e-Health and America's Broadband Networks

An Examination of How Broadband Services Enhance Health Care In America

August 14, 2007

US Internet Industry Association

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Publication Date: August 14, 2007
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Formed in 1994, the US Internet Industry Association is the primary trade association for companies engaged in Internet commerce, content and connectivity. USIIA serves its members through legislative advocacy and professional services. The association is headquartered in Washington, DC.

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EXECUTIVE SUMMARY

"e-Health is an emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies. In a broader sense, the term characterizes not only a technical development, but also a state-of-mind, a way of thinking, an attitude, and a commitment for networked, global thinking, to improve health care locally, regionally, and worldwide by using information and communication technology."

The emergence of eHealth has been shown to reduce the cost of healthcare and increase efficiency through better retention and retrieval of records, better management of chronic diseases, shared health professional staffing, reduced travel times, and fewer or shorter hospital stays. More directly, broadband helps to address three of the most critical complaints about the US health care system – high administrative costs, discrepancies in geographic coverage, and the high cost of delivery of services.

But as the medical arts have advanced, so has their need for bandwidth. Medical records have become more extensive, and need to be accessed by more parties simultaneously. Digital images have become clearer, but also larger. Many potential telemedicine projects have been hampered, therefore, by the lack of appropriate telecommunications technology, because regular telephone lines do not supply adequate bandwidth for most telemedical applications. Many rural areas still do not have other kinds of high bandwidth telecommunications access required for more sophisticated uses, so those who could most benefit from telemedicine may not have access to it.

There are four legislative/regulatory goals that must be achieved before eHealth services can meet their potential:

- **Adoption of Public-Private Partnerships.** While there has been considerable discussion of the use of federal funding for direct support of eHealth services, USIIA believes there are voluntary public-private partnerships that can be effective in promoting eHealth service deployment and adoption. The goals of such partnerships should include:

    - The use of funds to drive deployment of broadband to all available medical and health care facilities at the fastest speed possible consistent with the geography present.

  - The use of funds to drive deployment of broadband to all residential areas at a rate that reflects the specialized needs of seniors, minorities and others not able to afford the current generation of broadband solutions in rural areas.
  - The use of funds to support the acquisition of eHealth technologies for both medical facilities and residential facilities where such technologies are critical to advanced clinical telemedicine.

- **Reform of the RUS (Rural Utility Service) loan program.** The RUS loan program needs to be reformed in a manner that targets it foremost on rural areas that do not have any broadband. If and when all such areas become broadband served, then the RUS loan program will have accomplished much more than randomly doubling or tripling broadband coverage in a few rural areas. This program utilizes government-backed loans to private companies, but has been less than optimally effective because it allows loans for broadband deployment in areas where private capital has already been used or is available for broadband buildouts.

- **Incentives for adoption of administrative and clinical solutions.** Specifically, incentives to health care providers to reduce operating and administrative costs through effective document management and storage. While such incentives generally focus on the use of electronic medical records in place of the current paper versions, such incentives should also apply to innovations in storage, search, retrieval, privacy protection, security and transmission of records.

  Other obstacles to deployment of eHealth services include the unwillingness of physicians and hospitals to pay for the services without reimbursement, and the view of some in the community that these services are not easy to use. Given the substantial financial and health outcomes benefits from eHealth services, it is in everyone's interest to identify a workable model that reimburses clinicians for the capital and operating costs of adopting eHealth services.

- **Rejection of "network neutrality."** American consumers should not be forced to accept a "one-size-fits-all" broadband service that places critical medical monitoring and health care on the same footing as music and video downloads or non-critical communications. Efforts to enact forms of "neutrality" have focused specifically on treating the link between the consumer and the Internet in a ways that prohibits any prioritization of traffic on that linkage. To do so removes

the ability of network operators to function in ways that best meet the interests of their consumers in eHealth and other critical applications.

INTRODUCTION

Health care is a global paradox – capable of near-miraculous results, but difficult to administer in remotes areas of the globe and frequently expensive due to the requirements of research and development, procedural training and administration.

