Health Care Information Technology: A Key to Quality and Cost Issues
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Introduction

Health care information technology and systems are now major topics for health care reform, but were rarely mentioned in the early 1990s. Almost $20 billion was allocated in the economic stimulus package for these systems.

Paper medical records still dominate most medical practices. A national survey estimates only 4 percent of physicians have fully functional electronic health records (EHRs) with an additional 13 percent having some basic EHR. However, the Robert Wood Johnson Foundation (RWJF) estimates that in 2005, between 17 and 24 percent of physicians in ambulatory care settings were using EHRs to some extent. In 2008, the RWJF reported that adoption of EHRs was more common among primary care physicians, physicians in large practices, and younger physicians. Further, it was reported that a significant proportion of physicians had purchased, but not yet implemented, electronic health systems or were planning to purchase them within the next two years.

Paper records have several basic problems, all of which limit sharing, analysis and evaluation among medical professionals:

- they are incomplete and reflect treatment only by a specific physician or organization;
- they are not uniform;
- they are isolated (i.e., not easily shared); and
- they are inert (i.e., they can only be read, not processed interactively by other health care applications).

These limitations make it difficult to effectively coordinate a patient’s care across multiple organizations. In effect, patients are the mechanism for sharing their health information. Notice the drug ads that list everything you should tell your doctor because he/she doesn’t have shared access to all of your medical records.

Current adoption of electronic health systems is relatively low and progressing slowly. The exceptions are usually large, integrated delivery systems such as Kaiser Permanente, the Mayo Clinic and some large teaching hospitals. A 2006 RWJF study indicated that fewer than 10 percent of doctors use either a full or a basic system of electronic medical or health records, and as few as 5 percent of hospitals use computerized physician order entry systems.

A full EHR must support four functions:

- collection of patient health information and data
results management
order entry management
clinical decision support

A basic system may provide only the first function. The Congressional Budget Office report\(^6\) identifies seven different types of health information systems. These concepts include:

- electronic medical record
- electronic health record
- personal health record
- payer-based health record
- computerized physician order entry
- clinical decision support
- E-prescribing

**Some definitions:**

- Electronic medical records (EMR) – the electronic equivalent of a patient’s paper record
- Electronic health records (EHR) – a more complete record that includes all of a patient’s information across multiple health care organizations (this term is becoming the general term for all forms of electronic patient records)
- Personal health records (PHR) - a variation being considered and would be maintained and controlled by the patient (or by a third party such as Microsoft or another vendor) rather than a health care organization
- Payer-based health record – this is the electronic patient information maintained by the payers (e.g. insurance companies) and primarily includes procedure, cost, and payment information
- Computerized Physician Order Entry (CPOE) - systems that allow physicians to order procedures electronically
- Clinical Decision Support Systems – based on guidelines and research, these systems can suggest possible diagnoses and treatments that the physician can consider
- Electronic pharmacy systems (EPS) – systems that allow physicians to electronically enter prescriptions, which can then be checked for drug interactions

Another important concept is interoperability, which refers to a standard process by which different health information systems can communicate with each other, so that a physician in one health care organization can access a patient’s information even if the patient normally uses a different health care organization.

This paper addresses the following questions:

- What are health information systems and what types are there?
Why are they not being adopted more quickly?
What are the benefits of health information systems?

What is a health information system and what types are there?

Health information systems store and process information about patients’ health care delivery. The most widely available and used systems today are for checking eligibility and billing for insurance and government programs. However, these are not clinical support systems and are not used to track and evaluate care. They only track procedures and costs.

Health information systems support, track and evaluate the delivery of health care. The basic system on which everything is built is the EMR. Like today’s medical record, it includes the patient’s history, diagnoses, tests that were ordered and test results, prescriptions, physician’s comments, and, in the most complete form, x-rays and other medical images. However, unlike today’s paper records, EMRs can be easily shared and analyzed. In their simplest form, they are limited to a single organization. The term EHR was originally used to specify all of the patient’s health information across multiple health care organizations, but now it is often used interchangeably with EMR.

The PHR is an attempt to get around the slow adoption of electronic patient records by health care organizations and allow patients to directly access their own data. It has the patient (or usually a third party chosen by the patient) create and maintain his/her health information. One potential problem with PHRs is data quality. A second problem is privacy. Most, if not all, of the third party system providers are not the type of entities covered by the Health Insurance Portability and Accountability Act (HIPAA). Covered entities include health plans, health care providers, and health care clearinghouses, so HIPAA regulations do not cover PHRs for how they use and protect these records. However, Kaiser Permanente accomplishes the same objective (allowing patients’ access to their health information) by simply giving patients limited access to their own records in Kaiser’s EHR system.

