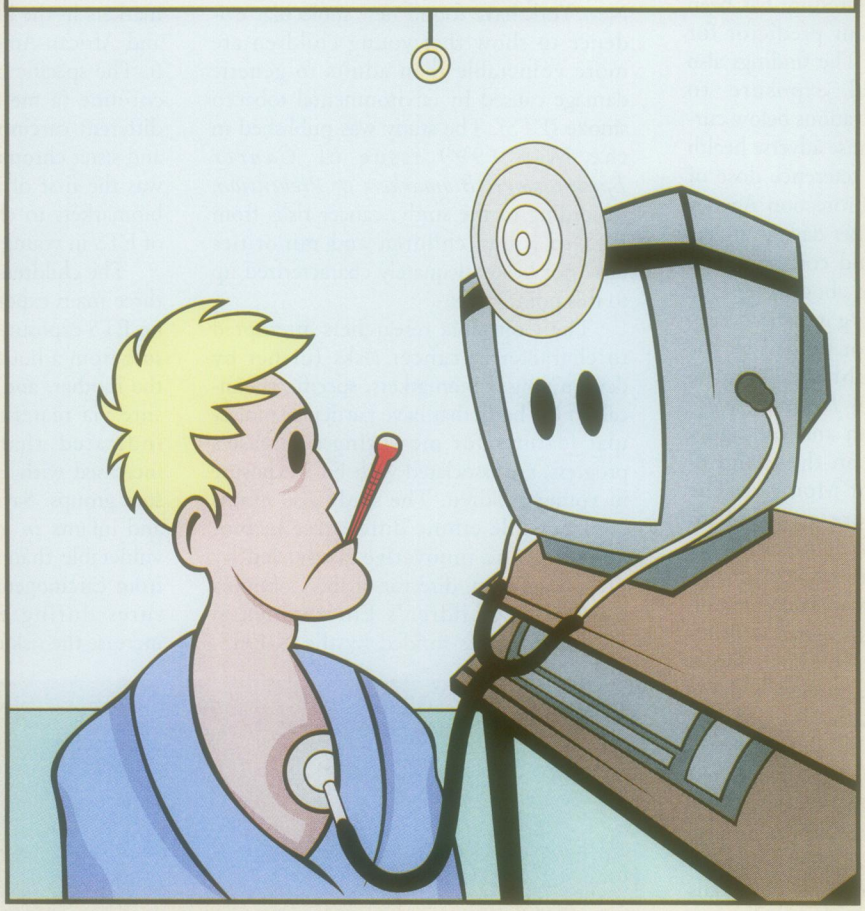
Making House Calls:

Using Telecommunications to Bring Health Care into the Home



In 1995, an estimated 22 million Americans used their computers to seek medical information, making health concerns the sixth most common reason for U.S. consumers to use the Internet, according to the U.S. Federal Trade Commission (FTC). And the number of people going online for this purpose is growing 70% annually, according to the New York City-based market research firm Cyber Dialogue. Developments in computer technology, the Internet, and wireless and satellite telecommunications have led to major innovations in the nature and delivery of health care that will have broad implications for the way people receive health information and treatment in the future. Health care systems are now linked into broad computer networks, which allows them to expand their reach and effectiveness by bringing medical services to the patient instead of the patient having to go to them. Health providers can now use e-mail and live audio and video to communicate and interact with other providers and patients. And by using the Internet, increasing numbers of consumers and health care providers are gaining free access to an expanding volume of health-related information that they couldn't previously get to. In addition, the Internet may now be able to provide much-needed medical information and services to rural and underserved populations.

Despite the benefits, the challenge of effectively incorporating health care into the telecommunications revolution is formidable and comes with its own set of hazards and concerns, including issues such as how to ensure the reliability of advice distributed through Internet medical sites, how to ensure the privacy and confidentiality of patient/user information, and

how to cover the cost of providing online health care to those who need it.

"Health care can have a tremendously exciting future in which we can have a significant change in our ability to bring services to the people as opposed to having them come to the services," says Dena Puskin, director of the Health Resources and Services Administration's Office for the Advancement of Telehealth in Rockville, Maryland. "That development can only accelerate for the benefit of all if we deal with the major public policy issues created by the telecommunications revolution." The office defines telehealth as "the use of electronic information and telecommunications technologies to support long-distance clinical health care, patient and professional health-related education, public health, and health administration."

