



Cybermedicine: A Primer

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Abstract Cybermedicine is the Internet-driven practice of medicine. It enables interactions between physicians and patients over the Internet. The supply of and demand for cybermedicine have skyrocketed over the last decade. The medical information people search for on Internet include disease reporting, diagnoses, prevention, public translation of research findings, integration of various disciplines, and pharmaceutical information. This paper provides a brief introduction on cybermedicine.

Keywords cybermedicine, cyberhealthcare, e-health, telemedicine, medicine and Internet

Introduction

The Internet, also referred to as Cyberspace, has made easy for people to interact from various parts of the world. This has benefited the human race in healthcare. Some regard the Internet revolution in healthcare as largely due to the massive consumer demand for online health information about healthcare, illness, and treatment. Medical information providers on the Internet mostly include individual patients, health professionals, companies offering medical products, non-governmental organizations, academic institutions, and governmental agencies.

Both physicians and patients can benefit from Internet technologies. Physicians mostly use the Internet to access databases such as Medline. It is increasing difficult to practice modern medicine without computers and the Internet. Patients go online to seek actual treatment advice and prescriptions from a physician. The Internet serves two purposes. First, it enables health professionals to access timely evidence. Second, it enables health professionals to actually *use* the evidence [1]. In the electronic age, medicine will include more flexible communication with patients, easier retrieval of medical information, faster access to patient data, and streamlining of medical office management.

The term “cyber” is often prefixed to any entity that is undergoing radical changes due to its use of the Internet. A classic examples would be cyberethics, cyberdoctor, cybernephrology, cyberhealthcare, cybermedicine, etc. Cybermedicine, also known as cyberhealthcare or e-health, is providing medical services using the Internet. In other words, cybermedicine is the discipline of applying the Internet to medicine. As shown in Figure 1, cybermedicine is new academic specialty at the crossroads of medical informatics and public health [2]. “Cybermedicine” means “medicine in cyberspace,” where “cyberspace” denotes the Internet. Typically, it is the practice of providing patients with prescribed medication after the patient completes a questionnaire online and the physician generates a “conference” about symptoms and medical history. The terms “cybermedicine,” “telemedicine,” and “eHealth” have all been used to describe Internet-based medical applications and services. Cybermedicine and telemedicine are related disciplines. They overlap in a limited sense as they both utilize the



Internet for clinical medicine.. Telemedicine is the practice of providing medical services to patients who are far from the physician by the use of telecommunications and information technology. Telemedicine is essentially applied to diagnostic and curative medicine, while cybermedicine is applied to preventive medicine and public health. Thus, telemedicine may be regarded as cybermedicine providing care over the Internet.

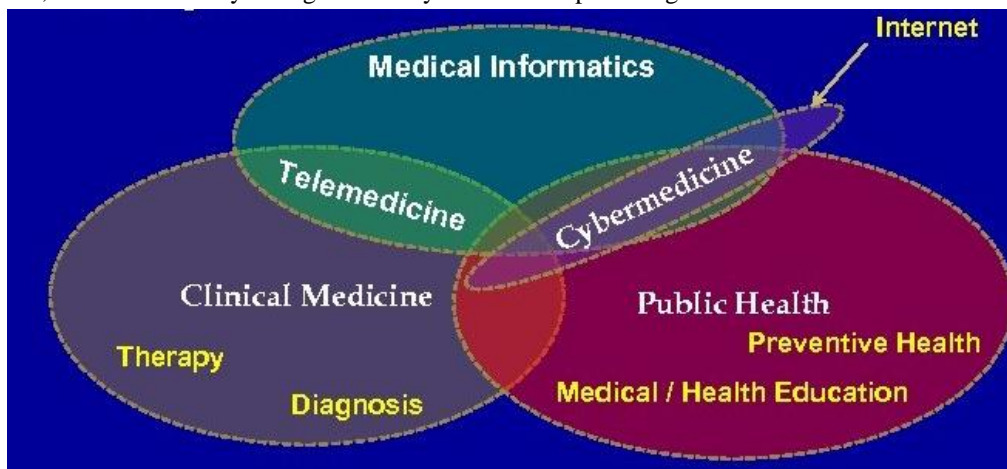


Figure 1: Cybermedicine is an emerging field at the intersection of medical informatics and public health [2]

Medicine on the Internet

The Internet is a huge network of computers spanning the entire globe. It is so huge that it has roughly 800 million web pages at the moment, with potential to grow. It has emerged as trend breaking technology. Practically every area of human interest including medicine, communications, commerce, science, media, education, law, government, art, agriculture, etc. is covered by the Internet. The Internet has radically affected the delivery of health care services. From critical care medicine scenarios to digitized radiology images, the Internet has become increasingly useful for medical practitioners. The uses of the Internet have made searching for medical information easier and more accessible to most medical practitioners [3]. Medical information is among the most retrieved information on the Internet.

