (usually pharmaceutical companies), universities and medical schools, governmental agencies, medical associations or societies, foundations, insurance and managed care companies and user fees. In many cases, sites have received financial support from multiple sources. The sources of support are shown:

Source of support	Number of sites
Commercial companies	35
University or Medical School	42
Governmental Agencies	6
Medical Associations or Societies	9
Foundations	5
Insurance Companies or Managed Care Company	5
User Fees	58

(7) The size of online CME sites

Sites fall into several groups according to the number of courses and hours of credit offered. There are three sites offering greater than 100 hours of credit. These sites are HealthStream University (about 415 courses adding up to about 830 hours), Medscape (about 400 courses; most are one hour, totaling about 400 hours) and ArcMesa (about 54 courses totaling 207 hours). At the other end of the spectrum, there are 25 sites that offer 4 or fewer credit hours of instruction. The remainder of the sites fall in between these extremes as shown.

The Size of Online CME Sites

Number of credit-hours	Number of Sites	Number of hours	% of sites	% of hours
Greater than 100	3	1507	3	49
50-99	6	360	6	12
25-49	14	549	15	18
10-24	28	481	29	16
5-9	14	87	15	3
<5	31	76	32	2
Total	96	3060	100	100

(8) How many sites promote their instruction with email reminders?

Eleven of the 96 sites offer email reminders of new courses to their registered users. The names of those sites are shown:

Current CME Reviews

Cyberounds

HealthGate

HealthStreamUniversity.com

MedConnect Emergency Medicine

MedConnect Family Practice

MedConnect Managed Care

MedConnect Neurology

Medscape CME Center

Primary

Virtual Lecture Hall

The Growth of Online CME Sites

Review of an article from April 1997 (Sklar, 1997) showed 13 sites offering online CME. In December 1997, 18 online CME sites were found using the search described in "Methods." Using the same search parameters, 37 sites were found in March 1998; in August 1998, 61 sites; in April and May 1999, 69 sites; in August 1999, 76 sites; in early December 1999, 87 sites and in February 2000, 96 sites.

The Physician Usage Survey

The physician usage survey was created to look for answers to these questions:

(1) How many physicians visit online CME courses?

(2) How many physicians are using the Internet to earn CME credits?

(3) How many credits are they earning?

(4) What are the trends in usage?

Twenty-three sites responded to the survey with some kind of usable information. Eleven sites did not respond or email was returned as being sent to an incorrect address. Three sites responded, but had no usable information. Two sites refused to share information. Five sites promised to share information, but eventually did not send anything after a second request. Three sites requested that information identifying the site be disguised because of proprietary considerations. A tabulation of the various responses to the Survey is shown in Table 9.
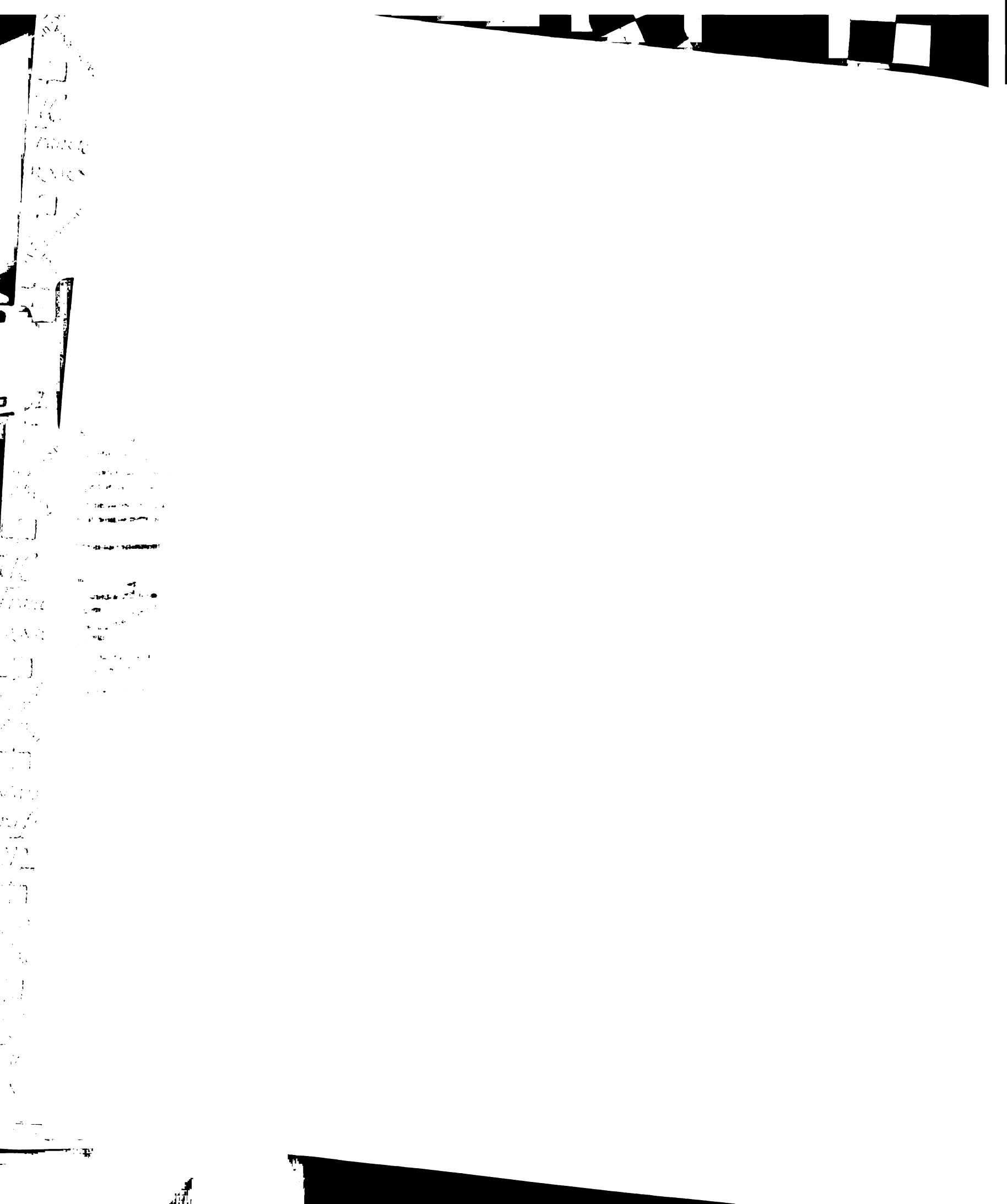
Table 9 - Responses to Survey

	Used in report	No response	Refused	*	**
HealthStreamUniversity.com	x				
Medscape CME Center		x			
ArcMesa Educators	x				
Current CME Reviews	x				
Virtual Lecture Hall	x				
Frontiers in Biomedicine					x
Cyberounds	x				
Pediatric Grand Rounds	x				
Johns Hopkins Saturday Medicine Rounds	x				
Cancer Control Moffitt Cancer Center				x	
HealthGate	x				
MedRisk Online	x				
Legal Medicine		x			
Medivision Virtual Online Training				x	
Pain.com	x				
CME-CE.COM		x			
AAPM&R EMG Case-of-the-Month Series	x				
MedEd Interactive					x
Virtual Hospital (University of Iowa)	x				
CLIA and the Physician's Office Laboratory		x			
Stanford Medical Informatics	x				
Ed Credits		x			
MedConnect Emergency Medicine		x			
Pulmonary and Critical Care Update		x			
Frontiers in Clinical Genetics					x
Medbytes		x			
Virtual World Congress Chest Diseases 1997			x		
Cleveland Clinic Journal of Medicine				x	
CME-WebCredits				x	
Essentials of Immunology Online	x				
Psychiatric Times		x			
Clinical Puzzles Online Course		x			
MMWR Continuing Education Programs	x				
MCP Hahnemann University		x			

Table 9 - Responses to Survey Continued

University of Alabama at Birmingham				x	
Radiological Society of North America	x				
Stanford Radiology Online CME	x				
CMEWeb	x				
The Doctor's Dilemma	x				
MedConnect Family Practice		x			
Alcohol Problems: Psychosocial Issues	x				
American Medical Association Online CME Courses				x	
NIH Consensus Statements	x				
University of Washington	x				
Totals	22	11	2	6	3

* = Promised information but did not give any. ** = Gave information but not useful.

The statements in the physician usage survey section are direct quotes or paraphrases of information given by the site owners either in email messages or in telephone conversations. In one case (Virtual Hospital), the figures are taken from a published medical paper. The responses of the site owners are presented in order of the approximate number of credit hours awarded by each site.

Medical Directions, Inc. operates the Virtual Lecture Hall. This site has been active since May 1998 and currently offers sixteen courses totaling sixty-three hours. Their instruction is aimed primarily to primary care physicians. The instruction type is either interactive or question/answer.

The owner of Medical Directions, Inc. stated on November 26, 1999,

In the first 6 months (5/98 to 11/98) we dispensed 1,500 hours of CME. In the second 6 months we provided 4,500 hours of CME. In the third 6 months we provided 9,000 hours of CME. In the first 6 months we had 1993 new registrants (almost all MDs/Dos). In the second 6 months we had 2788 new registrants. In the third 6 months we had 2183 new registrants.

