E-HEALTHCARE

Hongwei Du

College of Business and Economics
California State University, Hayward
Hayward, CA 94542
hdu@csuhayward.edu

Ben Bradford

California State University, Hayward
Hayward, CA 94542
ben@benbradford.com

Rostam Assadi-Shehni

California State University, Hayward
Hayward, CA 94542
rostam@cwnet.com

Vikram Gandhi

California State University, Hayward
Hayward, CA 94542
vgandhi@csuhayward.edu

WHAT IS E-HEALTHCARE?

According to University of La Trobe e-Healthcare is defined as "a way of delivering and achieving better health outcomes through effective and innovative use of health information." The author then defines e-Healthcare as the means "to provide high quality health care to all health consumers."

Providing e-healthcare for the consumers will in turn "increase home care by remotely monitoring chronically ill patients in their homes," and it will also "reduce the need for hospital care for patients." It is further developed that the use of e-healthcare for educational purposes "through the use of information technology reduce errors, wastes, and costs."

Nevertheless, we developed our own definition of what e-healthcare is all about. After thorough research through the Internet, visiting many sites, and analyzing the information we gathered, we have a thorough understanding of this business means. We were amazed to see how the healthcare industry running to catch up with the rest of the crowed who are already tuned into what we call *free E*.

We found many sites that they provide free healthcare advices to their patients, consumers, or visitors on drugs, diseases, prevention programs, and some sites go as far as diagnosis of many illnesses and recommendations for treatments.

EFFECTIVENESS OF E-HEALTHCARE

Leonard Schaeffer, the former head of the Medicare and Medicaid programs, explained some of healthcare's challenges at a conference recently: "Current rates of healthcare spending growth are clearly not sustainable, and those trends will be further aggravated by the aging of 78 million baby boomers who want to look good, to feel good, and to live forever" (Rovner, 2004).

Indeed there are many challenges facing our health care system today like rising healthcare costs, safety and privacy issues, the aging of the baby boomer population, and many other challenging problems affecting the world's most advanced healthcare system. The healthcare challenges that we are facing today are being combated by range of methods. One method, e-Healthcare, is a new technology that is being used mainly due to the advancement of the Internet. For example, the integration of the Internet into healthcare can speed the transmission of information, globally connect physicians to collaborate on services, such as telesurgery, and provide access to physicians and people that were once thought unattainable. E-Healthcare is providing significant opportunities for healthcare providers to deliver technologically effective healthcare services to their consumers and provide consumers with ways to access the information the consumers need.

From a Provider's perspective e-Healthcare can be a suite of IT related tools that enable the provider to deliver higher quality and more effective services. One area of medicine where you will find e-Healthcare related products is in Radiology. Radiologists use IT related products to transfer images across physical boundaries so that they can read digital film anywhere in the country at any time by logging onto the Internet. These systems utilized by Radiologists are called PACS (Picture Archiving and Communication Systems) and when combined with a web-enabled front-end, image, it can be stored digitally in a central location ready to be accessed through the Internet.

McKesson Corporation, a healthcare services / information technology company, has recently upgraded their Horizon Imaging System, which is a PACS / Radiology Information System product, to include "a Web-based workflow system for managing the full range of radiological functions, including management of patients, films, clinical history, electronic signatures, claims preparation and management reporting" (McKesson Corporation, 2004). The Horizon Radiology system is an effective e-Healthcare tool because it allows a physician to have access to patient history, images and reports to help the Radiologist give a better interpretation of the films that he/she is examining. The most effective part of a PACS system is the ability to store data digitally and be able to access it at any time and in any place ultimately delivering productivity gains for Radiologists and their staff. "The result should be improved clinician productivity, better and faster access to information, and ultimately, faster diagnosis of patient conditions so that treatment can begin" (McKesson Corporation, 2004).

Radiologists also use a tool called CAD (Computer Aided Detection) in Mammography and other imaging related modalities such as CT (Computed Tomography), and MRI (Magnetic Resonance Imaging). In layman's terms, CAD is a tool that a Radiologist activates that scans a

digital image and points out certain abnormalities in an image that a Radiologist may or may not have detected by the human eye. Many times, this computer aided tool can be an effective tool to assist a Radiologist in making a diagnosis and can even prevent the staff from utilizing a second Radiologist to interpret the image. It has been reported that "CAD can help doctors find almost 20% more breast cancers than they would have without using the technology" (Yee, 2004).