There are three major types of cybermedicine today [4]: (1) The consultation sites offer medical advice by the use of a doctor or a pharmacist., (2) The information providing sites give medical information about some sickness or drug, and (3) The e-pharmacy sites engage in the sale of drugs.

An offspring of the information revolution, cybermedicine is rapidly combining medical practice, commerce, education, and business. Today there are several new technologies which propel medicine toward cybermedicine: genomics, proteomics, nanotechnology, robotic medicine, telemedicine, the medical publishing, dermatology, radiology, psychiatry, pediatrics, primary care, and new 3-D imaging techniques [5].

Problems with Cybermedicine

Some critics of cybermedicine doubt whether physician– patient relationships are conducive to good patient care and meet the ethical ideals and standards of medicine.

The current problems faced with practicing cybermedicine include:

- *Standard and Quality:* Cybermedicine must avoid falling short of the standard of care required in traditional medicine. Lack of relevant clinical training materials is a major obstacle to improving health standards in many developing countries. Good access to Internet is a necessary prerequisite. Cybermedicine will improve quality of life by providing easy access to expert medical counselling for individuals. Quality refers to providing medical information that is accurate, easy to understand, and up to date. The often poor quality of information on the Internet is a limiting factor for the usefulness of the Internet for both consumers and health professionals. The quality of the medical material for patients varies greatly and is rarely "evidence-based." In an era of information overload, rapid access to a resource containing reliable, evidence-based guidelines is crucial for continual improvement in the quality of patient care [6].



- *Legal and Ethical Issues:* Problems such as confidentiality, paternalism, consent, responsibility, etc. are often discussed in light of the interpersonal interaction of the two parties. The new types of physician-patient interaction create new ethical dilemmas. Medical ethics are basic principles on which all medical decisions should be based. They are not the law, but are often enforceable by state medical licensing boards. Although medicine is regulated by the states, cybermedicine demands nationwide and international regulation. Some of the ethical problems posed by the use of cybermedicine include the problem of responsibility, the problem of privacy, the problem of validation, the problem of reliability, the doctor-patient relationship, and the problem of autonomy [4].
- *Education:* The use of the Internet by medical students has increased dramatically. The traditional continuing medical education (CME) is often costly and inefficient for medical educators and health administrators worldwide. Cybermedicine can be regarded as a tool to provide excellent opportunities for communication and teaching of medicine. The cybermedicine will open up alternative ways for professional medical education. The optimal use of these technologies definitely requires new technological skills by users, both patients and healthcare professionals.

Benefits and Challenges

The major benefit of cybermedicine is that it will create a fertile ground for patient-clinician partnerships and allow for more efficient management of health-related information. Cybermedicine empowers patients because patients may access the same on-line medical information as clinicians, thereby making the clinician-patient relationship somewhat democratic. Consumers who use the Internet as a health-research tool will greatly benefit from cybermedicine [7]. Whether it is before or after an appointment, cybermedicine helps patients do their health-care homework. For the first time in the history of medicine, patients have equal access to the knowledge bases of medicine. Cybermedicine partially solves a problem this nation faces: a grave shortage of doctors.

However, many critics feel that cybermedicine is “bad medicine.” They see cybermedicine as an affront to traditional medicine, as well as potentially dangerous to consumers. It is accused of failing to create physician-patient relationships. For example, a doctor may treat a patient without ever seeing him/her or knowing for sure that he/she is speaking truthfully about his/her symptoms. Some critics of cybermedicine worried that online medical care will result in increased misdiagnoses. A major challenge is protecting the privacy and confidentiality rights of patients over the Internet. At the moment, cybermedicine presents many potential hazards to “cyberpatient.” There are dangers and abuses (over-prescribing, impersonation, lower quality of service, etc.) that currently abound in cybermedicine because it is virtually unregulated. The practice of medicine in the US is regulated by the individual states. The future of cybermedicine would be bleak if it were to remain unregulated. At present, there is no state or federal agency overseeing cybermedicine. Several individuals have been apprehended for practicing medicine over the Internet without a medical license [8]. Concerted efforts have been made by the American Medical Association (AMA), the National Association of Boards of Pharmacy (NAPB), the Federal of State Medical Boards and other organizations to address these problems. The sheer volume of medical information is a problem for both cyberphysicians and cyberpatients.

Conclusion

When all is said and done, the tremendous power of the Internet is hard to deny. Cybermedicine is the discipline of applying the Internet to medicine. It is becoming increasingly popular around the world because of its many benefits. Although cybermedicine is yet to reach maturity, it has great potentials of improving the medical profession. The fear of cybermedicine that exists among physicians, patients, regulatory agencies, and lawyers is largely a fear of the unknown. The cybermedicine revolution is inevitable. It is apparent that the Internet and the WWW are here to stay. More information about cybermedicine can be found in the book in [9] and the journal exclusively devoted to it: *Journal of Medical Internet Research*.



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