A visit to the Virtual Lecture Hall site on January 24, 2000 showed the message, "Physicians have received over 18,075 hours of AMA Category 1 CME credit from the VLH since May 1998." A second visit on February 14, 2000 showed the message, "Physicians have received over 19,723 hours of AMA Category 1 CME credit from the VLH since May 1998." And a third visit on March 25, 2000 showed the message, "20,801 CME hours issued since May 1998." This would suggest that Virtual lecture Hall is presently awarding about 1000 credit hours per month.

Another large site, which asked not to be named, started in late 1998 or early 1999. Their instruction is of the question/answer type. The site manager offered this data: In 1999, they had between 2096 and 5341 courses per month "accessed but not necessarily completed." During that same period, the number of courses completed (quiz completed) ranged from 236 to 505 per month. This site also uses email reminders to registered users.

Medscape declined to participate in the survey for "proprietary reasons." However, George Lundberg, medical director of Medscape, stated in an Internet audio broadcast on February 8, 2000, "Last week we gave out 6000 CME certificates" (Lundberg, 2000).

ArcMesa presently offers over 200 hours of credit and has been rapidly increasing its numbers of users. The site became operational in October 1997. They reported 13 courses taken in 1997, 241 courses taken in 1998, 542 courses in 1999 and 312 in the first month of January 2000.
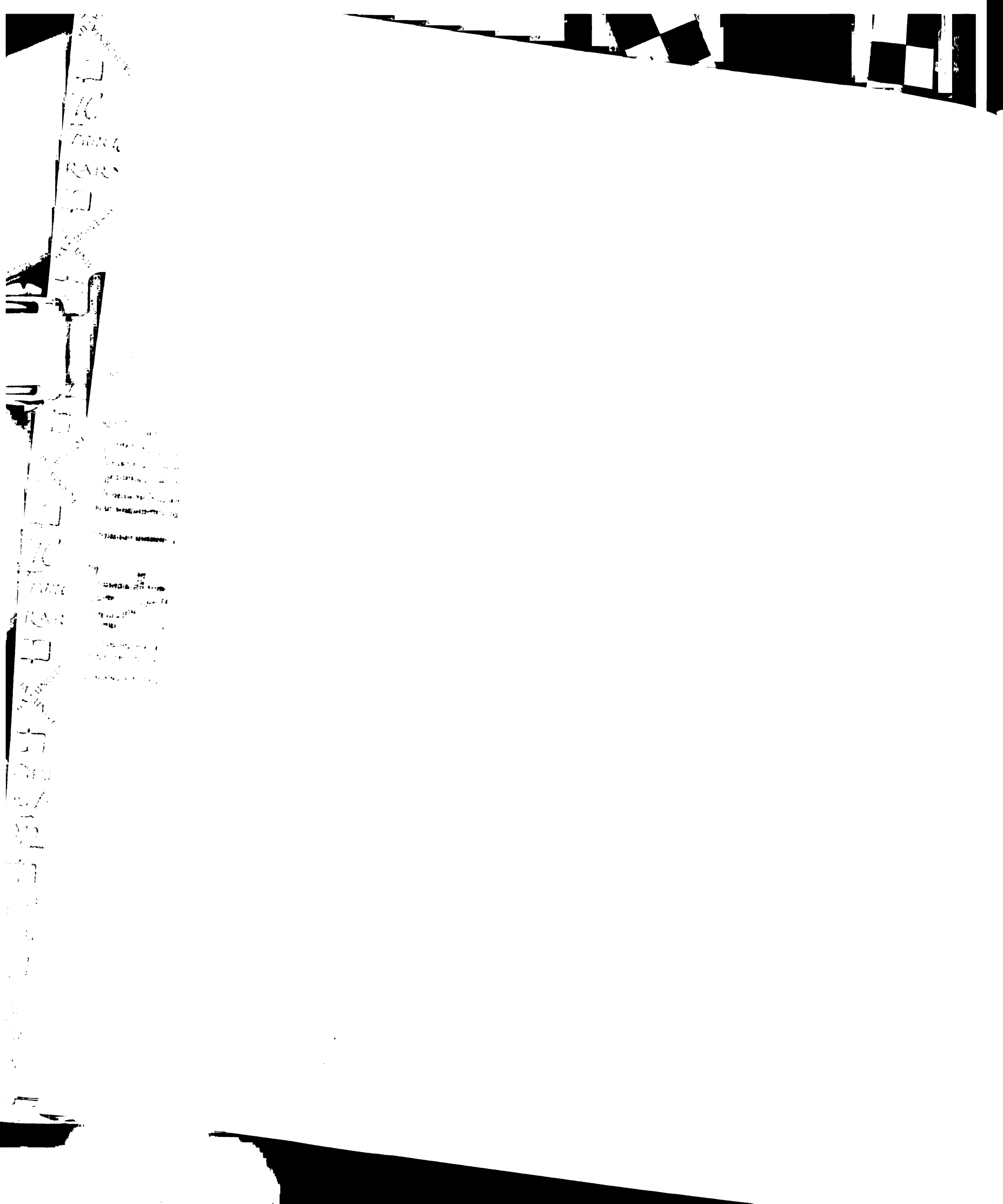
Cyberounds offers a new course each week and sends an email reminder about that course. The owner of Cyberounds explained that there are two types of registration. In one type, where doctors pay $125 for the year or $125 for 50 hours, and where the instruction type is text-only, Cyberounds has "about 400" subscribers. In the other type of registration, where doctors pay one course at a time, and where the questions are embedded in the text, they are getting "300-600 responses per program."

The Director and Moderator of the Johns Hopkins Saturday Morning Program (no longer available) said, "there were about 350 logons weekly with just a handful of subscribers for CME credit."

The editor of the Cancer Control Journal of the Moffitt Cancer Center wrote, "We have 121 registered physicians. They have taken (approximately) 319 tests since March 1999 for a total of 1,066 CME credits." She also wrote that that the site was getting 2100 to 3600 "hits" per month.

The editor of Pain.com, a free site, wrote, "we do not have definite numbers for physicians visiting Pain.com, but for November 1999 we had 346,252 page views from 56,911 visitors and awarded 248 hours of online CME credit."

One university-sponsored specialty-oriented site which asked not to be identified reported, "from February 1999 through December 1999, (we had) 552 clients registered; 369 clients were MDs; we issued 252 certificates."

One medium-sized site said that about 10% of their doctor-visitors were regular users of their site and that 90% visited "occasionally." They also noted "most doctors do their accreditation in one sitting and take on average 2 courses per sitting." And they

stated, "From July 1, 1998 to June 30, 1999, we awarded 127.5 CME credit hours for 18 courses."

CMEWeb specializes in question-answer instruction. They reported that, in the past three years, 4,000 doctors took tests at their site. These doctors took over 20,000 tests, worth over 30,000 credit hours.

The editor of Radiological Society of North America Electronic Journal said, "The total number of RSNA EJ CME tests taken is approximately 2600. The RadioGraphics CME tests taken average about 800 per month."

Morbidity and Mortality Weekly Report (MMWR), a free federal government-sponsored site devoted to infectious disease, has ten different courses offering one to three hours of credit each. Over the most recent reporting year, they awarded from 187 to 4236 credit hours with a total of 9201 credit hours. On the most popular course, Hepatitis C, 2118 users earned 4236 credit hours.

NIH Consensus Development Program, another free federal government-sponsored program, has been offering free CME credit for reading and answering questions about their online Consensus Statements since mid-1995. The director of the NIH program stated that from mid-1995 through the end of 1999, about 2870 physicians earned about 4007 credits using the online version of the service. These credits were earned on a total of 12 different courses. He stated that this had occurred in the absence of any promotion.