CAD assistance for modalities such as mammography has made a significant impact on the effectiveness of a Radiologist. Breast cancer screening with mammography is a hot topic and CAD's strength is the ability to detect small cancers in the early stages. A 2001 study conducted by Drs. Timothy Freer and Michael Ulissey utilized conventional mammography reading techniques as well as techniques utilizing CAD to diagnose over 13,000 women. It was reported that the physicians found almost 20% more cancers with CAD (Yee, 2004).

Some Radiologists expect the CAD systems to evolve and assist in the diagnosis process, appropriately termed – computer-aided diagnosis. Effective and highly paid Radiologists are those that can read images quickly and error-free. The higher the throughput for reading images, the more money the Radiologist will make. CAD can help the Radiologist be more effective and be speedy because half the work will already be done for them; in theory, what's left is monitoring the system to make sure it has appropriately diagnosed the image scan (Yee, 2004).

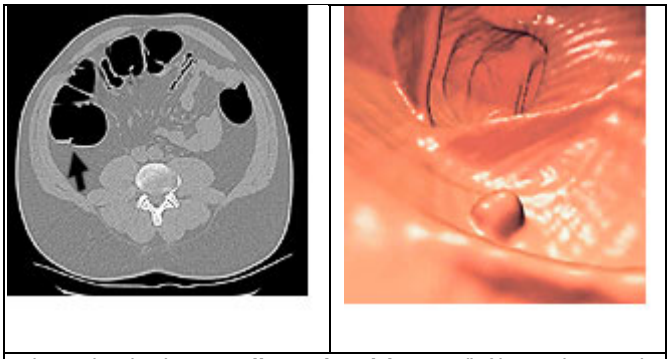
It is foreseen in the future that CAD could be an effective diagnostic tool if poorer communities are unable to afford a Radiologist or at least a full-time Radiologist, although this issue is highly controversial but has promise. However, it is quite clear that CAD will not replace an experienced human-being like a radiologist that must undergo years of intense training to be able to interpret and diagnose imaging studies (Yee, 2004).

Virtual Colonoscopy & the Use of CAD

Virtual Colonoscopy is a fairly new e-Healthcare technology that is being utilized by gastroenterologists to detect cancerous polyps in the colon region. "In a regular colonoscopy, a gastroenterologist inserts a scope into the rectum, and a camera provides video images of the colon. The 3D scan creates a similar view, and even allows a radiologist to zoom back and forth through the image of the colon and take a second look -- something you cannot do with regular colonoscopy"(Parker-Pope, 2004).

Anyone that has ever had a regular colonoscopy understands the major discomfort that one must endure before and after a study has been performed.

A virtual colonoscopy reduces the discomfort but also provides a much clearer image of the colon, allowing the radiologist to make a more accurate assessment of the diagnosis. Virtual colonoscopy produces "huge datasets that have to be reviewed by doctors, often taking 20 to 30 minutes for each study". With the introduction of CAD to assist the radiologist in examining the 3d images, the ability to identify certain concerns in an image will help the radiologist reduce the time necessary for the exam and potentially point out polyps that are difficult to diagnose (Parker-Pope, 2004).



The polyp in the **two-dimensional image** (left) can be much harder to detect than the polyp in the **three-dimensional image** (right). (Parker-Pope, 2004)

Telesurgery

An example of effective e-Healthcare technologies can be found in new telesurgery products that are helping doctors perform surgeries. One such hospital, Kapiolani Medical Center for Women Children, broadcast live surgeries for physicians to participate in from around the world. The surgical suites that cost in excess of $1.5 million will use high-bandwidth video conferencing tools to connect doctors that are outside the hospital (Sawada, 2004).

Another added benefit of this e-Healthcare product also allows patients to stay in Kapiolani as opposed to being transported abroad for costly operations. Not only will it be cheaper for the hospital and the patient, but it will reduce the duress associated with an emergency situation as well as provide the same level of care that the patient would have received abroad (Sawada, 2004).

Proliferation of Telesurgery

A new and very exciting e-Healthcare tool used in Radiology that is in its infancy is called Tele-immersion. Surgeons are faced with the fact that they must examine 2D images to perform a procedure on a patient that is obviously 3D. A Radiologist always examines 2D images but rarely can see the image translated in 3D. When a Surgeon is performing a procedure, he or she must rely on the Radiologist to translate the 2D image before the cutting takes place (Sandrick, 2004).

Dr. Jonathan Silverstein, a director of the Center for Clinical Information at the University of Chicago, has developed a tele-immersion system with a team of Radiologists that "superimposes anatomic images onto patients while they're operating" (Sandrick, 2004). "Surgeons can get 3D views that show where vessels are in relation to a tumor. They can turn the views into different orientations to truly understand anatomic relationships, to see where a tumor is so they can reach out and get it," Silverstein said (Sandrick, 2004).

