

The Value of Health Information Exchange: Connecting Communities

The technological world has been improving at such an incredibly fast rate that many fields are lagging behind and not reaping the benefits. The health care industry is one such field. Health information exchange aims to unify nationally and internationally the storage and distribution of critical patient health information. In a dynamically changing and growing world, people are traveling internationally more now than ever before, but their health information stays at home. This can lead to some troubling circumstances.

As an overview of how technology has changed information exchange on a social and business level, some statistics will be presented. As of 2000, 34% of the U.S. population and 50% of Western Europe used cell phones (Scientific American, October 2000). In a 2003 ILA report, it was predicted that 1.6 billion people will actively own and use cell phones by 2005. There are mobile devices that translate from any language to any other language. These can be used to set up and run international meetings. This is true even without the idea of desktop or laptop computers, linking people all over the world through email and instant-messaging services. Live conferences are held in the business world across different continents. Technology is now reaching the point where translations can be made on the fly (Ubuntu Love Day 2005). This was demonstrated as an open source product (free for everyone to use) at a conference in Montreal.

Health information exchange can take advantage of all the new technology in a very productive and successful way. Indianapolis, Indiana is already ahead in this respect. Hospitals are now set up with an online registry of medical records of over 1.5 million patients (Gearon, Safety Net). The usefulness of this type of system may not be so obvious, especially to a doctor who feels that the current system is adequate and learning a new one is a daunting task. It is easier to visualize a few cases to get a clearer image of the usefulness of this system.

People travel for various reasons and are equally likely to need medical attention when they are away and when they are home. Consider a man on an international business trip. Suppose that he was not on medicines, but a problem came up. He could be having an allergic reaction to a foreign food that he did not realize he was allergic to. Maybe he could even talk, but the doctors do not understand the language he is speaking. How long would it take to find a translator? Would there be a mistake in any actions taken by the doctor? These are questions that must be asked.

Suppose that a man were taking a lot of medicines for some reason, say an organ transplant of some kind. Now suppose that he was on a national business trip where no one knew him well enough to dictate to a doctor the medicines that he is on. If he were to have some kind of reaction that rendered him unconscious, serious mistakes could occur. This would not be anyone's fault. It is just a situation that can occur.

Now, suppose a database system were set up nationally, containing healthcare information on all citizens. The details of such a system will be sketched out in a later section. The same man would be in a much better situation if the doctor could call up a medical record of his unknown patient. The

doctor would then know the drugs his patient is on, what he can and cannot do, and even possibly exactly what is wrong without much examination. He will know all of this without needing to speak a word to his patient. What if this were an international system? Think about the first case and how efficiently things could occur at the hospital if the doctor got all of this foreign patient's important medical information in his own language.

Such a system would connect the doctors of the nation, and eventually the world. Communication would be instantaneous and easy. All doctors would be on the same side helping people rather than accidentally working against each other. The world would be connected in a way that it is not as of this moment.

The national database system is not an unreachable ideal. It is feasible. From a technical perspective, there are many problems with using a single national database. Currently, the Indiana system is set up on a central computer that handles all of the load (McDonald, Overhage...). The centralized approach works on a small scale, but at the national level, things will most likely break down. This is not how it has to work at all. Anyone that would be eligible to be entered into this system would already have a social security number. This is unique and identifying. The first three numbers of anyone's social security number identify an area in which they are from. When a doctor puts a patient's number into the computer, it knows exactly what database to go to. Breaking the national database into a web of numerous computers will make searching and sorting (very difficult computer science problems) much easier. The number of patients that the computer will have to look through will be a small fraction of all the patients on the national system. This does not create an issue for people living in different areas. A doctor will be using his own computer to input (or receive) the information, so distance to the server is not an issue. The location of the actual database (server) will be of no consequence to anyone. It is merely the method of how to make the system efficient. One issue is that many people do not like the idea of using SSNs for public uses like this (*A Sample...* and Mulligan). Later, it can be seen that this setup still works without the use of SSNs.