During the same period, each of the 12 NIH Consensus Statements courses was promoted to about 60,000 physicians by sending the printed version of the Consensus
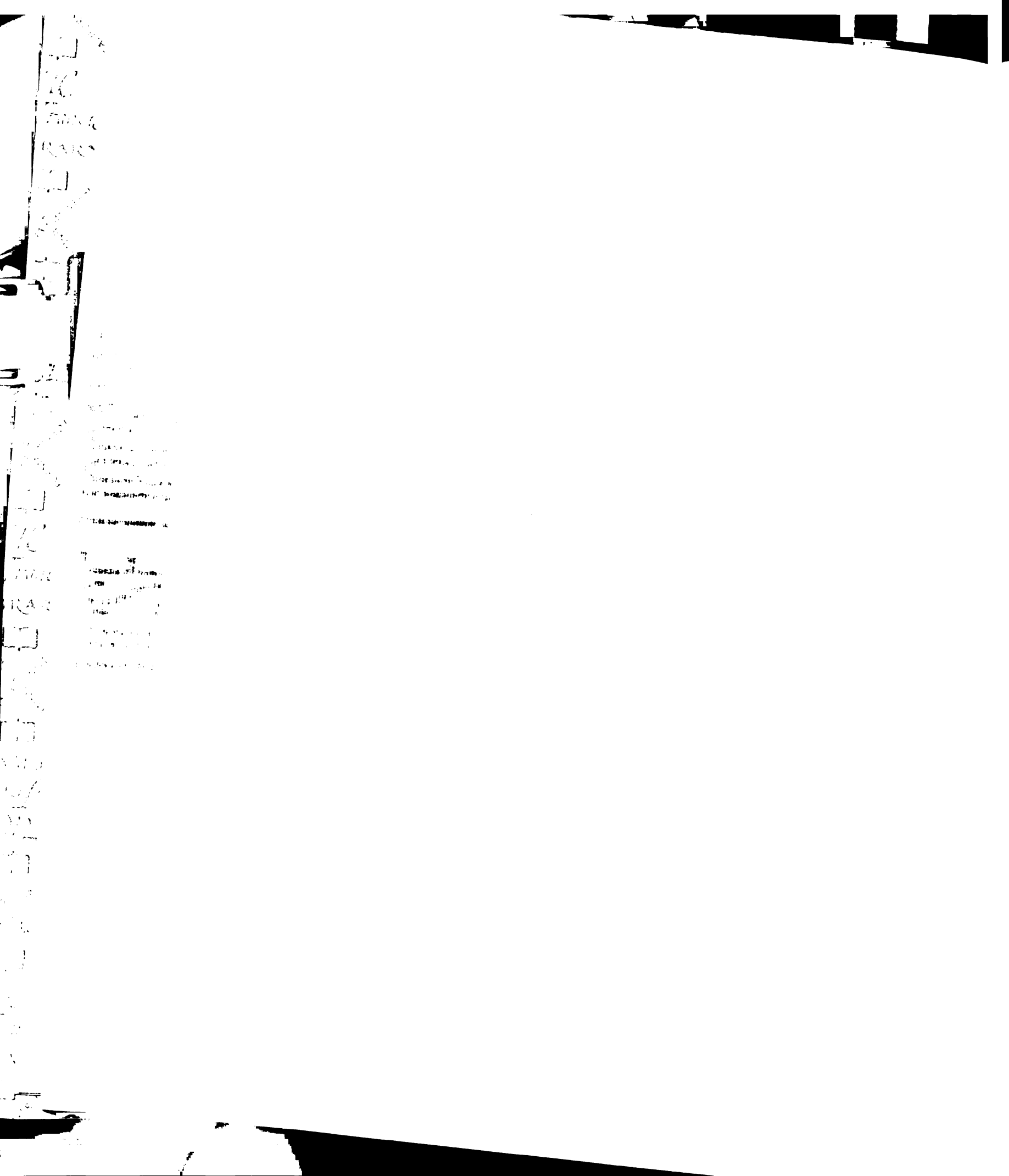
Statements along with the quiz form. This resulted in about 4160 physicians earning about 5767 credits through the mail version of the service.

The owner of Pediatric Grand Rounds reported that he had 255 physicians registered. He also stated that for 1998 (8/98 to 12/98): 27 hours of CME were used. He stated, "most of our users log on and watch but either don't register or don't register for CME. For 1999 so far, only 40 hours have been awarded."

The University of Washington Online CME site, a new generalist-oriented site, stated, "we currently have 15 (apparently all doctors) signed up for our courses, and as of last week, they had earned a total of 34 hours of CME credits."

The editor of Current CME Reviews, a psychiatric CME site, stated, "we have about 500 registered users that visit our site regularly to take tests."

The project director of The AAPM&R (American Academy of Physical Medicine and Rehabilitation) EMG Case-of-the-Month Series reported, "from our 1998 ACCME report, we have a total of 220 participants and up to 36 hours of instruction."

The Virtual Hospital at the University Iowa produces CME primarily for critical care and pulmonary physicians. They responded to the email request for information by referring to a published article (Peterson, Galvin, Dayton, and D'Alessandro (1999)) in which they

> determined the number of users who registered and submitted examinations with a score
> of greater than or equal to 70%. Between August 1996 and January 1998, registered users
> submitted 169 completed CME examinations. Of the users who submitted these
> examinations, 15 paid CME fees and received 52 h of AMA category 1 CME credit. The
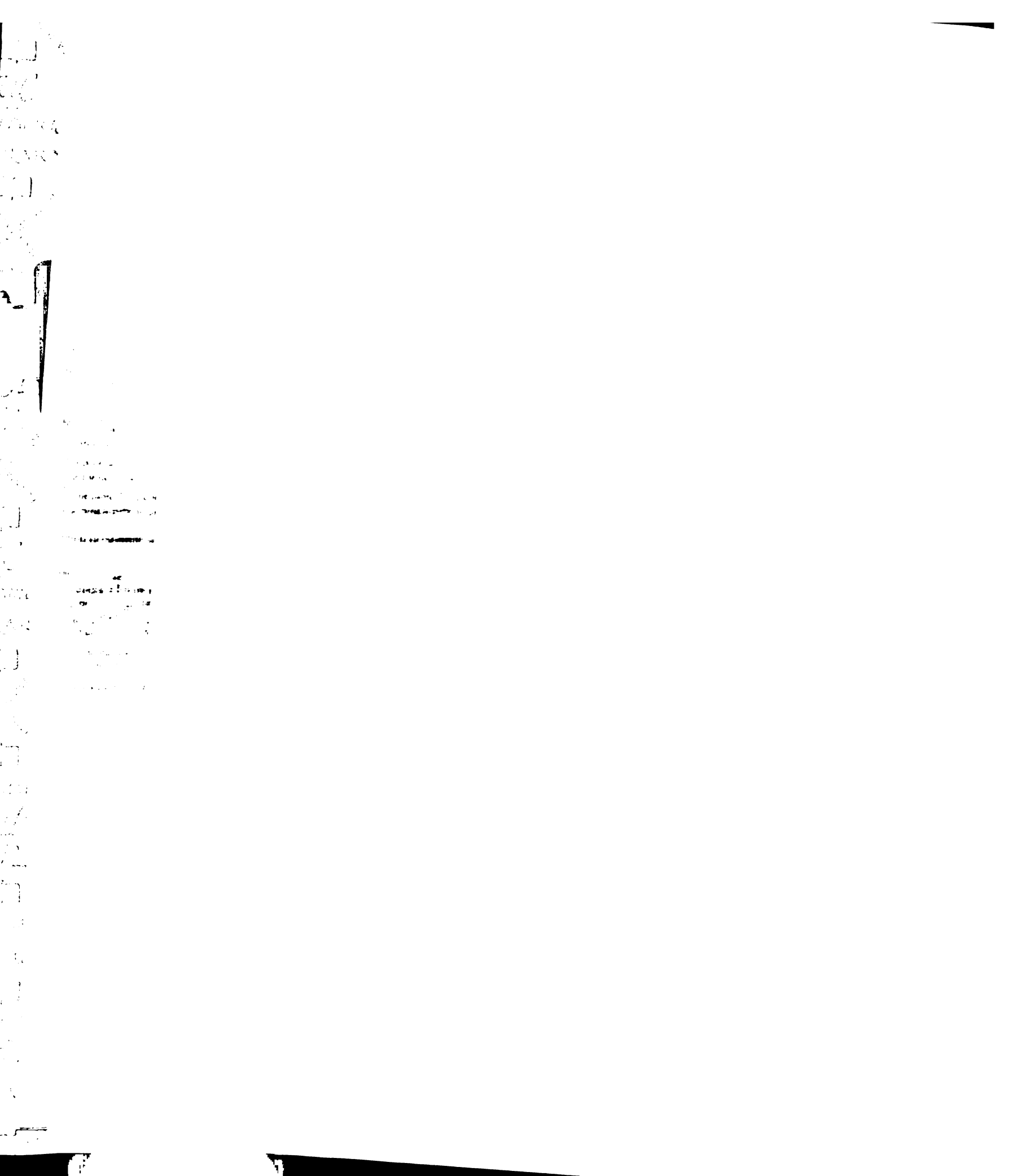
physicians who successfully completed the remaining 117 modules elected not to pay for formal CME credit.

MedRisk Online offers eight text-only programs on reducing malpractice risk in various practice settings. The director reported, "We have provided online versions since 1997. To date, fewer than 100 physicians have completed online courses, though more have registered and not yet completed their courses."

One site offering a medical ethics program reported, "34 physicians had subscribed for 15 credit hours each." A site offered a course in immunology had not yet had any subscribers.

Alcohol Problems: Psychosocial Issues, from Dalhousie University, is organized more like a traditional distance education course, in which students read material, answer questions, get personal online responses from the instructor and can interact with other students. The instructor reported, "the current course has been very successful with 11 participants from Western Canada, Eastern Canada, Martinique and Brazil, a very active enthusiastic group."

The director of the Stanford Medical Informatics online "Short Course" said, "about 15 people have taken the course over the last year."
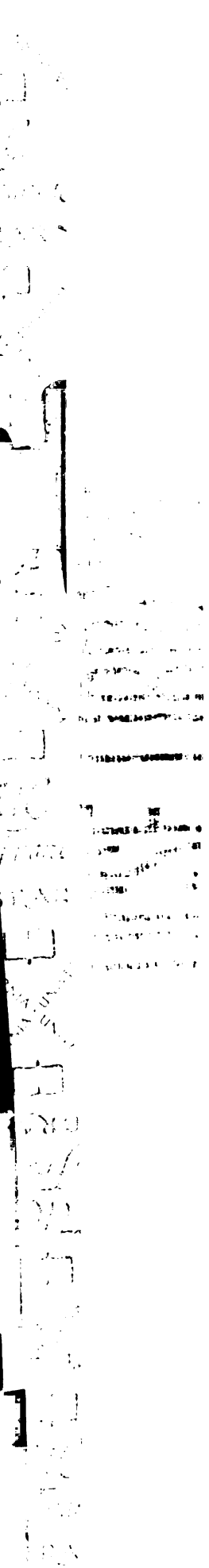
Discussion

In Discussion, the rapid growth of online CME sites and courses is reviewed; the growing gap between large sites and small sites is discussed; the slow growth in the numbers of users is presented; ideas are suggested to explain the discrepancy between the number of visitors to online CME sites and the number of credits awarded; and a brief discussion of the use of educational theory in online CME.

