Digitizing the Healthcare Delivery System

"In a digital healthcare system, providers can have the information they need right at the point of care. Computer algorithms can catch mistakes and prompt to ensure consideration of latest scientific developments. Public health officials can be alerted nearly immediately of unusual patterns that might indicate a natural or bioterror infectious outbreak, or to catch the next Vioxx® before tens of thousands are put at risk. Researchers would have vast new databases to learn more about what works."

Congressman Patrick Kennedy

Information Saves Lives

For patients of Dr. Evan Zahn, immediate access to personal medical records can mean the difference between life and death. That is why, in 1995, he and his colleagues decided to "go digital."

"We make decisions [based on images]," said Dr. Zahn, a pediatric cardiologist in Miami, Florida. "We realized that there was virtually no information-sharing among members of our discipline. We were still running, looking for lab slips, and if I wanted to see an x-ray I had to go find it in its envelope. The kids we deal with are for the most part critically ill—we deal with little babies with very bad heart disease—and we needed detailed information quicker than that. Often when people relay things verbally, the details are left out. We needed a free exchange of information."

Today, Dr. Zahn and his colleagues can instantly share digital images of their patients' hearts and other medical data with other doctors around the state. They use the system before, after, and even during surgery.

"When I want to know something about the inside of the heart that I can't see, and the child's on bypass, and time is critical, the computer is in the operating

"But I don't know that I would have proceeded with it without a second opinion. That's one of about a million examples I can give you. We rely on this type of image-sharing and information-sharing all the time. We share data about the patients, and not just images.

"I can look at all those things, including digital images of their operation as it is occurring. For every kid that comes in here, I know exactly who he or she is, exactly what he or she had done, I have pictures of everything, and I can talk to their physician and make a logical decision about what needs to be done. They don't have to rely on me being able to fax a piece of paper, or the parent's recollection. They just go in and they look at the whole hospitalization, everything you can think of—labs, progress notes, admission notes, operative notes, catheterization pictures, echocardiogram pictures—everything you would want to take care of a child with heart disease.

"I think it will go down as one of those things that we can't believe we ever lived without."

Dr. Evan Zahn,
Pediatric Cardiologist

"Take a child with complicated heart disease. I get called to the emergency room to evaluate them. All their heart surgery was done eight miles away at another institution, but I can't get any information from them: nobody knows what I'm talking about; it's 11 o'clock at night. Without the information, their heart is a black box to me. It's a terrible way to treat patients.

"I understand people's fear of this, and the privacy issue. But I think we'll look back on this period in 20 years and not be able to imagine it having been any other way.

"The value that our society and individuals will get from the ability of having their medical information viewed at multiple sites by multiple healthcare providers who are trying to help them is going to so far, far outweigh any problems, that I think it will go down as one of those things that we can't believe we ever lived without."[1]

[1] Evan Zahn. Commission on Systemic Interoperability staff interview. July 2005.

In fact, benefits to healthcare providers fall into four categories:

- Quality of care;
- Administrative efficiencies;
- Patient communication; and
- Public health and security.

Quality of care

- **Enhanced doctor-to-doctor communication.** With an interoperable system of healthcare, physicians can instantly share test results with other doctors, healthcare providers, labs, pharmacies, and clinics. The system will also allow doctors to highlight particular parts of the record and "point" or "link" that information to other parts of the patient record—in practice, any physician authorized by the patient will be able to look at a patient's chart with another physician who is far away. This will naturally streamline the process of consultation and improve healthcare delivery.

- **Available in any geographic location.** Physicians and other healthcare providers will be able to review the complete medical history of a patient, regardless of the location of either the patient or the provider. An individual on vacation on the West Coast who lives on the East Coast could go to any doctor and have their information available instantly. At each visit, healthcare providers add to the record, so no matter where and when the record is examined, it will be up-to-date.

- **Available in any treatment setting.** Access to medical histories will be available in any treatment environment: in an emergency room, in an exam room, in locations around a hospital, in a doctor's home or office, in public and private clinics—anywhere an Internet connection is available.

"In medicine, seconds can mean the difference between life and death. If you have a heart attack tonight and are rushed to the hospital, your life depends on timely access to accurate and current information. That's why it makes no sense that today's healthcare is not advancing in the Information Age; it's stuck in the Stone Age."

Senate Majority Leader Bill Frist

Doctors and their staffs deserve to have their concerns addressed with clear and simply stated information about benefits, potential delays, and realistic timetables. The more quantitative data available to make the case—in terms of saved money and especially increased time made available to care for patients—the more likely providers will support the switchover to an interoperable electronic healthcare system.