Telemedicine

Telemedicine (or medicine from a distance) more than any other innovation in health care exemplifies the challenges facing health care in the Information Age. As a medical discipline, telemedicine actually has a 40-year history, but it only began to grow in the early 1990s, thanks to innovations in telecommunications and technology and their increased affordability. For example, interactive therapy has been used for group mental health therapy in Nebraska since 1959, but the early technology proved too costly for its use to increase. But in the 1990s, telemedicine has snowballed because of developments in digital imaging and transmission. In fact, almost all the substantial discussion about telemedicine takes place in the 1990s literature. A few years ago, the cost of setting up a telemedicine operation was about $300,000, but today that cost has been reduced substantially to less than $50,000, according to the American Telemedicine Association, a Washington, DC-based trade organization that has promoted telemedicine throughout the world since 1993. "Telemedicine has come a long way in a short time because costs are a mere fraction of what they once were," says the group's executive director, Jon Linkous. "Just look at what it costs to buy a computer as compared to five years ago."

Some of the major medical fields in which telemedicine is already being used include radiology, ophthalmology, cardiology, pathology, and dermatology. For example, teleradiology—the transmission of medical images (through X-ray or magnetic resonance imaging, for example) to a radiologist for interpretation—is the single most common use of telemedicine in the United States. Also, through telemedicine, almost all interactions between dermatologists and their patients could be accomplished long-distance. In such a scenario, a rural health provider would use a dermascope to capture images of the patient's skin, and then send them via video stream (connected to a computer) to an urban dermatologic specialist who would read the images, make a diagnosis, and send the rural health provider a treatment plan for the health problem.

Other applications include patient monitoring, which allows patients to stay at home while they convey personal information to their health professionals via telephone; use in prison systems to cut the costs of transporting prisoners to health clinics while reducing the dangers to civilian populations of prisoners on the move; and the delivery of health care to military workers in remote areas.

The U.S. military is, in fact, one of the leaders in using Internet e-mail for teleconsultations. For example, since 1996, a dermatologist employed by the U.S. Navy as a consulting specialist for various shipboard primary care physicians has used telemedicine to treat sailors aboard aircraft carriers and other vessels. The Department of Defense is also implementing Web-based dermatology programs, and a total of 16 central sites in the United States and Europe will serve as specialty care centers, with each state connected to three remote clinics.

The use of telemedicine is not going to be limited to the United States, however. "It has the potential for application anywhere in the world," says Linkous. "Many developing countries, for instance, believe that telemedicine can help them build an adequate health care service at reduced costs."

A report on U.S. telemedicine activity produced by the Portland, Oregon-based Association of Telemedicine Service Providers and published in the January 1999 issue of *Telemedicine Today* reveals that the American telemedicine industry continues to exhibit strong growth. Representatives of more than 45 clinical specialties were surveyed as to their use of telemedicine technologies. The specialists reported a combined total of 41,740 teleconsultations in 1997, a 90% increase over the previous year. Mental health had the most programs (45) and consultations (7,000). Cardiology ranked second with 43 programs and 6,000 consultations, followed by dermatology (40/2,300), orthopedics (30/2,300), ophthalmology (8/4,000), and internal medicine (10/2,000).

"Clearly, the report shows that telemedicine is a field that is expanding in both delivery and diversification of services," says Douglas A. Perednia, president of the Association of Telemedicine Service Providers. "The challenge in coming years will be to sustain that growth as well as the quality and equity of the care being administered."

To accomplish this, a number of significant legal, economic, and technological issues will have to be addressed. "Despite the progress, telemedicine is still in its infancy," says Russell B. Rayman, executive director of the Aerospace Medical Association in Alexandria, Virginia. "I believe telemedicine will continue to grow but several questions have to be answered before telemedicine will be fully accepted in the health care community."

A Question of Cost

One big question is who is going to pay for telemedicine services. Although several types of telemedicine applications are reimbursable through Medicare, including teleradiology, remote patient monitoring, and live consultations with patients living in remote areas lacking professional health care, payment for other telemedicine services is still unavailable. For example, insurers don't reimburse for video consultations or the cost of satellite time. Meanwhile, Medicare includes a fee splitting scheme between referring and consulting doctors that many health care providers find unworkable.