Rapid Growth of Online CME

The number of online CME sites is growing rapidly as is the number of offerings at the larger sites. The number of sites found grew from about 18 in late 1997 to 96 in mid-February 1999. Since then about 10 new sites have appeared. Instruction is becoming more sophisticated, with better use of graphics, slides, animation, audio and video. The number of credit hours available has grown to over 3000.

The Growing Gap Between Large Sites and Small Sites

The three largest sites (HealthStream, Medscape and ArcMesa) account for 40-45% of the available hours. The twenty-nine smallest sites account for only 2% of the number of the available credit hours. Since the data presented in Results was gathered and analyzed (early February 2000), the larger sites have been growing even larger. Medscape now (April 9, 2000) lists 453 hours of free and paid CME; ArcMesa now (April 9, 2000) offers 200 hours. HealthStream has recently acquired or formed co-marketing agreements with Silver Platter, Cleveland Clinic, CMECourses.com and CMEWeb. A visit to the HealthStream site on April 9, 2000 reveals that HealthStream

plans "to have more than 2500 hours of continuing education available on the site by the end of 2000."

As the customer base of the larger sites enlarges, their instruction has become more attractive to look at and listen to. Many of the smaller sites have let their content stagnate and have done little to attract or retain customers. A significant customer base is required to at least break even on the costs of creating and maintaining an online CME site.

Slower Growth in Numbers of Users

The number of users is somewhat more difficult to quantify. Although a few of the larger, more-efficiently run sites believe that physician usage is growing, the sparseness of responses and the lack of precision of some of the responses make it difficult to estimate growth. The ACCME reports for 1997 and 1998 indicate that about 0.3% of CME credits were earned online in 1997 and about 1.0% of CME credits were earned online in 1998. Erickson (2000) pointed out a possible small decrease in the percentage of CME credits earned online and the apparent absence of interest in online CME by women physicians.

The Discrepancy Between Numbers of Visitors and Numbers of Credits Awarded

The growth in the number of credits awarded is not nearly as great as the growth in the number of courses and credits available. Many sites experience a large number of "hits" or page views in contrast to a very small number of CME credits awarded.

There is a series of "gates" affecting the journey from visiting a site to receiving CME credit. A large number of physicians visit sites, take a look around, and if they find nothing of interest or have difficulty navigating the site, they leave. If they stay, the next step at most sites is to register. Registration frightens away some portion of physicians who do not wish to give any information about themselves, especially medical license numbers, social security numbers or credit card information.

If the physician decides to register, or if the site allows further viewing without registering, there are some additional gates to pass. These gates depend on whether the courses are free, "pay-as-you-go," or by annual subscription fee.

If the instruction is free, a smaller number of physicians look at individual courses and then leave. A smaller number start to view one or more courses, decide that it does not meet their needs and leave without completing the course. An even smaller number complete the course and leave without completing the post-instruction quiz or questionnaire. And the smallest number complete all of the preceding steps and apply for the CME certificate.

If the instruction is "pay-as-you-go," the path through the gates is the same as above, except that at the last gate, a physician must submit his or her credit card information online. The fear of revealing this information further reduces the number of physicians receiving credit.

If the site charges fixed fee for all the credits a physician can earn in a given period (usually one year), the physician has another choice. Should he or she pay in advance for instruction he may not use? Or pay in advance for instruction he may not

even look at without paying? Most fixed fee sites allow viewing of a "demo" course to help with this decision, but surprisingly, some do not.

A further complication is that each site has its own registration and payment procedures that must be mastered in order to participate. An active user of online CME sites can end up with several dozen user names and passwords.

The Use of Educational Theories in Constructing Online CME

A number of theories of distance education, web-based instruction and physician continuing education are discussed in the Review of Literature. However, in examining the instructions found at the sites, there is very little evidence suggesting that the creators of these instructions had these theories in mind while they were constructing their programs. This comment applies especially to those sites which are primarily text-based, text-and-graphics-based, guideline-based, and most of the slide-audio and slide-video presentations. Much of the motivation for creating the Online CME programs appears to stem from the pleasure of experimenting with the new medium and from the hope of disseminating CME to a very large audience.

An educational module intended to teach physicians to recognize, evaluate and refer victims of domestic violence was constructed, but not completed or tested for effectiveness (Sklar, 1999). This module was intended to conform to certain instructional principles: the goals of the instruction are clearly stated; the learning objectives are measurable; cases are presented; the instruction waits for feedback before proceeding; the physician is given an opportunity to practice the skills presented; the program gives

feedback on the quality of the user's performance of those skills, and then allows the user to practice again.

Although each site was examined to find an expressed or implied educational theory, only one site was found in which the creators clearly were working from theoretical principles. This site is EPIC, (Expert Preceptor Interactive Curriculum) a site that intends to aid physician-preceptors to teach medical students. EPIC's introductory page has these sections:

> Describe collaborative clinical education and the characteristics associated with collaborative clinical teaching.
>
> Develop a plan for orienting the student to the preceptorship site.
>
> Describe how to assess a student's learning needs and level of professional development.
>
> Describe the steps involved in negotiating goals and expectations with students.
>
> Develop a plan for patient scheduling to accommodate the student in the practice.

The director of Alcohol Problems: Psychosocial Issues, in an answer to a direct question about educational theory, said "I am not sure how to answer your question re: educational theory. It is adult education, and assumes that (the students) already have basic knowledge and experience in the management of alcohol problems."

At least one site, CME-WebCredits, has an instructional theorist on its team. Although one could speculate that those sites providing interactive instruction subscribe to newer "learner-centered" or at least "patient-centered" theories, none of these sites stated an expressed educational theory.

Conclusions and Predictions

In this concluding section, the growth and consolidation of online CME is discussed and a set of predictions is put forth. These predictions include: the greater use of principles of instructional technology and the "team approach" in the production of online CME courses; changes in the ways CME is monitored and paid for; requirements that CME be shown to be effective; and combination of online CME with other instructional modalities. Some weaknesses in the present report are outlined. Finally, directions for future research are suggested.

Growth and Consolidation of Online CME

The number of sites offering online CME and the number of courses available has been dramatically increasing, from a handful of sites in 1995 to over 100 sites offering more than 3000 credit hours in early 2000. This increase will continue for the next few years. However, the tendency towards consolidation of instruction in a small number of "mega-sites" will accelerate, and these sites will survive while the smaller sites will fade and wither.

Instructional Technology and the Team Approach

The "look and feel" of online CME will improve. Online CME will resemble other quality Internet web sites. Plain text presentations will become less common and interactive multimedia presentations will increase. The creation of online CME will increasingly be a team effort; team members will include an administrator, marketing and promotion person, a financial officer, an expert on instructional design, medical domain experts, an expert on adult learning theory and one or several web designers. These

workers will need to figure out ways of making the entire process "user-friendly" to the physician-learner, and will need to eliminate a number of the "gates" through which a user must pass. The entire process of finding the correct course(s), previewing the course, registering, paying and receiving credit will be streamlined.

Changes in the Ways CME is Monitored and Paid for

The organizations that monitor, license, accredit and pay physicians will increasingly require proof of competence from physicians. One type of proof will be participation in CME activities. These same organizations may require that physicians provide proof of competency or knowledge about specific medical or ethical areas. As a reward or incentive for providing proof of competence or participation, some of these organizations will provide the time to attend activities and will pay for the activities. Directing physicians to specific online instructional courses could be a way to enforce and monitor physicians' participation in CME activities.

It is an open question as to who will decide which CME experiences are appropriate for which physicians. While the accrediting agencies usually state that their policy is to let each physician construct and monitor his/her CME program, I believe it is increasingly likely that at least some of these experiences will be required by either the state licensing bodies, the specialty boards, the hospitals, the managed care organizations or the payors.

Requirements that CME be shown to be Effective

The weight of studies such as those by Davis et al (1999) and Bero et al. (1998) will lead the accreditation agencies to require, or at least strongly recommend, that

providers attempt to prove effectiveness of their programs. The ACCME (ACCME 1999b) now requires that, "Educational activities are evaluated consistently for effectiveness in meeting identified educational needs, as measured by satisfaction, knowledge, or skills." Programs that are proven to be effective will command a premium over programs not so proven. Since this will be a very expensive research effort, universities, governments, foundations, pharmaceutical companies and other payors will have to support this effort. Effectiveness will be very difficult to prove, as is the effectiveness of any single educational intervention; a new industry will be spawned: proof of effectiveness of CME.

Online CME Combined with Other CME Modalities

Current research underscores the belief that CME, in order to be effective in changing physicians' behavior, should consist of a combination of modalities. Some of these modalities, according to Davis et al (1999), are "interactive techniques such as case discussion, role-play, or hands-on practice sessions" and "learn-work-learn opportunities afforded by sequenced sessions, in which education may be translated into practice and reinforced (or discussed) at a further session."

