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The Internet : Another Facet to the Paradigm Shift in Healthcare

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ABSTRACT

The Internet is an extremely powerful innovation that has and will continue to shape the healthcare industry in the years to come. Albeit a little too slowly, doctors are starting to catch onto this new wave of digital empowerment and creating niches that will enhance their ability to care for their patients and ultimately add value to their practices. The challenge is to encourage every doctor to come on board. The paradigm shift in healthcare delivery is that the Internet brings about the power of information to the patient. This balances the power in the doctorpatient relationship. Taken positively, the doctor too can benefit from Internet technology.

The biggest contribution of the Internet in the area of electronic medical records is the web-based display environment that is operating-system independent. The Internet can therefore be exploited to provide a supra system that can draw personal medical information together from anywhere to create a virtual electronic medical record. The Internet can also be used to shape up an Internet-based healthcare delivery system. The healthcare delivery paradigm shift brought about by the Internet calls for an eHealth strategy.

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INTRODUCTION

Internet technology is beginning to revolutionalise the way healthcare is delivered. Patients are beginning to email doctors who care to reply to them; they are locating information on the Internet and sharing them with their doctors; some are even prescribing for themselves by buying from online vendors. In the process, a new balance of power is created. How do doctors view these doctor-patient relationship shifts?

Healthcare delivery is clearly reshaping itself with the arrival of the Internet. The doctor-patient relationship is taking a paradigm shift. Both the patient and doctor now have a powerful tool in their hands for communication, information retrieval and storage. The necessary technology is ready and waiting. All it needs is for doctors to embrace it. As Internet technology continues to revolutionalise healthcare delivery, the message to doctors is clear: Get Online - Do Not Be Left Behind.

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THE PARADIGM SHIFT IN HEALTHCARE DELIVERY

Pervasive computing is a logical step in the evolution of healthcare. The Internet has enabled the connection of countless computers in hospitals, clinics, and homes. Connecting all types of devices such as computers, laptops, mobile phones and Personal Digital Assistants (PDAs) creates a network that is very much larger than the size of today's Internet, and offers more than just simple exchanges of information. The network will enable healthcare organisations to use it as a medium for health care delivery.

Healthcare is very information intensive. It is for this reason that until now, patients have little consumer sovereignty. They have to live by faith of what their doctors tell them. It is small wonder that patients are increasingly requesting for more online healthcare information now that they can obtain it for themselves. Web technology offers ease of access and at very affordable rates to both patients and healthcare providers. The Internet can be seen as a resource repository that is online twenty-four hours a day.

BENEFITS OF INTERNET TECHNOLOGY TO DOCTORS

The Internet can certainly put the doctor on the defensive. His doctor-patient relationship has to accommodate some power sharing with his patient. This may not be all bad; it will give the patient some responsibility. More constructively, the Internet can offer the doctor some real benefits.

Huge resource of information

Firstly, it is a huge resource of information on medical-related topics. Doctors can have easy access to journals online and most journals now even offer electronic

delivery of table of contents of journals on the day they are released. Granted that most information on the Internet is of variable accuracy, doctors do generally appreciate what is online. Without it, one would have to spend hours in libraries searching for information or acquiring new knowledge. It is of course easy to be overwhelmed by a barrage of information. What is important is that doctors must learn quickly to discern between credible pieces of information and trash[5].

Internet appointment booking

Secondiy. Internet appointment booking is now a reality. One such example is the local Central Appointment and Referral System (CARES) at "www.cares.com.sg". It enables one to electronically search a 24-hour online directory of specialists and book outpatient appointments with participating hospitals via the Internet. Confirmations of appointments can be made on the spot. Changes, cancellations, and inquiries on previous appointments can be achieved easily as well. With most electronic appointment systems, electronic appointment reminders can be sent to the patients via emails or mobile phones' Short Messages System (SMS).

e-Filing

The filing of reports electronically will save much manpower, postage stamps and paper work. Income tax returns can be filed electronically. It is only a matter of time that driving license check-up reports, maid check-up reports and immunization reports are submitted electronically.

Connectivity

Thirdly, each hospital in Singapore has its own information system. In addition, the systems are generally from different vendors and straddle across different operating-system plafforms. The Internet is able to deliver a supra system that is able to 'talk' to all operating systems so that electronic medical records may be shared[2].

Virtual Electronic Medical Records (EMR)

Fourthly, the virtual EMR can become a reality. It goes one more step beyond the typical EMR. EMR has been defined by the American Medical Association as "electronically maintained information about a patient's lifetime health status and health care. It replaces the paper medical records as the primary source of information for healthcare, meeting all clinical, legal and administrative requirements. It is seen as a virtual compilation of non-redundant health data about a person across a lifetime, including facts, observations, interpretations, plans, actions and outcomes[1]." The extra step that the Internet has propelled EMR forward is to make the hardware and software independent through the Internet web-browser. In addition, the virtual environment allows data to be displayed from multiple record keeping sites. A patient who sees a GP, two hospitals, a dietitian and a physiotherapist can have all the important information about the healthcare he has received displayed on the Internet in different windows all on a single screen.

e-Commerce

Fifthly, the buying and selling of equipment, pharmaceuticals, supplies, books, and other items can be done on-line. This is e-Commerce.

Telemedicine and on-line management systems

Finally, other areas that Internet Technology may benefit doctors are Telemedicine[4] and Online Medical and Disease Management systems[11]. The former allows doctors to perform medical consultations in real-time over distances and share files for second and third opinions. The latter allows doctors to identify in a shorter time the various possibilities surrounding certain cases. These systems aid diagnosis. Here is a word of caution though - they should never be overly relied upon.