The U.S. government is also worried about the cost of covering telemedicine services. An internal study conducted by the U.S. Health Care Financing Administration, the federal office that oversees Medicare, estimated that it would cost Medicare an additional $50 billion to pick up the full cost of telemedicine. Three bills currently before Congress propose amending the current program that provides Medicare reimbursement for telemedicine delivered to patients living in rural "health professional shortage areas" to include reimbursement for consultations using new types of technology. Other provisions of the bills expand eligible geographic areas and clarify eligible services. "More coverage of telemedicine will be provided, but what parts and how much of it is not clear yet," Puskin says. "But this doesn't diminish the importance of telemedicine. It's going to be part and parcel of how we deliver health care in the next century."

In the meantime, the failure of insurance companies to cover telemedicine is slowing its growth and making it difficult for many Americans to get access to adequate health care, say telemedicine advocates. "The health care community is very conservative, and that's why, despite its obvious utility, [telemedicine] doesn't have broad acceptance yet," Perednia says.

Critics also blame a patchwork state medical licensure system—in which each state requires its own medical license for doctors to practice inside state borders—for hampering telemedicine's development. "It makes no sense," Puskin says. "That's a remnant of a medical licensure system created

before the automobile and telephone." She adds, however, that "the state licensure system is not as serious an obstacle as some of the other issues impacting telemedicine."

Tapping into Technology

Perhaps the most central of the key issues affecting telemedicine's future is the role that the Internet will play in its development. Currently, the Internet is moving slowly as a vehicle for delivering actual health care (as opposed to health information), but many analysts believe that the medium offers great growth opportunity for the health care industry. Using the Internet to connect providers, physicians, and patients for transactions and other services could create a market worth more than $10 billion annually, according to a 1999 report published by the investment firm of Hambrecht and Quist LLC of San Francisco, California. Convinced of a potential financial bonanza, several companies are quietly investing in telecommunications delivery services and health care systems. For example, Gallery Systems in Berkeley, California, Medweb in San Francisco, and IN*PH*ACT in Nashville, Tennessee, are already offering Internet-based telecommunication systems that provide e-mail telemedicine functionality.

Other experts express reservations about the potential of the Internet as a medium for e-mail and Web-based teleconsultations. "Certain specialties, such as dermatology, pathology, and ophthalmology, rely primarily on still images to relay the most important clinical information," Perednia explains. "But store-and-forward technology like e-mail is limited in clinical applications where real-time interaction is important, such as mental health and some emergency care examinations." Other concerns focus on the reliability of technology systems, transmission speed, and the available bandwidth (or data capacity of a digital connection system—the bigger the bandwidth, the more data can be transferred at once at a faster speed). "The information on the Internet is not prioritized, and this means that health care specialists end up competing with people sending casual e-mail or who are involved with playing games," says Perednia.

Research is underway to remedy these problems. Beginning in the fall of 1996, the Next Generation Internet Initiative, a partnership of industry, academia, and government agencies, began looking for ways to provide affordable, secure information delivery via the Internet at transmission rates thousands of time faster than are possible today.

In 1998, the National Library of Medicine, one of the key participants in the Next Generation Internet project, began funding 24 research projects that are involved in various areas of telemedicine, including telemammography, teleradiology, and teletrauma. "If we are to benefit from the fruits of modern medical science, we must be able to transfer massive amounts of data instantaneously, accurately, and securely," says Donald A. B. Lindberg, director of the National Library of Medicine. "These projects are an important step in that direction."

A Doctor's Advice

The flip side of the telemedicine coin involves patients receiving health information and treatments through use of Internet technology rather than by conveying information to a doctor. Millions of people from around the world are seeking health and medical information on the Internet, and the benefits of online medical sites are wide-ranging. Health care consumers no longer have to snatch a few moments of their doctor's limited time, search through the aisles of a local book store, or gain access to a medical school's library to get information on their problems. Now, information about numerous medical conditions, therapies, and remedies—both proven and unproven—is available to anyone with Internet access. No one knows for sure how many Internet sites relating to health and medicine there are, but estimates put the number between 15,000 and 50,000.