Effective CME must also, according to Lane (1997) and Lewis (1998), involve institutional support for the changes promulgated by the instruction.

According to Barnes (1998), CME should be part of a

fully integrated practice-learning environment ...(in which) practitioners will

systematically analyze clinical, financial, and patient satisfaction information,

determining the impacts of educational interventions by objective measurement of patient

outcomes. A variety of educational resources will be made available to accommodate individual information needs, learning styles, motivation, and commitment to change practice behaviors. Training programs will be developed to support the specific competencies required for practice, including both clinical and non-clinical skills. Strategies will be devised for implementing the varied mandates and recommendations being imposed on the medical profession by payers, health care networks, and public health agencies.

Today's online CME cannot be seen as a complete CME solution. Most programs are "one-shot," consisting of one to three hours of instruction, and typically not integrated with any of the other activities mentioned above.

How can online CME be integrated into sets of other activities to create a complete learning experience? One potential solution is to consider the 3000-plus online CME credits as a "library." Once programs are catalogued according to medical specialty, medical disease and procedure, type of instruction, fee, quality, and level of difficulty, courses could be "assigned" to physician-students as part of a larger program that would also include some of the other modalities mentioned above.

Online CME courses could also be used as part of a larger online instructional program, in which an instructor would be preceptor to a group of physician-students. Periodically, the instructor would ask the students to study one or several of the programs and then to participate in an email, phone conference or live discussion group that would explore the physician-students' reactions to the material. Participants would be asked to describe how the material applied to patients in their practices. A program that works like this is the Alcohol Problems-Psychosocial Issues course from Dalhousie University.

Limitations of this Report

This report has several limitations:

The number of sites found is limited by the search string and by the number and identity of the search engines chosen. This is illustrated by the fact that the names of a few of the sites presented on the list were sent to me by colleagues and site developers and not found by using the search string. And several new sites have been found since the February 2000 date of analysis. There may be other sites as yet unidentified. In particular, online CME sites that are offered on intranets for the exclusive use of medical group or HMO members may not be found by searching the Internet. Only sites created in the United States, and in English, were included in the search.

The survey questions were worded in an excessively open-ended way. The question was, "Would you be able to share some of your information about numbers of doctors visiting your site, or the number of courses they have taken or credits they have earned?" This was done because of the belief that site owners would not want to be bothered filling out a long questionnaire and that they might be afraid to give out proprietary information.

However, this open-ended question resulted in usage information from which only anecdotal information could be obtained, but no way to tabulate the data. A more specifically formatted questionnaire might have resulted in responses that could be more meaningfully tabulated. Therefore any conclusions drawn from the survey about whether physician usage of online CME sites is increasing are speculative.

A follow-up email request yielded a few additional responses. A third or fourth letter could have been sent, but other aspects of the report seemed more pressing.

Medscape, perhaps the largest provider in number of credit hours, declined to participate, citing "proprietary reasons." Medscape's refusal to provide information may have falsely lowered estimates of how many physicians were utilizing online CME.

There were only two years of reports from the ACCME, and the numbers of physicians obtaining credit from online CME in 1997 and 1998 was too small to confidently predict a trend. Results from 1999 may be helpful in that regard.

No attempt was made to measure effectiveness of the online programs. There was no question about effectiveness in the request for physician-usage information, nor was mention of effectiveness noted at the web sites. Many sites had post-instruction tests of knowledge, and a few had pre-instruction tests as well as post-instruction tests. No sites were found which attempted to relate the content and teaching of the course to changes in medical practice.

No attempt was made to evaluate the quality of the online courses. Many organizations have established quality measures (see Review of Literature), but only one, Medical Matrix, specifically reviews online CME, and the criteria used in the Medical Matrix "Star System" is by no means universally accepted. In any case, I chose to avoid the quality issue.

While there would be value in maintaining the List of Online CME, the Database of Online CME Sites derived from this list and the Database of Online CME Courses, there are no present plans to do so.

Although many researchers, including this writer, have a theoretical bias that small "chunks" of information, presented in an interactive fashion, constitutes superior instruction, this report cannot claim to have shown that to be true.

Suggestions for Future Research

While it seems reasonable that online CME could be used as part of a larger integrated CME program, no one has done the research to prove that this would be an effective arrangement. A few workers are making tentative moves in this direction.

Rao, G. (2000) is assigning specific online CME modules to resident and practicing physicians as part of a total program to assess and correct deficiencies in an area of medical practice.

Harris et al. (1999) have received a National Cancer Institute grant to develop 3 online continuing medical education (CME) programs for physicians to improve their ability to implement cancer screening and prevention strategies. These programs will... focus on skin, breast and prostate cancer... we will implement (these programs) in a large California Individual Practice Association (IPA) and test them for actual improvement in physician performance with a randomized controlled trial. We will survey IPA members cared for by approximately 80 IPA physicians for cancer risks and prevention behaviors. We will make cancer risk reduction strategies, such as reminders and educational messages, available to all 80 physicians via an Internet-based Disease Management program, while the CME will only be available to half of the physicians. At the conclusion of the study we will measure changes in physician skills and knowledge via standardized tests, changes in physician performance via medical claims data, and changes in patient behavior via survey data.

Many similar studies will be needed to see whether online CME can be successfully integrated into larger programs aiming at improved practice and outcomes.

There is a need for studies that present the same medical content online through various instructional modalities. This is important because it is considerably more expensive and time-consuming to present that content in an interactive multimedia format than in a straight text or lecture fashion.

Studies need to be carried out on physicians' learning preferences and learning styles to identify which physicians will profit by the newer and more expensive technologies and which physicians might be better served using the older, more traditional methods.

Finally, it would be very useful to create and maintain a comprehensive peer-reviewed database of all online CME to be accessed by individual physicians, researchers and creators of comprehensive CME programs. This task would need to be taken on by a group of volunteer physicians or by a university.

Summary

Online CME has come into existence as a result of developments in distance education, computer and Internet technology, and changes in the nature of medical practice and technology. While it is now quite immature, being only about five years old, Online CME is growing rapidly and has a chance to become integrated into the larger arena of CME.

CME will continue to be an important part of every physician's life. In time, CME will become integrated with the physician's practice life and become less of a standalone activity. CME programs will be studied for effectiveness in changing physician practice; those programs that succeed will be retained; the others will be discarded.

Online CME will continue to grow and develop, and, as physicians become ever more comfortable with computers and the Internet, online CME, coordinated with other CME modalities and activities, will become a major way for physicians to maintain and increase their professional competence.

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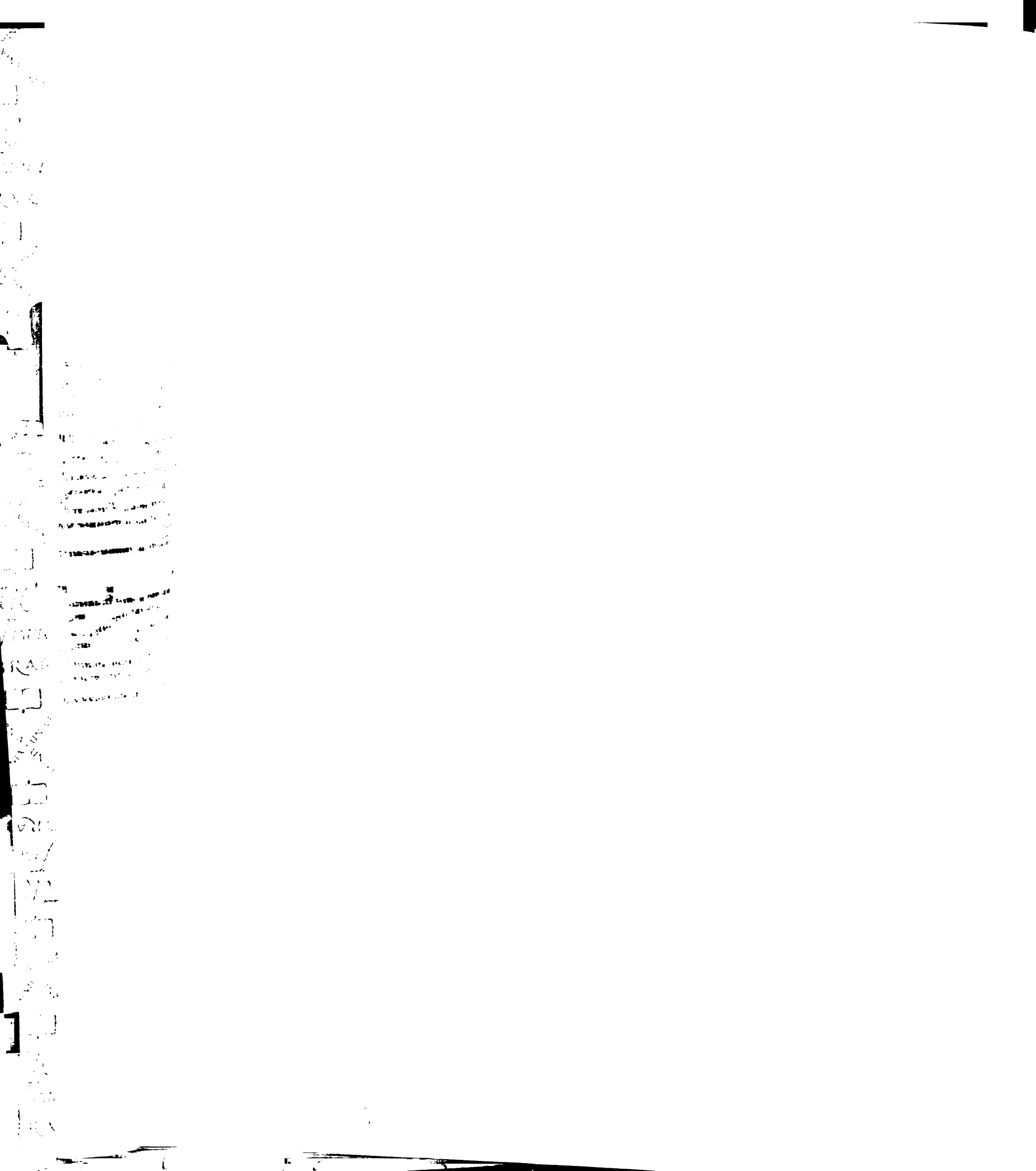
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Appendices