This new e-Healthcare tool is creating more effective communication between the Radiologists and Surgeons by allowing them to view their information in the same orientation at the same time. The system sends images to head-mounted displays that surgeons can see around and past.

It also allows for Radiologists to communicate with surgeons through an instant messaging type device and also the ability to push images to the surgeon to help in the procedure. The tool will also allow for Radiologists to draw circle or arrows on images to flag important items and to follow the entire surgery from the comfort of their office. In fact, it is the same type of communication if the Radiologist were to be in the operating room with the surgeon (Sandrick, 2004).

The Internet as an Effective E-Healthcare Information Tool

The proliferation of the Internet has allowed for patients to have access to more information regarding their health care. Everyone says these days that you have to be your own advocate when being given medical advice. Take for instance my mother, who recently came down with breast cancer; my mom was scared to death mainly because of the unknown. In a matter of 2 hours my mother's fears had rescinded because she educated herself by accessing information on breast cancer on WebMD. What she found was a wealth of information on what breast cancer is, how it is defined, how it is treated, and the success and failure rates of current treatment methods. When she went in to see her medical oncologist she could fully understand the lingo, the treatment methods she was being told, and she was able to discuss with him how she wanted to be treated due to the knowledge she had gained.

Harris Interactive performed a study in March 2004 centering on Healthcare statistics on the Internet. The study concluded that 111 million adults have looked for health related information on the Internet. Also according to the study WebMD was a top choice for web surfers seeking information online (Greenspan, Robyn, 2004 - 1).

Demographic Profile of U.S. Cyberchondriacs	
% of all adults who have looked for health information online	53%
Age	
18 - 29	82%
30 - 39	68%
40 - 49	63%
50 - 64	49%
65 +	26%
Education	
High School or less	49%
Some College	63%
College graduate	75%
Post graduate	84%
Income	
Less than $15,000	50%
$15,000 to $24,999	45%
$25,000 to $34,999	55%
$35,000 to $49,999	53%
$50,000 to $75,999	67%
$75,000 and over	77%
Source: Harris Interactive (Greenspan, 2004 - 2)	

Not only do patients have more information on the Internet than ever, but doctors do as well. The Internet has allowed doctors the means to seek out and research information on diseases, treatments, and studies to help serve patients. The Boston Consulting Group and Harris Interactive found that "doctors who have adopted electronic medical records, electronic prescribing, online communication with patients and remote disease monitoring say such tools have boosted their efficiency and quality of care" (ClickZ Stats Staff, 2004).

E-Healthcare Shortcomings

Even though e-Healthcare is an effective tool that the public, healthcare providers and insurance companies are promoting in this new Internet age, the tool has a few shortcomings. A new term dubbed, Cyberchondria, is the name given to those who self-diagnose their healthcare problems by solely

visiting the Internet (Greenspan, 2004 - 2). While the information on the Internet can be an effective source for gaining information regarding illnesses, treatments, and health services, the data can sometimes be faulty.

A survey by Harris Interactive cited a significant outbreak of Internet users who go online to look for information regarding healthcare (Greenspan, 2004 -2).

Although the information on the Internet can sometimes be faulty, generally the public believes that the information they gather on the Internet has improved their health services they receive. A survey conducted by the Pew Internet & American Life Project claimed that nearly 2,000 of their respondents felt that online resources can help them become well-informed patients regarding the health information and services they receive via the Internet (Greenspan, 2004 - 3).

Another major problem of e-Healthcare is the security implications that are associated with transferring sensitive and personal data through the Internet. It will be important that the e-Healthcare systems of today in the future accurately handle consumer's privacy, ethics, and security. A report sponsored by the California HealthCare Foundation and the Internet Healthcare Coalition found that 6.3 of the 37 million users who do not currently use online health information, do not do so because of privacy and security concerns. The study also explores several measures like password encryption and other security measures that can be undertaken by website operators to have a positive impact on a users desire to share personal health information online (Pastore, 2004).

The report also highlights that many users are not fond of the mixing of advertorial content and commercial sponsorships on sites where personal health information is being collected. Many users are concerned that insurers could access this personal health data to limit their insurance coverage or employers could limit job opportunities if this information were ever shared (Pastore, 2004).

THE EFFICIENCIES GAINED BY UTILIZING E-HEALTHCARE

This is being achieved through a collaborative program between healthcare providers, patients, and information technologist as we have described thus far. Also it is further developed by the instant access to comprehensive and standardized health records; the integration of hospital, community, insurance industry, pharmacy, government, home and educational health management systems; and the provision of computer based training programs to health professionals. All that means nothing without the right educational background to make this work; and this is where we come in, the information technologist.