But a letter titled "Evaluation of Cyberdocs," published by two German public health specialists in the 7 November 1998 issue of *The Lancet*, illustrates some of the dangers of relying on Internet medical sites for medical diagnoses and treatment. In postings to 17 Internet medical sites, researchers Gunther Eysenbach and Thomas L. Diepgen posed as a sick person with painful red blisters on his chest, suggesting a herpes zoster infection. They then evaluated the diagnoses offered by the purported doctors on the sites (often referred to as "cyberdocs"). In response to the researchers' postings, three of the doctors said they weren't qualified to treat skin problems. Five doctors recognized the condition and recommended prompt treatment with antiviral drugs. As for the other nine, one said the blisters were nothing to worry about and suggested a homeopathic remedy; another advised his patient to breath deeply, drink rainwater, and eat red clover and dandelions; and the other seven never replied. In their paper the researchers concluded, "Patients should be warned that there are currently no means to determine the credibility of qualifications of cyberdocs on the Internet."

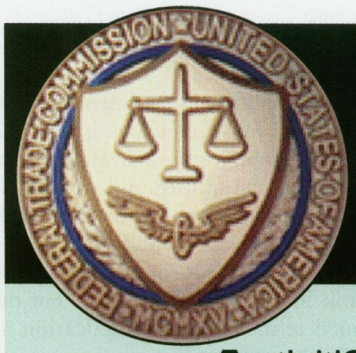
The *Lancet* letter highlights a disturbing aspect of telemedicine, says Brad Stone, a press officer with the U.S. Food and Drug Administration in Washington, DC: "The number of Internet sites touting remedies for serious illnesses are exploding in number," Stone says. "And cyberspace has become a popular place for fraudulent operators to pursue health and medicine scams."

"The fact that anyone can put whatever kind of information they want on the Internet is both [its] strength and weakness," says Marc Raheja, president of MNI Systems Corporation, an information technology company based in Mississauga, Ontario, that provides health information on the Internet. "The nature of the Internet allows people to share health information and prevents one party from controlling it, but often consumers can't tell if that information is accurate."

Many Internet health sites are run by hospitals, government agencies, consumer organizations, doctors, and medical schools, and are considered legitimate, reputable, and reliable. For example, the Web site of one of the leading online health information companies, the Blue Bell, Pennsylvania-based InteliHealth, a joint project of Aetna U.S. Healthcare and John Hopkins University and Health System, has amassed 2 million pages of health care information gathered in collaboration with more than 150 health care organizations, government agencies including the National Institutes of Health, and news organizations. The site, established in 1996, is visited by more than a million users per month.

Joel Kahn, chief medical officer and executive vice president of InteliHealth, believes that the health care community may be underestimating the ability of the consumer to judge the credibility of health information provided on the Internet. "One of the things we've learned is that people do look at the source of the health information on the Internet and take that under consideration," he says. For example, he says, "They see [the name] 'Johns Hopkins' attached to the InteliHealth Web site and it gives them peace of mind."

Medical professionals who monitor health Web sites believe that health fraud in cyberspace is no worse than that found in the real world. "You find the same health schemes promoted on the Internet as you do in the real world," says Stephen Barrett, a consumer health advocate and the author of the book *The Health Robbers: A Close Look at Quackery in America*. "In fact," Barrett says, "one can find far worse health information on radio talk shows. . . . They have done more harm than the Internet could ever do." Jeff Stier, associate director of external affairs of the New York City-based American Council on Science and Health, says, "Some of the health fraud problems on the Internet



If you responded to the ArthritiCure offer... You could have been SCAMMED!

ArthritiCure does NOT EXIST. The ArthritiCure product Web site is a fake, posted by the Federal Trade Commission to alert consumers to online marketing of unproven alternative medical treatments.

An estimated $10 billion is spent yearly on unproven arthritis remedies. One in 10 people who have tried unproven arthritis remedies report harmful side effects, according to a U.S. Department of Health and Human Services survey.

Any remedy, no matter how harmless, can become harmful if it stops or delays someone from seeking a prescribed treatment program from their physician.