Appendix A - The Structure of the Site Database

The first set of rows takes text, date or numerical input:
ID Number.
Name of Site.
Sponsoring or Accrediting Organization.
URL.
Number of Courses.
Number of Credit Hours.
Fee per Credit Hour.
Date Last Visited.
Date Instructional Material Last Updated (by Site owners).

The second set of rows takes Yes/No Input:
Does the site accept financial support from pharmaceutical or other commercial
sponsors?
Is the site affiliated with a Medical School or University?
Is there Federal or State Governmental Support?
Is the site offered as a benefit for Specialty Society membership?
Is the site offered as a benefit to physician-members of a Managed Care Organization?
Is there support from a foundation?
Is the CME site part of a larger site offering other services to physicians?
Is the instruction required for licensure or accreditation?
Do the site managers use email to keep physician-users informed of additions or
changes to their sites?

The third set of rows concerns type of instruction. Is the instruction primarily:
Text-only?
Text plus graphics?
Slide-Audio Lecture Format?
Video lecture Format?
A presentation of guidelines?
Question/Answer Format?
Interactive?

The fourth set of rows asks these questions:
Is there a stated or implied educational theory underlying the instruction?
Do the site managers appear to be trying to evaluate the effectiveness of the
instruction?
Is the instruction approved for credit by the American Academy of Family Physicians
(AAFP)?
Is the instruction approved for credit by the American College of Emergency
Physicians (ACEP)?

The fifth set of rows asks about medical specialty. Is the instruction oriented to the
following specialty? (One or more choices):

Allergy/Immunology, Anesthesia, Basic Science/Research, Cardiology, Colon &
Rectal Surgery, Critical Care, Dermatology, Emergency Medicine, Endocrinology,

Appendix A - The Structure of the Site Database, Continued

Family Practice, Gastroenterology, General Interest, Geriatrics, Hematology, Infectious Disease. Internal Medicine, Medical Genetics, Medical Informatics, Nephrology, Neurological Surgery, Neurology, Nuclear Medicine, Obstetrics/Gynecology, Oncology, Ophthalmology, Orthopedic Surgery, Otolaryngology, Pain Management, Pathology, Pediatrics, Physical Medicine & Rehabilitation, Plastic Surgery, Preventive Medicine, Psychiatry, Pulmonology, Radiology, Rheumatology, Sports Medicine, Surgery, Thoracic Surgery, Urology.

The first set of rows takes text, date or numerical input:
ID Number.
Name of Course.
URL of Course.
Name of Parent Site.
URL of Parent Site.
Number of Credit Hours.
(This information is entered with a drop-down box consisting of these values: 0.5, 1.0, 1.5, 2.0, 2,5, 3.0, 4.0 and 5.0. Other values may be typed in.)
Fee per Credit Hour (Unit).
(This information is entered with a drop-down box consisting of these values: 0, 1-4, 5, 6-9, 10, 11-14, 15, 16-19, 20, 21-24, 25, and 26+).
Sponsoring or Accrediting Organization.
Date Course Posted or Revised.

The second set of rows takes Yes/No Input:
Does the site accept financial support from pharmaceutical or other commercial sponsors?
Is the site affiliated with a Medical School or University?
Is there Federal or State Governmental Support?
Is the site offered as a benefit for Specialty Society membership?
Is the site offered as a benefit to physician-members of a Managed Care Organization?
Is the CME site part of a larger site offering other services to physicians?
Is the instruction required for licensure or accreditation?
Do the site managers use email to keep physician-users apprised of additions or changes to their sites?

The third set of rows accepts information about medical specialty and has room for up to eight entries. The names of the specialties are taken from the lists of specialties maintained by the American Board of Medical Specialties and the American Board of Internal Medicine List of Subspecialties.

The complete list of specialties is: Allergy/Immunology, Anesthesia, Basic Science/Research, Cardiology, Colon & Rectal Surgery, Critical Care, Dermatology, Emergency Medicine, Endocrinology, Family Practice, Gastroenterology, General Interest, Geriatrics, Hematology, Infectious Disease. Internal Medicine, Medical Genetics, Medical Informatics, Nephrology, Neurological Surgery, Neurology, Nuclear Medicine, Obstetrics/Gynecology, Oncology, Ophthalmology, Orthopedic Surgery, Otolaryngology, Pain Management, Pathology, Pediatrics, Physical Medicine & Rehabilitation, Plastic Surgery, Preventive Medicine, Psychiatry, Pulmonology, Radiology, Rheumatology, Sports Medicine, Surgery, Thoracic Surgery, Urology.

The specialty names are accessed from a dropdown list.
The specialty selections are named: Specialty1, Specialty2, Specialty3, Specialty4. Specialty5, Specialty6, Specialty7, and Specialty8

Appendix B - The Structure of the Course Database, Continued

The fourth set of rows accepts information about medical conditions or procedures and has room for up to six entries. The names of these medical conditions or procedures and their associated numerical codes are taken from the UMLS Knowledge Source Server list of unique identifiers. The names and unique identifiers are accessed from an abridged dropdown list of medical conditions or procedures derived from the UMLS Knowledge Source Server list.
The conditions and procedures selections are named: CondProc1, CondProc2, CondProc3, CondProc4, CondProc5 and CondProc6

The fifth set of rows accepts information from a dropdown list of Types of Instruction. The types of instruction are defined as Text-Only, Text-and-Graphics, Slide-Audio-Lecture, Video-Lecture, Guideline-Based, Question-and-Answer and Interactive. (These terms are defined in Table 5). There is space for up to three entries. The types of instruction selections are named:
Type_of_Instruction1, Type_of_Instruction2, and Type_of_Instruction3

The sixth set of rows takes Yes/No Input:
Is the instruction approved for credit by the American Academy of Family Physicians (AAFP)?
Is the instruction approved for credit by the American College of Emergency Physicians (ACEP)?

The next row accepts a course description. Where available, the course description or list of objectives given by the author(s) is used. Where not available, a brief description was created based on looking at the course material.

The last row has space for comments.

Searches by the website user yield this information: Name of Site and Course, Course Description, Date Posted or Revised, Sponsor, Credit Hours and Fee/Hour. The other information may be useful to researchers and will be made available on request.

Appendix C - Searchable Database of Online CME.

To search for an Online CME course, first choose your medical specialty by clicking on your specialty in the left-hand box. Then choose the medical condition(s) or procedure(s) that you want to learn about from the right-hand box. If you want two or more conditions or procedures, hold down the CTRL key (PC) or Command/Apple Key (Mac) while you click each condition or procedure.

Family Practice ▼	Select .... ▲
	Abdominal Pain
	Acne Vulgaris
	Addiction
	AIDS
	Alcoholism
	Allergy ▼

(Optional) Now choose the type(s) of instruction you prefer (click here here for a definition of these types). Then choose the maximum number of dollars per credit hour you are willing to pay.

Type of Instruction:
Multiple Selections allowed

Cost/Unit of Credit:
Choose the highest number only

No preference	Maximum cost per unit ▲
Text Only	Free
Text and Graphics	$1-4 per unit
Slide Audio Lecture	$5 per unit
Video Lecture	$6-9 per unit
Guideline Based	$10 per unit
Question/Answer	$11-14 per unit
Interactive	$15 per unit ▼

(Optional) Do you require...

⊂ AAFP Prescribed Credit?

⊂ ACEP Category I Credit?

⊂ No preference.

Submit   Reset

There are only about 45 courses in the database (5/4/2000), so to be sure of getting some positive results, try "Family Practice" and "Asthma" or "Internal Medicine" and "Osteoporosis" or Family Practice" and "Breast Cancer" or "Family Practice" and "Leukemia." And don't choose Type of Instruction, Cost or AAFP or ACEP credit. As the database is populated, these other choices will become operational.

Appendix D –Results of Search of Course Database

Results of your search

You asked us to find online CME designed for the specialty of: Family Practice in the subject areas of Osteoporosis. You did not specify a particular mode of instruction. You did not specify which fee level you prefer.