Given the difficulty of having a single, physical EHR spanning multiple health care organizations, interoperability and regional health information networks are ways to allow health care organizations to share EMRs/EHRs when needed. These networks are subject to appropriate privacy and security considerations. They also facilitate sharing patient information when needed. For privacy and security, all of these systems would have sophisticated access controls, such as passwords, digital signatures, encryption and audit trails to track who accessed the records and when.

More sophisticated EHR systems allow and support additional clinical support applications. These systems are especially important for hospitals and large integrated delivery organizations. Between 4 and 24 percent of hospitals have adopted CPOE systems, but it is estimated that possibly as few as 5 percent have fully functioning CPOE systems.
An EPS can automatically check for drug interactions with the other medications the patient is taking, and for dosage guidelines. These systems would also eliminate the confusion and errors caused by illegible prescriptions.

Clinical Decision Support Systems can make suggestions and alert the physician to new research or guidelines for care. Health information system advocates are not suggesting that these systems take over care, or make decisions, for the physicians. These systems are enablers that can help improve the clinical decision process. However, without the data from an EHR, these advanced applications are impossible or useless.

**Why the Slow Adoption of Health Information Systems?**

While many large integrated health care delivery organizations have developed and are currently using their own systems, commercial systems now exist for EMRs and some of the other applications. The existence of commercial, off-the-shelf systems, some of which meet government certification standards, reduces their costs of implementation and use for many providers and organizations. Although the government is encouraging the use of these systems and providing incentives for their adoption and use by health care providers and organizations, their adoption is still slow. Many people resist changing from comfortable, familiar processes and procedures to learning new ways of doing things.

A new generation of physicians trained in medical schools and teaching hospitals that often use these health information systems and highly value their impacts on quality will likely increase use of this new technology.

Another aspect of the slow adoption of health information systems involves cost/benefit analysis. First, these systems are new, and combined with their slow adoption, there are relatively few rigorous cost/benefit analyses. Given this slow adoption, the few studies seem to show relatively small effects from health information systems. However, most of these studies are still limited in scope. It seems logical that more and better information should improve clinical decisions and health quality.

Second, in many cases, the providers who must pay for these systems are often not the ones who benefit from them. If a health care delivery organization puts in a system that makes it easy to share health information and therefore helps them to eliminate unnecessary and redundant lab tests, they lose the revenue from tests not conducted. The patient does not see an economic benefit, assuming the tests are paid for by insurance. The insurance company, which did not pay for the system, does see a benefit, since it pays for fewer tests. However, the overall health care delivery system does not see a benefit, unless the insurance rates go down the next year, based on greater delivery efficiency. This part of the problem also reflects that health care delivery is organized into isolated, independent smokestacks, or entities, which mean costs and benefits frequently go to different organizations.
A third issue is whether health information systems will be adopted differently by different groups and result in further differences in health care quality for different populations. Although cost is a major barrier in adopting these systems, so far there is little evidence that those serving poor, minority and underserved populations are less likely to acquire and use these systems. Of the approximately 1000 community health centers, about 8.6 percent have fully functioning EHR systems with another 15.9 percent reporting at least a basic system.

What are the Benefits of Health Information Systems?

Health information can easily be shared by multiple providers. This is especially important for patients with multiple chronic conditions who are seeing multiple specialists, who often do not know what the others are doing and prescribing.

Health information systems can automatically check for potential adverse drug interactions, recommended dosage guidelines and specific patient drug allergies when the prescription is written. This is important because adverse drug events (ADEs) are the most common cause of medical errors in hospitalized patients and can add 20 percent to the cost of the hospital stay. Additionally, emergency rooms treat 700,000 patients each year for ADEs.

When orders are written, CPOE systems can check them for compliance with recommended guidelines, make suggestions based on the latest research findings, and, when combined with outcomes data, can analyze which procedures are most effective.

Finally, computerized analysis of medical images can allow more sophisticated analyses and result in better diagnoses. When combined with telemedicine, it allows diagnoses and treatment plans to be developed by specialists who are often not available locally, especially in rural and underserved areas.

References

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