How can you tell if an advertising claim for a "miracle" health-related product is likely to be phony, exaggerated, or unproven? Here are some tip-offs that generally signal a rip-off:

- **Phrases like "scientific breakthrough," "miraculous cure," "exclusive product," "secret formula," and "ancient ingredient."**
- **Use of "medicalese"—impressive-sounding terminology to disguise a lack of good science.**
- **Case histories from "cured" consumers claiming amazing results. Their testimonials also imply that their experience is typical for consumers using the product or service. When you see a testimonial, ask for proof of its "typical" nature.**
- **A laundry list of symptoms the product cures or treats.**
- **The latest trendy ingredient touted in the headlines.**
- **A claim that the product is available from only one source, for a limited time.**
- **Testimonials from "famous" medical experts.**
- **A claim that the government, the medical profession, or research scientists have conspired to suppress the product.**

For more information on alternative treatments and online advertising, contact the Federal Trade Commission. Or check out these consumer publications:

Fraudulent Health Claims
Virtual "Treatments" Can Be Real-World Deceptions
Shop Safely Online
Advertising and Marketing on the Internet: The Rules of the Road
FTC's consumer publications on diet, health, and fitness

Source: http://www.ari.net/arthriticure/

are also found in the real-world media, but the size of the Internet makes it much more difficult to monitor."

But other consumer organizations, as well as federal agencies, say that, given its nature and growth, the Internet may pose serious health fraud problems. The FTC is responsible for protecting the public by preventing the dissemination of false or deceptive advertisements for consumer products and services, including those sold on the Internet. "For a small front-end investment, anybody can put a Web site up and advertise the latest cure to a disease, no matter how bogus it is," says FTC staff attorney Richard Cleland. "The risks of getting caught and punished are small compared to the money to be made."

To educate consumers, the FTC set up a Web site in 1999 called ArthritiCure as part of a new government effort to draw attention to fraudulent advertising for health products on the Internet. On the Web site's home page is an advertisement that states, "Be pain-free FOREVER! If you suffer from the pain of arthritis, ArthritiCure is a must for YOU!!!" But when users click on the ad, they receive a surprising message: "You could have been scammed." The Web site then offers users advice on how to recognize fraudulent claims. "We're trying to educate consumers by showing them what types of bogus claims and products they should be looking for on the Internet," Cleland says. "In terms of health fraud, education is going to be the key in the cyber age because consumers are going to have much more responsibility for their own health care decisions."

Too-Open Communication?

In addition to ensuring the accuracy and reliability of the information consumers receive from the Internet, new technologies present the problem of how to ensure the privacy of electronic health and medical information transmitted on the Internet and in health care providers' ever-broadening computer networks. This issue may be difficult to resolve, but the Internet's growth itself may depend on it. "Surveys have shown that consumers are staying off the Internet because they are concerned about the privacy of their communication," says Deirdre Mulligan, staff counsel at the Center for Democracy and Technology, a nonprofit Washington, DC-based advocacy organization dedicated to the protection of civil liberties in the electronic age. "We also know that a slight majority of the people who are asked to register at a Web site feel that they need to protect their privacy by giving false information."

The issue of privacy and confidentiality goes right to the heart of medicine—the

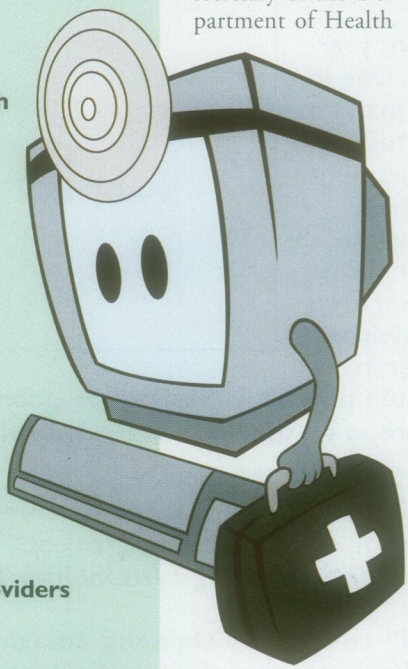
patient–doctor relationship. "Patients who think they are revealing information that can be used against them [for example, to deny medical insurance] may be reluctant to seek the health care they need," says Kahn. Many believe consumer fears are justified, given the myriad ways in which confidential medical information can easily be obtained and the potential for misuse. Consider the example of a patient who belongs to a health maintenance organization (HMO). Personal physicians, insurance administrators, electronic file clerks, and case reviewers are just a few of the people who have access to a patient's records. "An HMO has tremendous amounts of information about people, and those [companies] can access it to their benefit," says Jim Harvey, a lawyer with the Alston and Bird law firm in Atlanta, Georgia. "There is really nothing to prevent one of them from selling it to, say, a pharmacy for research purposes or to an Internet business that would want to use it for advertising purposes."