Furthermore, although we would love to have each one of our colleagues at the disposal of a doctor's office, insurance company, school, pharmacy, and so on so forth, we created the technologies for people to be free, for their convenience, to provide personal freedom and independence for people through the use of technologies so that they have more time to enjoy their lives, as it was intended by whomever or whatever who has created us.

How Will E-Healthcare Deliver Efficiencies in the Future?

Speaking of goods, we may want to look at some of advantages of this system and address some of the concerns raised by the healthcare community.

- **Advantages and Concerns:**

i. ***Increased efficiency***: We have already discussed the bad doctors' handwritings that have caused so many deaths already. This is a serious matter that often taken as a joke. However, even if we do manage to find the patient's chart, most often doctors does not have all the pertinent data, such as patients' medical history and background information when making their assessments.

However, with a system such as EMR, Electronic Medical Records which is the backbone of e-healthcare system, we do not have to wait or be present for obtaining our own medical records to be transferred to another healthcare provider so that someone else can use the information to make the right diagnosis when providing healthcare for us. The reduction of paper trails, time saved for both of us, the doctors and the patients, when going through the whole medical-life-story every time visiting a new doctor, are just bonuses of efficiently using our resources.

Memorial Herman Healthcare System describes a real life example where Dr. David Bauer indicates, "An area where we have been able to quantify benefit is dictation costs. Since implementing Logician, our dictations have dropped by 81%. And since the dictations that are being done are electronically placed in the Logician chart, we are also saving the labor costs previously associated with pulling paper charts and inserting dictated notes." Please see <http://www.medicalogic.com/emr/user_experience/hermann.html> for more information.

ii. Improved accuracy: The lab tests and digital scanning methods can be entered quickly, easily, and accurately into an EMR system which can dramatically reduce the probability of error. Because the content is electronic, there is never an issue with illegible or unreadable text.Example: The River Health System reports that they had "significant improvements in immunization and diagnosis rates." Please see <http://www.medicalogic.com/emr/user_experience/riverside.html> for more information.

iii. Address Accuracy concerns: High accuracy is a prime formulation of an e-healthcare system. The system achieves this by properly documenting every aspect of a healthcare system in its roper order, place, and in a timely fashion- that is as fast as a computer can save the information and retrieve the pertinent data. This makes it easy to access the data and cataloging the most frequently used information, and facilitates the communication between healthcare professionals who often make assumptions based on experience and not pertinent data, which is scarcely available at their disposal.

iv. Improved patient care: The system can support a preventive care directly, by providing many information on a multitude of health risk hazardous materials, side effects of drugs, either over the counter or prescription drugs, preventative measures for the consumers, daily intake of products on the market place, dietary plans and so much more. Also, E-healthcare system

can provide decision support at the point of care. It can be used to track patient follow-up activities, patient compliance, and patient progress.
Furthermore, At Providence Healthcare System Dr. Le Blanc testifies that Logician software that is implemented by the e-health system saves the day for a patient when "the orders for patient's cardiac workup were rescinded, the patient did not have to undergo an expensive and duplicative battery of tests, and she went for immediate surgery to repair her injury."
Please see <http://www.medicalogic.com/emr/user_experience/providence.html> for full story.

v. ***Better resource allocation:*** When visiting a clinic, we can see how small the patients' rooms are. "The Valuable space used to manage and store paper records can be reallocated for exam rooms or offices." Also, we always have to spend a few minutes of our valuable time for the nurse keep looking for our records, only to come back to tell us that she could not find our records because she is either looking under our last names when we actually go by our middle names, they file our charts under our middle names but we actually go by our last name, the file is still seating on doctors' desks because the good old doctor needed to discuss our healthcare plan with our healthcare providers to know what drugs are covered what are not, or simply they have lost the chart. These are not if statements, all of which did happen to me, and I am sure I am not the only one. We would like to have less time spending on pulling our charts, if they can find them and read them, and spend more time providing quality healthcare for us. Also, only God knows how many trees they have to cut down to file so many charts stored on those hospitals and clinics. No more paper trails period. Lets have the prescriptions e-mailed to our local pharmacy to pick up in our way home. How long do we have to wait in our local pharmacies to have our prescriptions filled? If we were that healthy to wait up, standing for that long in a local pharmacy store, then it was not our bodies that needed to be examined, but our minds.