Financial barriers

Even for early adopters, the shift to a connected system will be an evolutionary process that will require updates, replacements, and changes in software, hardware, and procedures as standards and practices are refined. This alone is a discouraging truth, and it is compounded by the fact that healthcare providers face competing capital demands and have relatively limited resources. Financial incentives should be considered in various forms.

> "By creating national interoperability standards, we will give healthcare providers the confidence that an investment in health IT is an investment in the future."
>
> **Senator Hillary Rodham Clinton**

Good news: much of the technology already exists

The necessary technology already exists and in some places is already in use. *The Washington Post* described the daily use of a system in a recent story:

> At 9 a.m., Dr. Julio Panza begins his rounds at [a] coronary care unit…. Residents and fellows review the status of the 14 patients in the unit. Panza takes notes and records his diagnoses and orders with a pen, as doctors have for centuries.
>
> Discussion turns to one particularly vexing case, a patient admitted the previous afternoon with chest pains. Panza turns to a computer screen and calls up the patient's lab results, which have been transmitted by lab machines. Another click and he can see what medicines have been dispensed from the unit's automated medicine cabinet. Yet another click and the group watches a video of what happened the day before as doctors threaded a thin wire through the patient's arteries and installed three tiny stents to keep the passageways open. Panza clicks again to find details of previous hospital visits and learns that the patient was a heavy smoker and a diabetic.

> What the folks at the [facility] have discovered is that most of the makings of an electronic medical record are already available in digital form at most hospitals. By investing a relatively small amount of time and money, they've collected it all in one database and designed an easy-to-use interface that allows nurses, doctors, medical researchers, and finance staff to organize it in almost any way they want.[31]

Conversion

The transition from a paper-based system to an electronic interoperable system will require changes in the way physicians and their staffs work. Procedures that are now carried out on paper will have to be translated and modified to fit the electronic system—although the expectation is that these new procedures will be faster and simpler. Conversion will therefore require physician and employee training. It will also require the establishment and adoption of standard terminology—that is, a common language for the description and exchange of data.

While efficiency will drastically improve simply by automating much of what is painstakingly done by hand now, the full benefits of interoperability will not be realized if workflow patterns do not change with the introduction of technology.

Implementing Interoperability Must Be Made as Simple as Possible

The new procedures and systems that make interoperability possible must be straightforward in their adoption, transparent in their influence and benefit, and in line with the priorities of the business of being a healthcare provider. The new procedures and systems should also require as little adjustment in practice as possible. The concerns of healthcare providers should be respected as they are given the opportunity to adopt more efficient and resource-saving systems into their daily practice.

Certification

Healthcare accounts for nearly 16 percent of the U.S. economy,[32] and as the industry embraces information technology, more and more vendors will compete to sell their products to doctors, hospitals, and clinics.

Given the complexity of the systems and the myriad choices that will be available, few if any people will be equipped to both practice medicine and study these systems well enough to make a completely informed decision best suited to their circumstances.

American Health Information Community

On June 6, 2005, Department of Health and Human Services Secretary Mike Leavitt announced the creation of the American Health Information Community (AHIC) that will serve as a standards and policy advisory board for the healthcare industry. It will focus on accelerating the work necessary to reach widespread implementation of health data standards.[33]

[31] Steven Pearlstein. "Innovation Comes From Within." *The Washington Post*, March 4, 2005.
[32] Statement of Mike Leavitt, Secretary of Department of Health and Human Services, before the Committee on the Budget, United States Senate, July 20, 2005.
[33] Office of the National Coordinator for Health Information Technology, Department of Health and Human Services. "American Health Information Community (the Community)." August 2005. <http://www.os.dhhs.gov/healthit/ahic.html >

Standard Product Identifiers and Vocabulary. The standards and vendor products that enable the U.S. system of interoperable healthcare information must support these functions:

- Physician access to patient information, including past diagnoses and treatment, lab results, prescriptions, MRI results, and x-rays;
- Access among providers in multiple care settings;
- Systems that allow doctors to order medications and tests for patients in the hospital;
- Computerized decision-support systems, including best practices;
- Tracking for compliance to support study and revision of best-practice definitions;
- Secure electronic communication among providers and patients;
- Automated administration processes, such as scheduling;
- Automated filing of insurance claims;
- Patient access to health records, disease management tools, and health information resources; and
- Data storage and reporting for patient safety and public-health monitoring efforts.

Infrastructure Issue: Broadband Internet Access

Interoperability will require nationwide broadband connectivity—high-speed access to the Internet-among healthcare providers. This is because access to data for more than a trivial number of patients will call for significant bandwidth—the ability to accommodate many requests for large data files. Dial-up connections will be too slow to meet provider needs. (Patients, however, may be able to rely on dial-up, since they may only rarely need the bandwidth-driven ability to view detailed images and streaming audio or video.)