In 1999, the U.S. Congress continued to debate and grapple with the privacy issue. The Health Insurance Portability and Accountability Act of 1996 set a deadline of 21 August 1999 for Congress to pass comprehensive federal legislation to address the privacy of medical records. When Congress failed to act by this deadline, the Clinton administration announced that it would ask the Department of Health and Human Services to draft new privacy regulations for medical records under a provision of the act that gives the secretary of the Department of Health and Human Services the power to devise privacy standards through regulation. Republicans and Democrats are still at odds over several privacy issues, such as the degree of access law enforcement officials should have to federal records and whether patients can sue insurers or hospitals that illegally release their records.

"It's an extremely complex and controversial issue," says Donald B. White, a spokesperson for the Washington, DC-based American Association of Health Plans, which represents HMOs, preferred provider organizations, and other similar health plans that provide health care for more than 140 million Americans. "Many organizations and people don't want to see the U.S. government propose the rules, but Congress is going to have an extremely difficult time satisfying everyone."

Internet Resources for Telecommunications and Health Care

- **Achoo Healthcare Online**
  http://www.achoo.com/
- **American Telemedicine Association**
  http://www.atmeda.org/
- **American Council on Science and Health**
  http://www.acsh.org/
- **Quackwatch**
  http://www.quackwatch.com/
- **American Association of Health Plans**
  http://www.aahp.org/
- **Center for Democracy & Technology**
  http://www.cdt.org/
- **National Library of Medicine**
  http://www.nlm.nih.gov/
- **U.S. Federal Trade Commission**
  http://www.ftc.gov/
- **U.S. Food and Drug and Administration**
  http://www.fda.gov/
- **Association of Telemedicine Service Providers**
  http://www.atsp.org/
- **Sandia National Laboratories**
  http://www.sandia.gov/
- **Office for the Advancement of Telehealth**
  http://telehealth.hrsa.gov/
- **InteliHealth**
  http://www.intelihealth.com
- **Telemedicine Information Exchange**
  http://tie.telemed.org/



Technology for a Healthy Environment

The whirl of advances in the Internet and in telecommunications technology is expected to continue changing how health-related information is transmitted and received as well as how people and organizations will interact in the delivery of health care. In the future, not only will patients assume a more active role in their own health care, but the continued refinement and application of telemedicine systems will move the point of care increasingly closer to the patient. In 1994, the National Association for Home Care estimated that 15,000 providers delivered care to 7 million individuals requiring in-home services because of serious illnesses and long-term health conditions. These numbers are expected to grow rapidly as the home monitoring industry develops electronic and telecommunication equipment that will allow medical care to be delivered by telemedicine systems to people in their homes. At least one researcher predicts these advances will have special implications for environmental health as well.

"Telehealth is going to have an enormous impact on the environmental health field," predicts Steve Warren, an engineer and research scientist at Sandia National Laboratories in Albuquerque, New Mexico. "Technology will allow health professionals to monitor the home environment to ensure the best care." Warren, who coauthored a 1999 research study titled "Smart Home Care: Technology in the Home of the Future" as part of an internal document for use by Sandia's Simulation Technology Research Department, envisages a home of the future in which so-called smart devices will collect data about a patient's environment (for example, humidity, temperature, and carbon monoxide levels), which can then be analyzed to assess the patient's state of health and identify external factors that may influence it. In order to protect individuals in the home, additional smart devices may be placed around the house to detect viruses, bacteria, and possibly chemical and biological agents.

Developments such as these inspire enthusiasm about the future of medicine. "I feel we are entering the golden age of medicine," Puskin says. "Telemedicine is going to allow people anywhere in the world to have access to excellent health care without having to travel great distances. That's the great thing about the telecommunications revolution. It's allowing us the freedom and options to do whatever needs to be done when we want or need to do it."

Ron Chepesiuk