To some, a key solution to this paradox is technology. Technology has always played an integral role in medicine, so much so that the intersection of technology and the medical arts has come to be known as telemedicine, or more broadly as telehealth. Both terms are derived from the combination of the Greek word "tele," meaning 'far', and medicine or health.

Telemedicine has been practiced for much of mankind's history. African villagers, for example, used smoke signals to warn people to stay away from villages stricken by infectious diseases. Beginning in the early 1900's, the Royal Flying Doctor Service used radios and aircraft to deliver clinical medical support to the vast areas of Australia's Outback.[1]

Telehealth is a broader application of communications and information services related to health care, referring to not only clinical care but non-clinical services that include medical record-keeping, administration, education and research. An example of this was the use of printed materials for medical training after the advent of the printing press, or the fulfillment of medical prescriptions via fax machine.

A more recent term, eHealth, has come to refer more specifically to the convergence of electronic communications and health services, specifically encompassing computer and Internet technologies. Like "telehealth," eHealth addresses electronic communications for both clinical and non-clinical services:

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[1] See http://www.wikipedia.org/wiki/telemedicine

improve health care locally, regionally, and worldwide by using information and communication technology."[2]

eHealth occurs in two distinct forms – synchronous, or "real time," communications and asynchronous, sometimes referred to as "store and forward." Synchronous eHealth requires the presence of two or more parties at the same time and a communications link between them that allows a real-time interaction to take place. Video-conferencing is one of the most common technologies used in synchronous telemedicine. There are also peripheral devices which can be attached to computers or the video-conferencing equipment which can aid in an interactive examination. For instance, a tele-otoscope allows a remote physician to 'see' inside a patient's ear; a tele-stethoscope allows the consulting remote physician to hear the patient's heartbeat.

Store-and-forward telemedicine involves acquiring medical data (such as medical images, biosignals, etc.) and then transmitting this data to a doctor or medical specialist at a convenient time for assessment offline. It does not require the presence of both parties at the same time.[3]

The applications of telemedicine through these two technologies are diverse. At the University of Kansas Telemedicine Program, technology has been used for several years for oncology, mental health care to patients in rural jails, hospice care, and most recently, to augment school health services by allowing school nurses to consult with physicians.

Several telemedicine programs are being initiated in correctional facilities, where the costs and danger of transporting prisoners to health facilities can be avoided. The University of Texas Medical Branch at Galveston Center for Telehealth and Distance Education was one of the original programs to begin providing services to inmates, and sees hundreds of patients per month.

Home health care is another booming area of telemedicine, including Japan, the UK and the US. The Veterans Affairs Administration has initiated home telehealth as part of its telehealth program. Telemedicine does not have to be a high-cost proposition. Many projects are providing valuable services to those with no access to health care using low-end technology. The Memorial University of

[2] "What is e-health?" Bunther Eysenbach, J Med Internet Res 2001;3(2):e20
[3] See http://www.wikipedia.org/wiki/telemedicine

Newfoundland telemedicine project has been using low-cost store and forward technology to provide quality care to rural areas in under-developed countries for many years.

The military and some university research centers are involved in developing robotics equipment for telesurgery applications. A surgeon in one location can remotely control a robotics arm for surgery in another location. The military has developed this technology particularly for battlefield use, and some U.S. academic medical centers and research organizations are also testing and using the technology.[4]

Clinical eHealth (telemedicine) has traditionally proven beneficial for populations living in isolated communities and remote regions and is currently being applied in virtually all medical domains. Specialties that use telemedicine often use a "tele-" prefix; for example, telemedicine as applied by radiologists is called Teleradiology. Similarly telemedicine as applied by cardiologists is termed as telecardiology, etc. Telemedicine is also useful as a communication tool between a general practitioner and a specialist available at a remote location.

This paper examines the current state of the art of eHealth as it applies to technologies currently deployed by or envisioned for the American broadband industry. Its goal is not to propose specific solutions to the paradox of health care, but rather to examine the means by which effective eHealth services are supported today and how they may best be supported in the future. Integral to this discussion is a review of current and prospective legislation and regulation that would best support the rapid advance in eHealth services through advances in broadband.