Here are the results of your search:

Name of Site; Name and URL of Instruction	Date Posted or revised	Sponsored by	Credit Hours	Fee/ hour
AMA Online CME Courses, **Managing Osteoporosis Part One:Detection and Clinical Issues in Testing**; After completion of this CME activity, the physician should understand: the pathophysiology of osteoporosis, the concept of osteoporosis as a disease and risk factor for fractures, BMD as one measure of osteoporosis, common techniques for measuring BMD, typical BMD measurement report, issues in selecting a BMD measuring technique, status of bone turnover markers as adjuncts to BMD measurement and Non-BMD risk factors for osteoporosis.	03/99	American Medical Association	3.0	Free
AMA Online CME Courses, **Managing Osteoporosis Part Two: Glucococorticoid-Induced Osteoporosis**; After completion of this CME activity, the physician should understand: the effects of glucocorticoids on bone metabolism, patterns of glucocorticoid-induced bone loss, evaluating the patient on glucocorticoid therapy, preventive measures, optimal calcium intake, various pharmacological interventions and follow-up of the patient on glucocorticoid therapy.	06/99	American Medical Association	3.0	Free
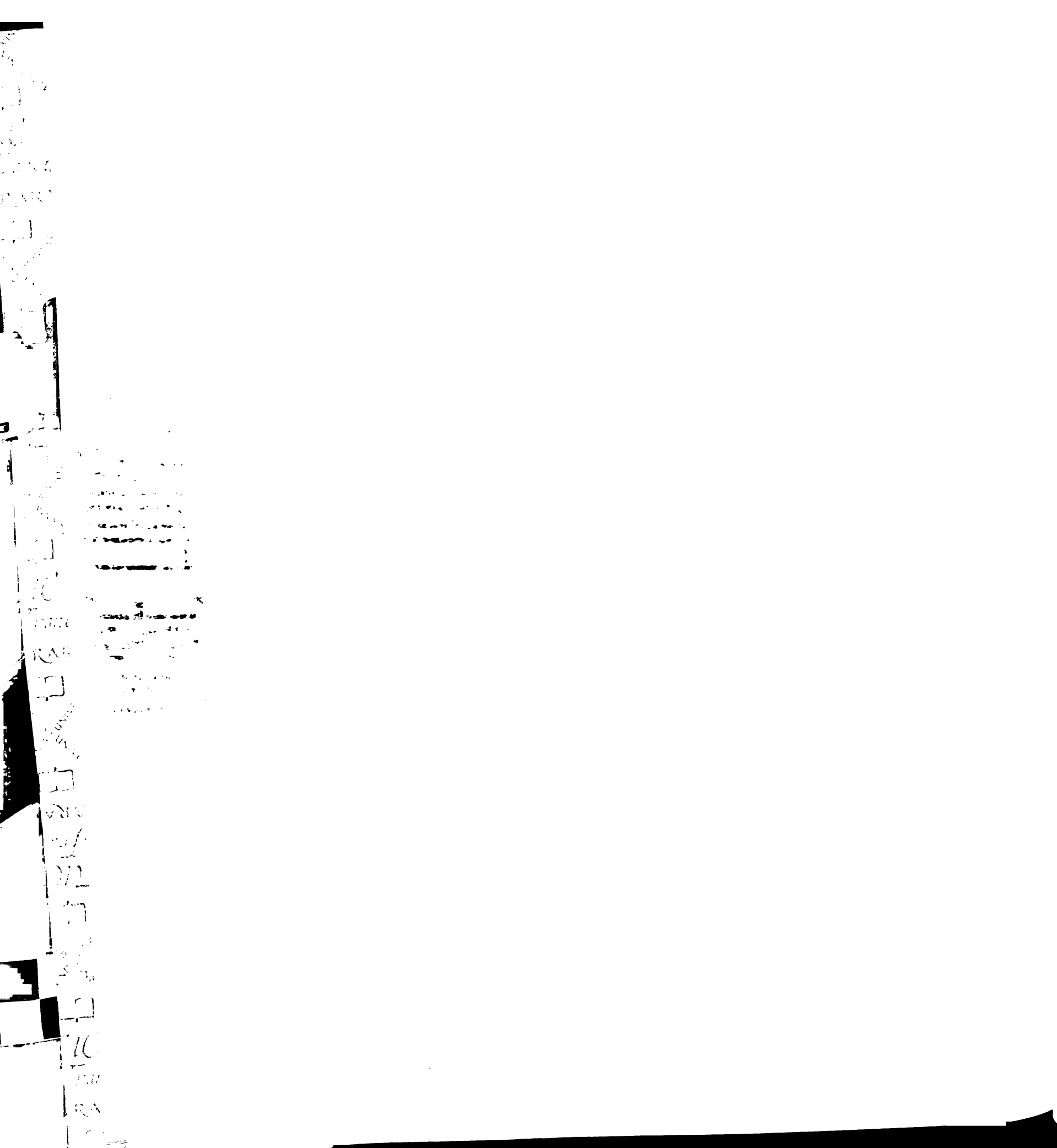
Appendix E - First Letter Requesting Assistance on Survey

Dear (website owner name):

For the past several years, I have maintained an annotated list of online continuing medical education sites. The newest version of this list is posted at http://www.netcantina.com/bernardsklar/0listcme_99_12_12.html. After editing it will also be posted at http://www.medicalcomputingtoday.com/0listcme.html.

I am in the process of writing a master's thesis entitled "The Current Status of Online Continuing Medical Education." As part of this thesis I would like to give some idea of the numbers of doctors who are actually participating in online CME and some idea of the extent of their participation.

Would you be able to share some of your information about numbers of doctors visiting your site, or the number of courses they have taken or credits they have earned?

I realize that some of this information may be confidential. I will appreciate whatever you are willing to share. If you wish, I will promise to disguise the name of your site in my report.

If some other person in your organization is the more correct person to answer this inquiry, could you please forward it to that person?

Sincerely

Bernard Sklar MD

Bernard Sklar MD
Graduate Fellow, Medical Information Science
University of California, San Francisco
1133 Amador Avenue
Berkeley, CA 94707
Phone (510) 526-4018

Send me Email
Visit my web site.

Dear (web site contact):

On 12/15/99, I wrote asking for your assistance in a project involving online CME. Since I have not heard from you or anyone in your organization I am taking the liberty of writing a second time.

For the past several years, I have maintained an annotated list of online continuing medical education sites. The newest version of this list is posted at http://www.netcantina.com/bernardsklar/cmelist.html.

I am in the process of writing a master's thesis entitled "The Current Status of Online Continuing Medical Education." As part of this thesis I would like to give some idea of the numbers of doctors who are actually participating in online CME and some idea of the extent of their participation.

Would you be able to share some of your information about physicians visiting the (name of site) site? I am particularly interested in knowing how many doctors have taken your courses and how many credits they have earned.

I realize that some of this information may be confidential. I will appreciate whatever you are willing to share. If you wish, I will promise to disguise the name of your site in my report.

If some other person at (name of site) is the more correct person to answer this inquiry, could you please forward it to that person?

Sincerely

Bernard Sklar MD

Bernard Sklar MD
Graduate Fellow, Medical Information Science
University of California, San Francisco
1133 Amador Avenue
Berkeley, CA 94707
Phone (510) 526-4018

Send me Email
Visit my web site.

Appendix G - A 32-year-old with depression Part I eCore Family/General Practice

A 32-year-old mother of three children comes to see you with multiple somatic complaints and "feeling blue." As you take her history, you note that anhedonia is prominent. A complete physical examination fails to disclose any obvious cause for her symptomatology. After further discussion with the patient, you establish a diagnosis of mild-to-moderate depression, but the patient denies any suicidal thoughts. Nevertheless, she states that "life has not been very much fun for the last several months." In counseling this patient you should

1. try to cheer her up because a positive approach on your part will help offset the negativity she brings to the encounters.

2. assure her that her condition is treatable and is often self-limiting.

3. act as a role model and share with her any personal encounters you have had with this same condition.

4. explore with her various coping skills that she may have found effective in the past because they may prove effective again.

(Select the single best answer.)