Security is the number one issue that comes to mind when talking about large amounts of important information being transferred over the internet. One can imagine the security issues that arise from using an ATM and examine how those machines deal with such crucial data transfer. Many use something called a leased-line which has a very high thru-put because it is directly connected to the host computer. Such a system can be thought of as a separate entity from the internet. This is one way of implementing a connection between a client and host, but it may not always be practical as it is much more expensive and dedicated. Of course the data will be encrypted with or without the dedicated line. In order to maximize security and make the system easy to use at the same time, smart cards can be used. They are already very popular in Europe for banking and insurance purposes. This is a card that has a microprocessor in it that talks to the host computer directly. The user does not need to memorize PIN numbers (*What is a...*). It is much more difficult to have a smart card stolen without the owner realizing it than it would be to have a four digit number stolen. Simple put, anyone can memorize a four digit number without indicating that they have done so. If the smart card is stolen, then the owner can not do anything, making it apparent that someone else has it. An added security feature

could be that the doctor has permission to view all of the data and write new information to the patient's files, but the owner of the card only has access to view their files and no write abilities. The patient would need an extra password in this setup. This way a stolen card would be nearly useless to the thief, and only temporarily annoying to the actual owner. As recommended by (Mulligan) the card holder would need some way to suggest that there is incorrect information that needs to be changed.

Another common security issue is what would happen if the host computer were to be compromised by someone. This could be mostly avoided if they had their own dedicated lines even though it would be the most expensive option. An option like this would allow the fastest information exchange, maximum (although not perfect) security, and most reliable service. Without the dedicated line, if someone were to access the computer in a malicious way, the data would be encrypted and it would be a very small segment of the entire health care system. The attack would have to be extremely focused and well-informed to get at a specific person. If it were not a targeted attack but just an attempt to invalidate the data, backups could be made very regularly (as would be advised with such important data). As of this moment, there are security systems implemented directly into the operating system (of Linux) that detects whether something was changed and what it was. This can lead to extremely fast detection and fixes to the invalidated data (these are called ACLs and LIDS -- see Turnbull).

The next issue is how to start implementing this vast system. A rolling change would be the smoothest. People sign up for it as an option immediately where it is implemented, meanwhile hospitals and ERs begin implementing the technology as they can. Cards can be issued as people sign up, but there may be a better way. There is already talk of getting a national ID card, and it would be useful if at the same time the ID card is implemented that this system is incorporated directly in with it. There would not need to be two separate initiatives or cards. More realistically and in a way that would be less upsetting to the general population, insurance companies could fund the distribution of cards to their clients. There is a great deal of motivation behind an action like this. People on this system are, in general, going to be at a lot less risk of something going wrong. In addition to getting people involved, there is the issue of how data will be saved and formatted. There is currently an international standard for saving data on computer systems called Unicode. This is used for storing any type of language or characters. Technology has reached a point where it is feasible and would be most beneficial to have health information exchange be an international matter. A standard would have to be agreed upon so that other doctors could easily understand what another one meant. This is something that must be discussed by a committee or group of professionals (see HHS to view the current purposed standards).

There is and will continue to be resistance to making these purposed changes that cannot be ignored. Doctors, for one, are on the whole not trained to work with computers and new technology. They have a system that works for them and do not want to switch over to a national (or international) standard. These are perfectly legitimate reasons. So one solution would be to start training doctors that are in college to use the new system. If it is taught right

from the start, then there will not be an awkward unproductive shift between systems. It will just take some time before the nation merges to the new system, but it will also take some time for the patients to change as well. This is a reasonable assumption and should be taken into consideration while trying to implement it. Also, there are inherent flaws in technology. Sometimes systems go down or unexpected things happen. Although this is not something that should just be ignored, it will be a long time before the effects would be very bad. Doctors manage now without the system, so they can manage for an hour or so without it. It was previously discussed how methods of intentional data corruption could be handled.

The national implementation of central health information databases has been discussed in some detail now, but the international idea still remains somewhat vague. It can be seen that this system would connect international communities in a way that could not have been thought of before. The storage of a patient's critical health data in Unicode can allow a foreign doctor to view quick translations into his/her native language. Suddenly people with severe conditions will be able to travel internationally without fear of being in jeopardy.

There are many hidden benefits to moving to this system as well. If all the hospitals in the world were to not have paperwork being shuffled around, the efficiency of health care would skyrocket. Data transfer would be instantaneous and typing is faster than handwriting. Prescriptions could be sent straight from the doctor's office to a pharmacy of choice. With this system, refills for prescriptions could be just a few clicks on the internet. Health Information Technology is predicted to lower health care costs by up to 20% per year (see HHS).

Health information exchange improves the quality and efficiency of health care. It allows communities of doctors to be in touch at the most critical moments in care. The technology brings people together by allowing them to travel without the fear of avoidable mistakes or miscommunication in the case of an emergency. If the health care industry could use modern technology to its fullest potential in exchanging information, then a long anticipated international community is just around the corner.

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