REVIEW

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Electronic health records: A primer for practicing physicians

ABSTRACT

Electronic health records (EHRs) offer a number of advantages over the old paper record. They have the potential to improve the quality of patient care, reduce the cost of health care, and expedite the transfer of information. Yet fewer than 20% of hospitals and physician practices now use them. We discuss the advantages of EHRs, reasons for adopting this system, current barriers to the adoption of EHRs, and issues to consider when choosing a system.

KEY POINTS

Practices adopting EHRs need to consider how to keep backup copies of their online clinical data, and how to prevent improper disclosure of the data.

EHRs offer a number of desirable features, such as electronic prescribing, clinical decision support, legible documentation that is available to multiple users from multiple locations, and easier processing of correspondence to patients and referring physicians.

EHRs can simplify the documentation of services and improve compliance with coding requirements.

ELECTRONIC HEALTH RECORDS (EHRS)—also sometimes referred to as electronic medical records or computer-based patient records—have potential to improve the quality of patient care, reduce the cost of health care, and expedite the transfer of information. Use of EHRs can also simplify documentation of services and improve compliance with coding requirements.

While some hospitals and practices have already adopted EHRs, rates of adoption range from 12.5% in smaller practices to 19.5% in group practices of 20 or more.[1] Clearly, many institutions and practices are slower to adopt an electronic system.

In this article, we examine the forces motivating the move to EHRs, the barriers to their adoption, and issues to consider when choosing an EHR system.

DEFINITION

Although many people use the terms "EHR" and "electronic medical record" interchangeably, professionals in medical and health care informatics commonly define the electronic medical record as the electronic record created in a hospital or ambulatory clinic, whereas the EHR is a longitudinal record—ie, it receives information from multiple sources (including electronic medical records) and "follows" the patient across different provider organizations.[2]

FORCES BEHIND GOING ELECTRONIC

Institute of Medicine reports

The Institute of Medicine over the last few years has issued three reports highlighting

problems with the current US health care system and recommending the use of technology to help solve these problems.

The first report, "To Err is Human: Building a Safer Health System,"[3] focused on medication errors, noting that two separate studies estimated that approximately 50,000 to 100,000 preventable deaths occurred each year due to inpatient medication errors.

The second report, "Crossing the Quality Chasm, a New Health System for the 21st Century,"[4] recognized a gap between the current and potential US health care system, and outlined ways to redesign the present system. These included providing patients unfettered access to their health records, use of electronic communications between clinicians and patients, sharing of information between clinicians and institutions, and making information and decision support available to clinicians so they can provide evidence-based care. The report recommended using EHRs as a way to meet the goals for redesigning the health system.[4]

The third report, "Building a Better Delivery System: A New Engineering/Health Care Partnership,"[5] encouraged the use of clinical information technologies and system engineering tools to transform the health care industry into a more efficient system.

The 'pay-for-performance' movement

The second Institute of Medicine report[4] suggested that reimbursement for hospital and physician services be tied at least in part to measures of quality improvement, and this suggestion led to the "pay-for-performance" movement. The Business Roundtable, an association of the nation's largest employers, developed a set of three measures toward the goal of recognizing and rewarding quality of health care in hospitals.

One of these measures is computerized physician order entry, a process that allows a physician to use a computer to directly enter medical orders.[6] It could improve the legibility of physician orders and reduce errors by eliminating the need to transcribe the orders to other forms, which is typically done in the hospital. It could also enable remote access to the patients' orders and clinical information. Through appropriate prompts and automation, computerized physician order entry could incorporate evidence-based medicine and guidelines into patient care and thus improve the overall quality of health care.

The pay-for-performance movement, which includes Medicare, third-party payers, and employers who pay for employees' health insurance, has gathered momentum recently and has proposed parameters for measuring the quality of health care (eg, mammography rates, rates for prescribing angiotensin-converting enzyme inhibitors in patients with congestive heart failure at the time of discharge). These outcome measures for providers and institutions would drive a portion of the reimbursement amount. The expectation is that having EHRs would help to identify patients in whom these measures are not met and would help to target efforts to improve performance in these outcome measures. In addition, computerized physician order entry—in conjunction with a clinical decision support system—can help remind physicians about these measures at the appropriate time, ie, when they are with the patient, or when they are working on a patient's chart at another time.