DIFFICULTIES THAT THE INTERNET BRING

The Internet also brings with it certain difficulties. The need for the doctor-patient relationship to take on a more equal balance of power has been alluded to. There is also an opportunity cost in surfing of the Internet, such as personal time and neglect of loved ones.

The virtual EMR brought about by the Internet will achieve integration of personal health information. With it comes the risk of erosion of privacy. There exists a genuine public concern on threats to privacy. Individuals are concerned that personal health information may be reused or sold for purposes other than diagnosis and treatment purposes. They also fear that automation is allowing unauthorized individuals to access their personal health records. Security measures pertaining to all EMRs include fortifying the system against hacking and unauthorised entry, introducing regular computer audits, and employing the use of digital certificates and encryption keys. The public is also concerned that computers can facilitate the propagation of errors in medical records at lightning speed[10]. Notwithstanding these difficulties, the benefits that the Internet brings to doctors are substantial.

DEVELOPING AN INTERNET BASED SYSTEM FOR HEALTH CARE

The world is at the threshold of an Internet-based system for health care. Some prototype examples are already in place around the world, such as that of the University

of Pittsburgh Cancer Institute[8]. The central idea behind an Internet-based system for health care is a supra system Internet browser that allows patient record information from various healthcare providers to be displayed, so long as a computerized information system is available online and there is authorisation from both the patient and healthcare provider. This is not a problem as most healthcare providers have their in-house Management Information Systems (MIS), Electronic Data Infrastructure (EDI), Enterprise Resource Planning (ERP), or Systems Applications Products in Data Processing (SAP).

In this supra system of virtual medical records, one or more display windows can appear, each containing summary data of a patient and any other data of current interest to the healthcare professional. The data becomes a record for the next healthcare professional who examines the patient on a separate occasion. Because the data is stored in electronic form and Web-based, the next healthcare professional can have access to it and update the records easily from any part of the world[2].

This supra system approach towards a virtual patient record leaves all existing databases and applications unchanged. This is the quantum leap that the Internet brings to EMR since it is operating-system independent. Such a supra system overcomes the present constraints of operating systems and places on a single screen the information that is needed for a timely decision. The sources of information can be hospitals, laboratories, or clinics. In principle, data from existing industrial and legacy systems can also be integrated without modification[2].

The complete Internet based healthcare system has five other components besides the supra system Internet web-based browser described. They are:

- EMR System which stores the data of the healthcare provider, visible via an Internet based browser if proper authorisation is in place;
- Medical Logistics, which comprises of e-Billing, e-Procurement, and supply chain management that reduces the effort of the healthcare provider;
- Executive Information System (EIS) which generates reports on performance indicators, health trends, Casemix, finance, and data- mining.
- Gateway to knowledge databases, telemedicine and patient-care enhancing tools that the healthcare provider can use for healthcare related applications.
- Healthcare related applications such as telemedicine communications, patient-care records systems, full-text knowledge databases, patient education programs, computer aided diagnosis and management programs.

THE HUMAN FACTOR

A recent article appeared in the Singapore Business Times that Singapore is currently the most wired-up country in Asia[3]. Yet in spite of this, not many of our local doctors have incorporated the Internet as part of their local practice. This may appear surprising as the Singapore Government has been investing millions of dollars in information infrastructure.

Several factors may stand in the way. They include doctors' general reluctance to adopt new computer technologies because many have failed in the past, lack of programs, courses and seminars to promote widespread usage, and lack of infrastructure support services. Most importantly, doctors must be able to see the need for the embracing of such new technology - be it clinically or financially - before they may do so.

MEETING THE HEALTHCARE DELIVERY PARADIGM SHIFT

To meet the healthcare delivery paradigm shift, the profession will need leadership initiative from both the Ministry and the medical organisations. A medical organisation such as the SMA can play the crucial role of helping doctors deal with the changes in healthcare delivery brought on by the Internet. SMA should also go beyond this to help doctors exploit the Internet, which is a global network of resources and communication channels.

The Internet is fast becoming a medium where e-commerce on medical supplies, drugs and equipment and learning material can be conducted. Today, the doctor does not need to go to the bookshop to buy his reading materials. He may not need or needs to go to the library less often because full-text articles and journals are beginning to be available online, either free or at a small subscription.

Doctors can meet on the Internet and communicate with one another over Email, Bulletin Boards, and Chat Rooms. Over time, virtual communities may be formed to facilitate the meeting of like-minded doctors who share a common passion be it professionally, e.g. a community of hand surgeons or recreationally, e.g. a community of golfers, scuba divers, or stamp collectors. The Internet can encourage more discussion and foster a closer medical fraternity.

eHEALTH STRATEGY

To meet the healthcare delivery paradigm shift, an eHealth strategy from an organisation like the SMA is needed to look into the following tasks[9]:

- Establish an online presence to provide services to its members as well as the public;
- Develop an information strategy that helps doctors

and the public identify good medical and health resources on the Internet. This can be achieved via links with reputable websites;

- Develop content independently or conjointly with other information providers to help doctors keep abreast of the latest, e.g. full-text reading materials, case studies with answers and various learning tools;
- Develop content independently or conjointly with other information providers to help the public understand more about how to care for themselves and use health services optimally.
- Create an online community so that doctors can interact freely with one another.

Both the MOH and SMA have taken steps to meet the healthcare delivery paradigm shift. There is now an SMA website with a new look. Implementation of many of the tasks listed above has commenced. The SMA website is accessible at "www.sma.org.sg".

Please refer to pages 447-450 for the new SMA website – A to Z Guide.

CONCLUSION

The Internet is an extremely powerful innovation that has and will continue to shape the healthcare industry in the years to come. Albeit a little too slowly, doctors are starting to catch onto this new wave of digital empowerment and creating niches that will enhance their ability to care for their patients and ultimately add value to their practices. The challenge now is to make it easy for every doctor to come on board.

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