   If interested to learn more, please see a detail description of calculations of a healthcare provider since the implementation of their new e-healthcare backbone at:
   <http://www.medicalogic.com/emr/user_experience/capregion.html>

vi. ***Address Security Concerns:*** We have heard many stories about how certain individuals, when getting fired or simply unhappy on their jobs, tamper with confidential information that are strictly doctors-patients' prerogative confidential information. "Unlike paper records, access to EMRs can be restricted, so staffs have access to records based on job function. Audit trails track record access and usage." These are password-protected files that are only accessible to healthcare professionals on need to know basis. As far as the communication across the network is concerned, we can always create a VPN, virtual private network, between the places we feel they must use high secure line of communication, firewalls, the state of the art encryption technologies, and so much more that insures the safe keeping of the information, transmission, and access.

vii. ***Reduced malpractice costs:*** It is further developed that e-healthcare system reduces the cost associated with malpractice insurance, insurance fraud, and so much more that is a burden to our society in general. Improving documentations and a properly developed database system for an e-healthcare system insures accessibility, readability, availability, and just about any other positive adverb as we said before in the beginning. The subject of audit and trail could

have never been any easier when the search for a claim is just the mater of accessing the data over a secure channel. The software industry awaits to plumb the market with all kinds of programs which can facilitate the process of a claim accurately and efficiently.

viii. Regulatory compliance: For as far as the regulatory agencies are concerned, e-healthcare system could only facilitate the information they require doing their job in a timely fashion. The paper trails, waiting periods for mailed documents, lost, illegible documents, and so much more that are currently associated with the relationship and communication chandelles between these agencies could be totally eliminated by implementing the e-healthcare system

- **Trends in e-healthcare**

As the idea of e-healthcare becomes a reality here are some of the trends that will define it years to come

A more informed user:

Over 100 million users in the United States alone have some form of Internet access either at their work or home and 70% of these users have researched a doctor or a medicine online. This has lead to insurance companies like PacifiCare offer it's members online access to tools that help them identify which hospitals might be best for them for more than 30 different surgeries and Blue Cross of California also offers access to quality and medical outcome data for all hospitals in the state—to more than 3.7 million of its PPO and self-insured.

"Digital" Hospital:

A lot of traditional hospitals are moving towards e-healthcare, hospitals like the Indiana Heart Hospital have moved towards a paperless environment this helps them keep a central data for all their patients. Thus irrespective of location the patient is receiving treatment his or her records can be access by a doctor or nurse with a click of button.

eCleveland Clinic, a Ohio based clinic, provides consumers with access to an evaluation of their medical records, imaging scans, and lab results. The clinic nurses triage email requests as they would phone calls, and match patients to the right specialists on the team. Patients are registered at the clinic and have their own medical records. If necessary, a patient can talk to a nurse who facilitates the conversation with the physician. The integrated service works because the underlying process is the same as an in-person second opinion visit—it's only delivered electronically.

Greater Accountability:

Hospitals are moving toward the use of technology to improve patient safety, decrease medical errors, and improve outcomes. Senator Ted Kennedy recently introduced a bill that would require most hospitals to use Computer Physician Order Entry (CPOE) systems. "The requirement to use technology to improve care is a critical trend that will cut through all departments," says Mark Bard, President, Manhattan Research, Inc., New York. "The push toward improving safety and reducing errors will have far-reaching effects on everything from clinical records and pharmacy orders to bedside care and the emergency room."

CONCLUSION

E-healthcare has sure come a long way. From being a pipe-dream in the early 90's this is largely due to physicians and hospitals adopting technology, as evident from a survey reported by Healthhero in June of 2003 which indicates that over 85% of physicians have gone online as opposed to only 7% in 1996.

However many challenges still remain; E-healthcare in hospitals offering certain services like appointments and prescriptions online, for it to become pure e-healthcare i.e. where a person is diagnosed and treated online is bogged down due to many factors like:

a) Regulation: Current U.S. Law prohibits a doctor from practicing medicine in any state besides the one he or she is licensed in – this restricts the reach a online physician can have.

b) Infrastructure: Many users are still using 56k dialup access to get on the Internet and many e-healthcare sites heavily use voice and data that a high speed connection.

c) User attitude: Patients still prefer to visit a doctor in person and are apprehensive about getting advice online, however as more people adopt the technology attitudes can change over time.

In spite of these challenges e-healthcare remains a lucrative industry with some analyst predicting a $2.6 billion market by 2010 and a 25% growth rate after that.

E-healthcare will empower the consumer and he/she will be able to choose their insurance, doctor and treatment according to their liking and will not be restricted to their locality or neighborhood this will lead to greater efficiency and reduced costs for providers and end users and hopefully will provide a solution for 40 million or so Americans who are un-insured.

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