The National Health Information Infrastructure

More recently, the federal government has created a plan for a National Health Information Infrastructure for "sharing information and knowledge appropriately, so it is available to people when they need it to make the best possible health decisions."[7] The first key component is to increase the use of EHRs across the nation.

Using a computer to enter medical orders could improve legibility and reduce errors

WHAT DO STUDIES SHOW?

Studies have shown that using computerized physician order entry and a clinical decision support system can decrease medication errors, including those that result in harm to the patient. But while these studies have shown improvement in practitioner performance, they have not consistently shown improvement in outcomes, such as a decrease in patient deaths or adverse drug events.[8] The studies have focused instead on specific situations, such as antibiotic use in intensive care units, and not on medication use in general.

Also, most studies were done using home-

grown systems at institutions with a strong academic interest in and commitment to these systems. Many vendor-provided EHRs contain a basic clinical decision support system in the form of a drug database that automatically checks for drug interactions and drug allergies. Some EHRs provide the capability to integrate pertinent information, such as displaying laboratory data on renal function while ordering medications. Other EHRs provide a way to develop reminders and alerts to guide the busy physician in monitoring patients with chronic illnesses.[9] Still, it is difficult to generalize the results of published studies to most vendor-provided EHRs and to all clinical settings.

BARRIERS TO WIDESPREAD USE

The cost of purchasing and implementing EHRs is clearly a barrier for many practices. Initial studies on EHR costs have focused on home-grown systems. These analyses showed significant cost savings, although it was not always clear whether the full costs of each system were described.

One goal of the National Health Information Infrastructure is to increase the use of EHRs

Unfortunately, vendor-based systems may be a lot more expensive.[10] The average purchase and start-up cost for a vendor-provided EHR is approximately $32,600 per physician, with monthly maintenance costs of $1,500 per physician. Cost overruns are common, and actual costs tend to exceed the vendor's estimates by 25%.[1]

Few data exist as to the return on investment for vendor-provided EHRs. Cost savings are more likely with systems that allow improved clinical documentation and that are integrated with the billing function, so that manual entry of charge information is reduced.[1] Even the recent initiative to provide the system used by the US Department of Veterans Affairs (the Veterans Information Systems and Technology Architecture, or VistA) free of charge would require significant investment in hardware, licensing of the database, and training, and the VA system still lacks some key components of a full EHR.

In addition, implementation of EHRs requires changes in workflow and retraining for physicians and office staff. The Medical Group Management Association University of Minnesota study[1] mentions that both the government and the health care industry should recognize the phenomenal amount of process and behavior change required by the implementation of EHRs, and encourages policymakers to budget considerable time and effort for training of end users.[1]

The design of vendor-provided EHRs adds structure to the clinical process that is not always intuitive to the user. Physicians who are generally comfortable making notes in the paper chart using a pen may now need to get used to a new interface requiring a keyboard and a pointing device. Technologies such as speech recognition and "digital ink" may make computer-based technology more accessible but are not yet reliable enough and are prone to errors. The system may be difficult to learn, and the practice may be less productive while the new technology is assimilated.

Physicians need to consider other potential impacts on their practices, as discussed in the following sections.

Failing to digitize the past medical record

During the transition from a paper-based medical record to an EHR, existing medical records still need to be stored and retrieved. Apart from the efforts required to integrate the EHR into the routine work flow, this is probably the most vexing issue.

Importing existing medical records into the new EHR can be very expensive and time-consuming. The process needs to be managed effectively so that historic medical record information is accessible and retrievable once it has been transferred to digital form.

Any practice that does not completely transfer its patients' past medical data to digital format will not be able to reap all the benefits of EHRs, and will be burdened by a paper system and an electronic system.

Another related and ongoing issue is importing nonelectronic medical data such as outside laboratory or radiology reports into the EHR. Again, this process has to be managed effectively so that the outside records are accessible and retrievable.

Concerns about smaller vendors

Some less well-established vendors offer less expensive systems that may have fewer fea-

tures than more expensive systems. Such vendors also tend to have a poorer record of remaining viable in an industry in which the underlying technology can change faster than the vendor's ability to incorporate that new technology into its products. Systems that support clinical documentation and billing need to be updated regularly, for example, with codes for disease classification and current procedural terminology. EHRs need access to up-to-date drug databases in order to provide automatic checking for drug interactions. Less-established vendors may find it more challenging to keep their products current. The systems with better features and more robust product support can be significantly more expensive.