THE CHALLENGES OF eHEALTH

Telemedicine has been shown to reduce the cost of healthcare and increase efficiency through better retention and retrieval of records, better management of chronic diseases, shared health professional staffing, reduced travel times, and fewer or shorter hospital stays. More directly, broadband helps to address three of the most critical complaints about the US health care system – high administrative costs, discrepancies in geographic coverage, and the high cost of delivery of services.

A study by Harvard Medical School and the Canadian Institute for Health Information determined that some 31 percent of U.S. health care dollars, or more than $1,000 per person per year, went to health care

[4] "Telemedicine Coming of Age," Nancy Brown, January 13, 2005.

administrative costs, nearly double the administrative overhead in Canada, on a percentage basis.[5] Such administrative costs can be dramatically reduced by replacing the current patient records systems – a paper-based system using hand-written charts – with more current electronic document management and storage systems.

Geographic distances are also a critical factor, as the majority of primary health care facilities, specialists and care facilities are located near points of population density, more removed from rural areas of the US. The use of eHealth services over broadband can, in many cases, alleviate the disadvantages of physical distance by supplanting physical visits to a facility with virtual visits and follow-up monitoring.

The U.S. spends more on health care, both as a proportion of gross domestic product and on a per-capita basis, than any other nation in the world. Current estimates put U.S. healthcare spending at approximately 15% of GDP, the world's highest.[6] Broadband reduces these costs in a myriad of ways, from eliminating the need for medical visits for routine monitoring to the ability to recognize a patient's deteriorating health before the deterioration becomes obvious and critical. Specifically, home eHealth and disease management services have been shown to incur cost savings and improve care in homebound and chronic disease patient groups and have been singled out as a valued service by patients.

BROADBAND AND EHEALTH SOLUTIONS

The practice of telehealth was possible prior to the advent of broadband, but in more limited fashion. Records could be stored on floppy disks for transmission. And fax machines could be used for the transmission of some real-time medical information such as blood pressure readings or electrocardiographs.

But as the medical arts have advanced, so has their need for bandwidth. Medical records have become more extensive, and need to be accessed by more parties simultaneously. Digital images have become clearer, but also larger. At the same time, the deployment of broadband access to residential locations – and particularly residential units for seniors and the disabled – has made possible whole new fields of eHealth applications and services.

[5] Costs of Health Administration in the U.S. and Canada, Woolhandler, et al, NEJM 349(8) Sept. 21, 2003
[6] "The World Health Report 2006 - Working together for health."

Many potential telemedicine projects have been hampered, therefore, by the lack of appropriate telecommunications technology, because regular telephone lines do not supply adequate bandwidth for most telemedical applications. Many rural areas still do not have other kinds of high bandwidth telecommunications access required for more sophisticated uses, so those who could most benefit from telemedicine may not have access to it.[7]

Today, there are six eHealth activities that specifically benefit from broadband:

- **Electronic Medical Records.** The collection, communication, storage, indexing and access to patient data.
- **Clinical eHealth.** All types of physical and psychological measurements that do not require a patient to travel to a medical person. This involves two distinct areas of clinical service – patient treatment and remote patient monitoring. Patient treatment replaces the traditional visit to a medical facility or office with a broadband consultation using remote videoconferencing or other broadband services. Remote patient monitoring uses devices to remotely collect and send data to a monitoring station for interpretation. Such remote applications might include a specific vital sign, such as blood glucose or heart ECG, or a variety of indicators for homebound patients.
- **Evidence Based Medicine**. Aimed primarily at health care professionals, this service delivers information on appropriate treatment under certain patient conditions so that the professional can determine whether a diagnosis is in line with current scientific research.
- **Consumer medical and health information.** Consumers are able to use the Internet to obtain specialized health information and on-line discussion groups to provide peer-to-peer support.
- **Medical education.** The use of online medical education for health professionals and special medical education seminars for targeted groups in remote locations.
- **Virtual healthcare teams.** The creation of teams of healthcare professionals who collaborate and share information on patients through digital equipment (for transmural care).[8]

Broadband offers five delivery mechanisms in support of these activities:

- **Advanced network services.** These include both dedicate high-speed lines and connections and Virtual Private Networks (VPNs).[9] Networks link tertiary care hospitals and clinics with

[7] "Telemedicine Coming of Age," Nancy Brown, January 13, 2005.
[8] See http://www.wikipedia.org/wiki/ehealth

outlying clinics and community health centers in rural or suburban areas. Studies by the several agencies within the U.S. Department of Health and Human Services and private vendors place the number of existing telemedicine networks in the United States at roughly 200.[10] These programs involve close to 2,000 medical institutions throughout the country. Of these programs, it is estimated that about half (100) are actively providing patient care services on a daily basis. The others are only occasionally used for patient care and are primarily for administrative or educational use.

- **Point-to-point connections.** Using private networks, hospitals and clinics deliver services directly or contract out specialty services to independent medical service providers at ambulatory care sites. Radiology, mental health and even intensive care services are being provided under contract using telemedicine to deliver the services.
- **Network to End-User Connections.** Primary or specialty care to the home involves connecting primary care providers, specialists and home health nurses with patients over broadband video systems for interactive clinical consultations.
- **Home to monitoring center links.** Specialized broadband applications are used for cardiac, pulmonary or fetal monitoring, home care and related services that provide care to patients in the home.
- **Web-based e-health patient service sites**. These provide direct consumer outreach and services over the Internet. Under telemedicine, these include those sites that provide direct patient care.

LEGISLATIVE AND REGULATORY GOALS

Broadband is a critical element in the ability to deliver eHealth services, and the evolution and adoption of eHealth services is directly tied to the growth of broadband networks in the United States.

Regulation and legislation that inhibit the deployment of broadband and innovation in new services will result in higher costs for American healthcare and inhibit the expansion of eHealth services.

There are four legislative/regulatory goals that will help eHealth services meet their potential:

- **Rejection of "network neutrality."** American consumers should not be forced to accept a "one-size-fits-all" broadband service that places critical medical monitoring and health care on

[9] A virtual Private Network is a private connection that is carried over a public network such as the Internet.
[10] Reference data from the American Telemedicine Association, at http://www.telemedicine.org.

the same footing as music and video downloads or non-critical communications. Efforts to enact forms of "neutrality" have focused specifically on treating the link between the consumer and the Internet in a ways that prohibits any prioritization of traffic on that linkage. To do so removes the ability of network operators to function in ways that best meet the interests of their consumers. Another network neutrality theme would ban anyone other than the end user from paying for quality improvements, but that precludes many economically sensible and clinically sound business models for eHealth services.

- **Adoption of Public-Private Partnerships.** While there has been considerable discussion of the use of federal funding for direct support of eHealth services, USIIA believes there are voluntary public-private partnerships that can be effective in promoting eHealth service deployment and adoption. The goals of such partnerships should include:

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- **Reform of the RUS (Rural Utility Service) loan program.** The RUS loan program needs to be reformed in a manner that targets it foremost on rural areas that do not have any broadband. If and when all such areas become broadband served, then the RUS loan program will have accomplished much more than randomly doubling or tripling broadband coverage in a few rural areas. This program utilizes government-backed loans to private companies, but has been less than optimally effective because it allows loans for broadband deployment in areas where private capital has already been used or is available for broadband build-outs.

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records in place of the current paper versions, such incentives should also apply to innovations in storage, search, retrieval, privacy protection, security and transmission of records.

- There is pending legislation (S.1455, the "Health Information Technology and Privacy Advancement Act," and S.1693, the "Wired For Healthcare Quality Act") that would create a non-profit corporation at the national level with a primary focus of facilitating the rapid development of a secure and efficient health information exchange program, particularly in the exchange of information at the state and federal levels and with private parties. Both are currently under consideration by the US Senate, and would serve to more rapidly advance administrative eHealth services.

  Other obstacles to deployment of eHealth services include an unwillingness by physicians and hospitals to pay for the services without reimbursement, and the view of some in the community that these services are not easy to use. Given the substantial financial and health outcomes benefits from eHealth services, it is in everyone's interest to identify a workable model that reimburses clinicians for the capital and operating costs of adopting eHealth services.