The level of broadband adoption has surged in the last few years. A study by the Department of Commerce shows that the number of Americans with high-speed Internet connections doubled from 2001 to 2003. Another study by the Pew Project shows a 60 percent increase between March 2003 and March 2004.[34] However, many rural areas have no broadband access and it will be an essential ingredient in fostering the development of health information technology in already underserved areas.

President Bush set a goal for universal affordable access to broadband technology by 2007. He said, "My Administration has long recognized the economic vitality that can result from broadband deployment and is working to create an environment to foster broadband deployment. All Americans should have affordable access to broadband technology by the year 2007."[35]

Federal, State, and private programs to promote the expansion of broadband may resolve this problem well before a connected healthcare system is fully deployed.

Federal preemption

Today, States can—and do—create laws that differ substantially from each other on privacy, security, and the handling of personal information.[36] In this environment, it is not possible to create a single set of procedures and systems that satisfies the regulations and statutes of all States.

This means that two physicians authorized by a patient to share information may not be able to legally do so simply because they are located in different States. Therefore, Federal jurisdiction should be superior to State jurisdiction in matters of medical privacy related to healthcare interoperability.

Legacy systems

"Legacy" systems (usually electronic medical record systems with limited interoperability capabilities) are those systems implemented prior to the introduction of common national standards. These are the healthcare systems in use today.

[34] John Horrigan. "Pew Internet Project Data Memo." Pew Internet & American Life Project. April 2004.
[35] White House. "Broadband Rights-of-Way Memorandum." Memo to the heads of executive departments and agencies, April 26, 2004.
[36] Stephen A. Stuart. *HIPAA/State Law Preemption Fact Sheet.* State of California Office of HIPAA Implementation, January 9, 2003.

Confidentiality

"We need a better way to share information. We need a better system so that physicians have at their fingertips all the information they need to do their job—including patient history, the latest research, drug interactions, and everything else they need…. Information, in the hands of the right people, at the right time, drives quality and value. We need to empower patients and healthcare providers to make the right choices. And to do that, healthcare decision-makers—providers, payers, and patients—need to have access to the right information, where and when it is needed, securely and privately."

Senator Hillary Rodham Clinton

Patient consent

Before the interoperable system goes on-line, the rules on consent must be clear. Privacy and security policies should be considered as a part of design, not as an afterthought, and should be based on current law.[37] Legislation and regulation should be regularly considered to reevaluate emerging technologies and capabilities. Policies must be widely agreed to by patients and practitioners alike on the terms and conditions for access to and dissemination of patient data.

The structure and rules of health information networks must support the exercise of patient rights under Federal privacy regulations. Although State privacy rules vary, Federal jurisdiction should be superior to State jurisdiction in matters of medical privacy related to connectivity. Health activities that are not directly covered by the Health Insurance Portability and Accountability Act (HIPAA) need to be associated with this or other privacy rules, by either regulation or statute.

[37] Some laws, such as the Health Information Portability and Accountability Act of 1996 (HIPAA) (Public Law 104-191), may need revision in light of the benefits and concerns that arise under an electronic and interoperable system.

enacted with stiff criminal sanctions against individuals who purposefully access protected data without authorization. There should also be clear and comprehensive safeguards to protect anyone whose personal data was improperly accessed or released.

Patient Authentication

Creating a unique number would be the most direct way to establish a patient's identity and this approach is used throughout Europe. However, no approach to personal authentication in computer systems is free of financial costs, management issues, and privacy concerns. A direct approach would involve an administrative infrastructure that may be unacceptable to some at this time for a variety of reasons, including privacy concerns.

This approach could be modified to allow individuals to opt out of the uniform patient identifier. This compromise would let the nation provide a system benefiting individuals who recognize that their need for connected health information exceeds their privacy concerns, while not penalizing those who find privacy more valuable. However, such a compromise would sharply reduce the administrative savings because the system would have to accommodate both sets of individuals. It would also present new liability challenges, specifically involving the potential liability of providers who lacked information in the treatment of a consumer whose information was not available.

An alternative to creating unique personal identification for everyone is to define a national standard set of authenticating information required to receive healthcare. This set of data could be captured when an individual first enters the healthcare system. Such information could include a set of data such as date of birth, school, employment, and insurance policy number.

Individual Access

Medical records should be like money in a bank account: the money belongs to you, while the task of accounting belongs to the bank. By further allowing patients to add comments to specific areas within the record, they can take a proactive role in maintaining their health record while the information remains clear to the healthcare provider.