Concern about errors and difficulties

A potential problem is an increase in errors due to problems with the user interface design. There is also the possibility of systematic errors due to errors in programming or in the clinical decision support system.[11]

The transition from paper to EHR requires new skills and a healthy skepticism about how the software product works. A typical feature of EHR is electronic prescribing, yet some EHRs provide medication "pick lists" that are cumbersome to navigate. Some features support the user's definition of clinical decision support system rules but don't provide an easy process to define them, leading to rules that are triggered too often or under the wrong circumstances.

Some of the time-saving features in EHRs, such as the ability to develop documentation templates, can also result in documentation errors when the user forgets to delete the parts of the template that don't pertain to the visit. While documentation templates help in complying with coding requirements, they also can lead to "cookie-cutter" notes that may lack the richness of the physician's decision-making thought process.

Concerns about privacy

Concerns about patient privacy and security are another challenge to implementing EHRs. The Health Insurance Portability and Accountability Act of 1996 requires practices to undertake reasonable and appropriate safeguards to protect the privacy and security of health information. Practices adopting EHRs need to consider how to keep backup copies of their online clinical data, and how to prevent improper disclosure of the data.

Focusing on the machine vs the patient

How does the use of EHRs with computerized physician order entry and integrated clinical decision support affect the training of residents and students? One concern is that getting used to an EHR can detract from the learning potential of a patient encounter. A resident or medical student focused on typing an appropriate note or putting in orders may not pay as much attention to getting a good history. Recommendations made by the clinical decision support system may be taken literally and accepted, thus preventing appropriate individualization of patient care. Over-reliance on a clinical decision support system may interfere with the resident or students' normal information-seeking behavior and problem-solving ability.

HOW TO SELECT AN EHR SYSTEM

Once your practice has decided to implement an EHR system, there are several ways to improve the chances for a successful implementation.

Choose an EHR system that matches the size and volume of your practice

Make a list of features important to your practice. Features can include electronic prescribing, documentation of problems, histories, and other notes related to the patient visit, and form letters to patients and referring physicians. It is also important to identify the size and visit volume of the practice, including planned growth over the next 1 to 2 years, so that the EHR system has adequate storage capacity. Even a simple list of EHR requirements will make it easier to compare the EHR vendors' product offerings objectively.

It is also important to evaluate the vendor's approach to implementation, training, and support. Some vendors bundle these charges into the purchase price of the system, some quote a fee for implementation and training, and others offer a menu of services that the customer can select from, depending on the skill level of the practice. The practice may also want to consider obtaining additional assistance to convert patient data from paper to electronic format.

WHO HOSTS THE EHR SYSTEM?

Vendors typically follow two basic models for marketing EHRs.

The practice as the host

In the traditional model, the practice is the "host" of the system: ie, the practice has the computer workstations, printers, and a server on site and is not dependent on an Internet connection for day-to-day operations, since all patient data are maintained locally and so do not need to be transmitted over the Internet. In this model, the practice is responsible for backing up and storing the data safely. With this approach, the practice can expect to spend a large part of the expense in the initial phase of the project. This model provides the most flexibility to the practice, but it also requires more technical skill among the staff. In addition, the staff may bear the responsibility of installing software upgrades.

The service provider as the host

The other model is that in which an application service provider hosts the EHR system at a remote site and provides access to the EHR via the Internet. The only equipment required at the site of the health care provider is an appropriate computer with reliable broadband Internet access and a Web browser (eg, Internet Explorer). EHRs are thus accessible from any location, including home, as long as the Internet connection is adequate.

This model is completely dependent on having an appropriate Internet connection. Software upgrades, data storage costs, and other costs are bundled into a periodic payment that spreads out the expenses without a large initial investment. The provider, not the staff, is responsible for installing the upgrades.

Other considerations

If you are thinking about adopting an EHR system, evaluate the vendor's approach to managing the privacy and security of the data hosted outside the practice. Also, ask about the vendor's approach to product updates: some vendors provide them free of charge.

Further discussion about the advantages and disadvantages of these systems is beyond the scope of this article. Also, given the continual changes in the marketplace and in health information technology, it is best to consider this when you get close to making the decision. ■

Evaluate the vendor's privacy and security policies for data hosted outside the practice

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