- ○ 1. 1, 2, 3
- ○ 2. 1, 3
- ○ 3. 2, 4
- ○ 4. 4
- ○ 5. All

Appendix H - A 32-year-old with depression Part II eCore Family/General Practice
You selected:
6   2. 1, 3

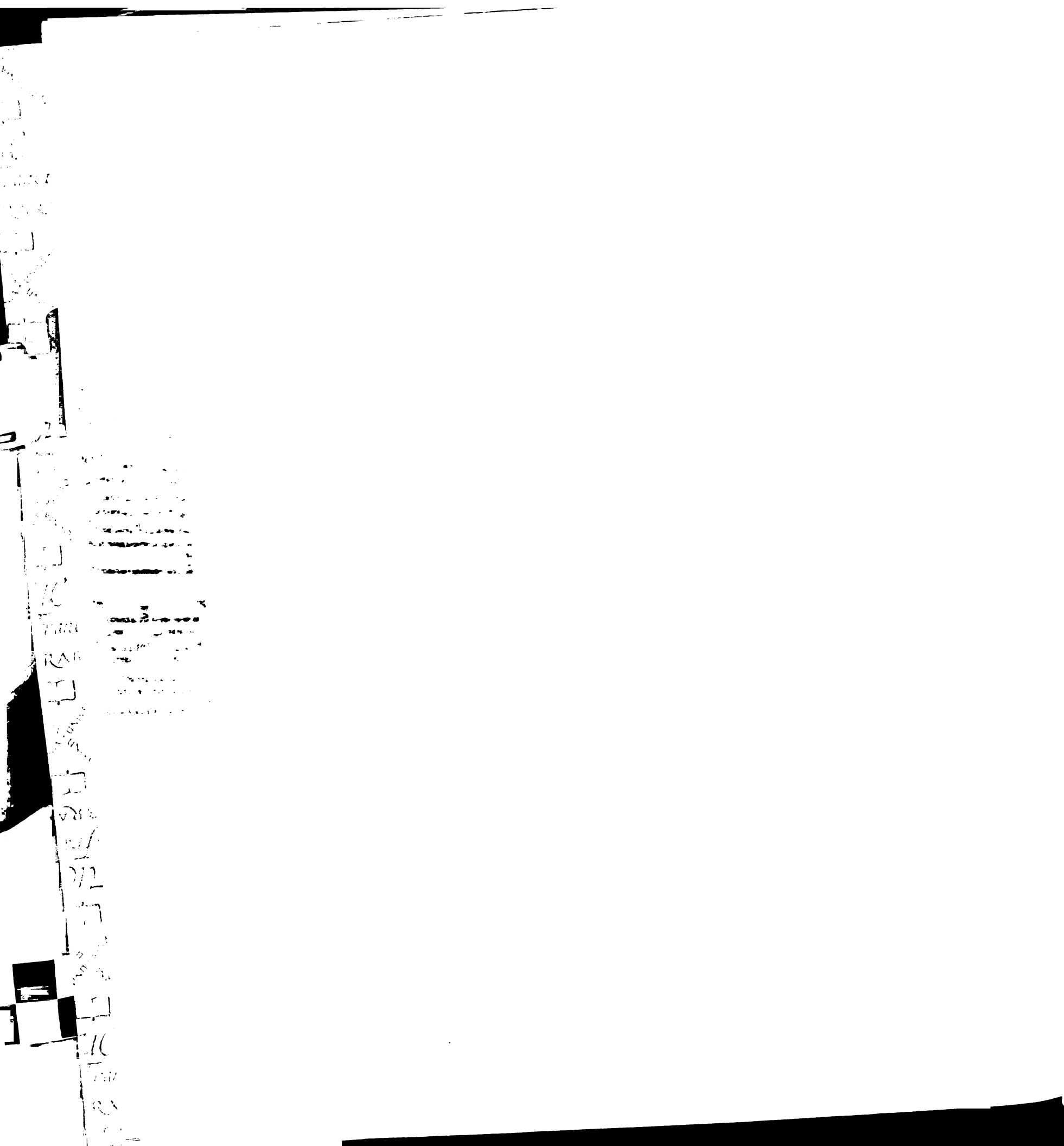**This selection is incorrect!**
Please reattempt this question:
32-year-old with depression

A 32-year-old mother of three children comes to see you with multiple somatic complaints and "feeling blue." As you take her history, you note that anhedonia is prominent. A complete physical examination fails to disclose any obvious cause for her symptomatology. After further discussion with the patient, you establish a diagnosis of mild-to-moderate depression, but the patient denies any suicidal thoughts. Nevertheless, she states that "life has not been very much fun for the last several months." In counseling this patient you should

1. **try to cheer her up because a positive approach on your part will help offset the negativity she brings to the encounters.**

2. **assure her that her condition is treatable and is often self-limiting.**

3. **act as a role model and share with her any personal encounters you have had with this same condition.**

4. **explore with her various coping skills that she may have found effective in the past because they may prove effective again.**

(Select the single best answer.)
C   1. 1, 2, 3
C   2. 1, 3
C   3. 2, 4
C   4. 4
C   5. All

*You selected:*

☞   3. 2, 4

This selection is correct!

Mild-to-moderate depression is a frequently encountered but underdiagnosed condition in the patients of a busy family practice. Patients who have mild-to-moderate depression frequently have somatic complaints that serve to legitimize their visits to a physician. The physician must avoid becoming so preoccupied with the patient's somatic symptoms that he/she ignores the underlying depression.

Mild-to-moderate depression can be managed using a variety of easily learned techniques and, on occasion, pharmacotherapy. It is as important to know what not to do as it is to know what to do. The components of therapy include establishing a therapeutic relationship with the patient, providing support for the patient, legitimizing the patient's concerns, reflecting on the patient's comments, showing respect for the patient as an individual, and creating a partnership with the patient. The patient should be encouraged to do most of the talking, to express his/her feelings, to recount his/her troubles, and to reflect on his/her coping mechanisms. The physician should confine his/her contributions to making occasional suggestions as to how the patient may be able to handle a particular problem.

Depressed patients do not respond well to efforts to cheer them up nor do they relate well to other individuals' experiences with depression. They are usually so self-absorbed that these tactics are ineffective.
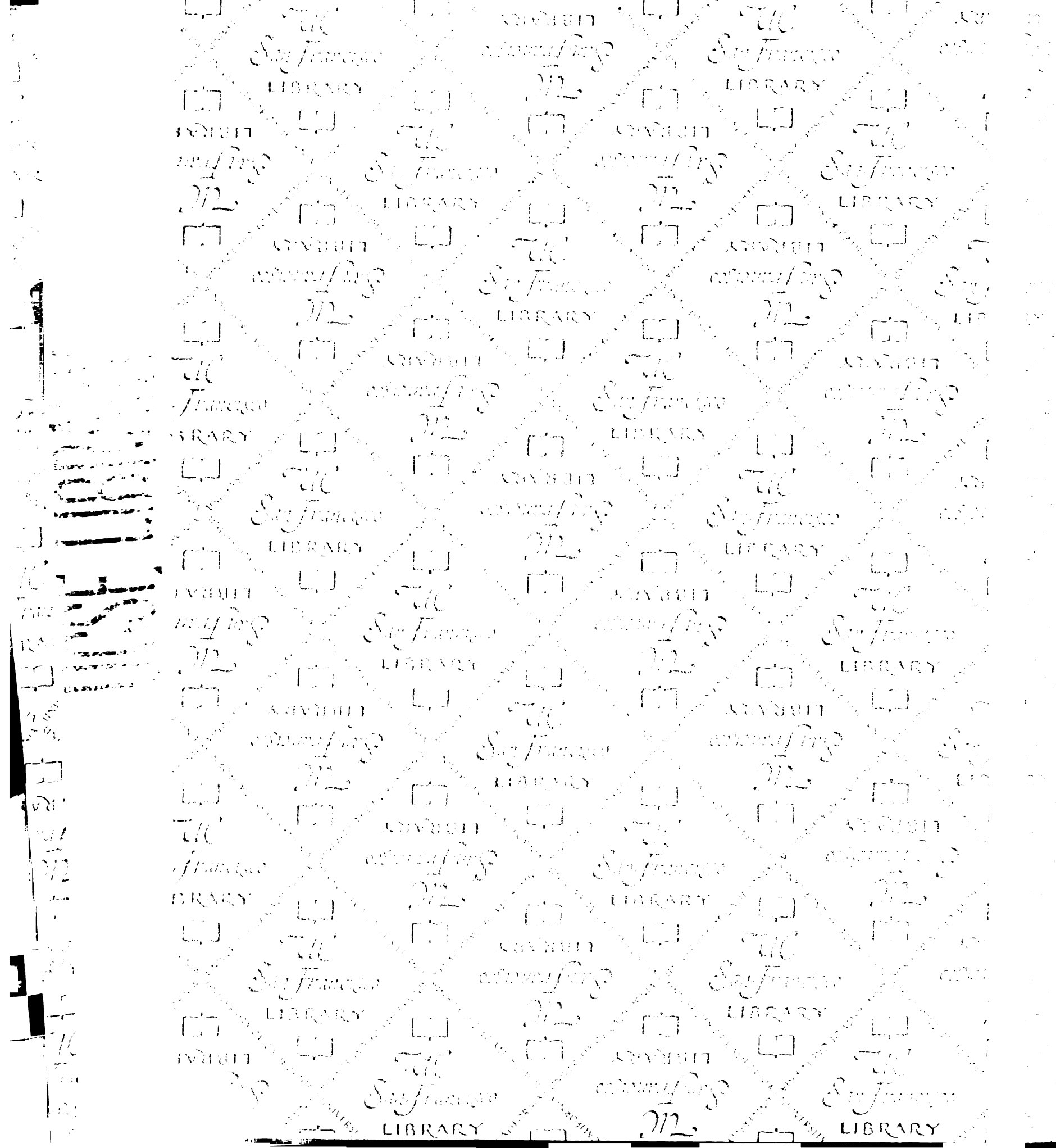
User Response Data

1.
2%

2.
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3.
66%

4.
10%

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19%
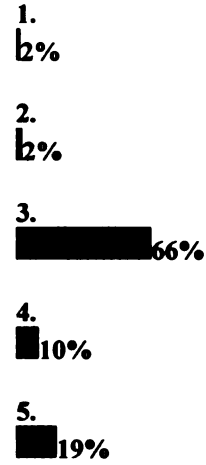
564 total responses

These data are for initial responses. Your response data is included in the total.