Unintended Consequences: Identifying and Mitigating Unanticipated Issues in EHR Use

By Genna Rollins

A federal guide alerts users to unanticipated and undesired effects of EHR use and offers approaches to avoiding and remedying them.

Electronic health records hold the promise of better care coordination, improved patient safety, and more accurate documentation and coding; however, as anyone who either uses an EHR or has been involved in implementing one knows, the road to realizing those benefits can be fraught with barriers and unexpected twists and turns. In recognition of the challenges associated with using EHRs, the Agency for Healthcare Research and Quality (AHRQ) funded research into the unintended consequences of EHRs and published a guide on avoiding them.

Developed by researchers at RAND Corporation in cooperation with Kaiser Permanente of Colorado and the AHIMA Foundation, the guide is designed to help organizations anticipate, avoid, and address problems that can occur when implementing or using an EHR. Based on research literature, practical guides for EHR implementation and use, and input from individuals and institutions that have implemented EHRs-including about 200 AHIMA members-the guide is a compilation of known best practices, according to one of the authors and principal investigators, Ross Koppel, PhD, a professor of sociology at the University of Pennsylvania.

"There was a desire by AHRQ to have something that would help people identify, predict, and alleviate unintended consequences of EHRs," Koppel says. "The systems are expensive and implementations arduous, and that was the impetus to produce this guide-to help organizations be more successful and realize all the potential of their technologies."

What Are Unintended Consequences?

The guide defines unintended consequences as unanticipated and undesired effects of implementing and using EHRs. Although occasionally there are unintended positive benefits, for the most part the unintended EHR-related consequences negatively impact the work place. Some of the most common unintended consequences include increased work for clinicians, unfavorable workflow changes, ongoing demands for system changes, and conflicts between electronic and paper-based systems.

Unintended consequences also can result in unfavorable changes in communication patterns and practices and foster negative user emotions when physicians and other caregivers become frustrated with hard-to-use software.

In addition, unintended consequences can generate new kinds of errors and shake up the power structure in an organization; for example, certain departments can gain an edge by requiring compliance with EHR features such as clinical decision support alerts.

Finally, unintended consequences can lead to overdependence on technology that only comes to light when the system goes down. For example, physicians dependent on clinical decision support systems may have trouble recalling standard dosages or formulary recommendations.

According to Koppel, unintended consequences are ubiquitous across EHRs, regardless of the software vendor or care setting.

"They're a constant, so that to think you can avoid them altogether is like avoiding pain in life-it's impossible," he says. "Seventy percent of implementations fail. That doesn't mean they're complete failures. It could mean it takes twice as long and costs

four times more than planned, or that not all departments are up or that only some of the intended functions are implemented."

Unintended consequences, Koppel says, are a byproduct of interactions between technology and the complex healthcare environment, interactions made more challenging by the fact that EHRs are implemented in active care settings.

"Healthcare organizations have to bring up these systems while they're operating 24-7. It's like building an airplane while you're flying at 35,000 feet," he explains. "Doctors and nurses are under extraordinary pressure and want to get their work done. If the technology is in the way, they're brilliant at workarounds that get embedded, and no one even notices them. Sometimes [the workarounds are] very effective, but often they expose patients to harm and are inefficient."

If that assessment seems bleak, Koppel emphasizes that the guide offers all kinds of EHR implementation specialists, including HIM professionals, help in anticipating trouble and exploring ways to minimize the impact.

"We hope HIM staff and other IT types will review the guide in general, and if they suspect problems with their EHRs, they'll go to specific sections of the guide to find targeted advice," says Koppel. Separate sections of the guide address challenges and considerations for current EHR users as well as those planning implementations.

Case Study

The guide offers multiple case studies of known unintended consequences, raising awareness of the issues and illustrating a process and approach to resolving them. The following example describes the unintended consequences of the continued use of paper after an EHR implementation.

Paper Persistence after EHR Implementation

Issues Encountered

The Computerized Patient Record System (CPRS) is implemented throughout the Veterans Affairs medical system. A recent study indicated that clinicians in the VA system consistently use paper to work around the limitations of CPRS. Some examples of the workarounds they identified include:

An emergency department physician feels that a paper form is more efficient than CPOE. He passes his paper-based orders to the nurse, who passes them off to the clerk, who then enters the order into the computer.

A pharmacist makes handwritten notes on printouts from the EHR and then enters the handwritten data back into the system later in the day. The pharmacist said, "The hand notes help me remember. I do this for discharges and inpatients. There can be 6 to 12 discharges per day. It is not possible to make these types of notes in CPRS [in real time]. I don't know how you would do this in the computer... We need paper to do our job."

A nurse uses a notebook to track patient lab values: "I add important footnotes-anytime the [international normalized ratio] INR is too high... The primary care provider will think the INR was too high only this one time but I have the data in my notebook to show that it was too high three times."

Finding a Solution

An EHR has many advantages over the paper record, including improved legibility, remote access, and the ability to integrate across information systems. However, don't be surprised if the EHR does not replace paper use entirely. Paper use may continue to the extent that clinicians perceive that it is more efficient than using the EHR.

How to best deal with the persistence of the paper record is still an open problem. However, the VA is carefully studying when, where, and why clinical users would develop these paper-based information tools to supplement

or work around the EHR. They then use their observations to determine how the EHR applications could be altered to better suit the clinical users' work.

In some instances, paper-based solutions may be more efficient than a difficult-to-use EHR. However, these workarounds can create unanticipated risks or negate many of the benefits of having an EHR. If modifying the EHR to better suit the clinicians' work processes is not feasible, it might be most effective to develop standardized paper-based tools that can be used throughout your organization to supplement the EHR. While this solution may not be ideal, it is likely preferable to several different ad-hoc approaches floating around.

Lessons Learned

Paper-based supplementation and workarounds are very common.

Administrators should seek to find out why clinicians find paper records desirable and try to determine how the EHR could be modified to better suit clinical work so as to reduce the need for paper.

In some instances, user preference for paper may be very strong. In these circumstances, it may be preferable to use both paper and electronic systems; approved paper systems should be standardized to avoid inconsistencies across the organization.

Considerations for Current EHR Users

For organizations that have already implemented EHRs, the guide recommends a series of measures to avoid a range of adverse unintended consequences. These steps include actively involving clinicians and staff in the reassessment and ongoing quality improvement of technology solutions, using interdisciplinary brainstorming methods for improving system quality and giving feedback to vendors, and continuously monitoring for problems and addressing any issues as quickly as possible, especially ones obscured by workarounds or incomplete error reporting.

The guide contains real-world experiences from a variety of settings. One example involves the Veterans Health Administration's (VHA) implementation of its prospective risk analysis system, Health Care Failure Mode and Effect Analysis (HFMEA). This five-step process uses an interdisciplinary team to evaluate a healthcare process proactively. HFMEA is an example of root cause analysis, which the guide recommends as a systematic approach for identifying risks introduced by an EHR.

The guide describes a case study of employing HFMEA in a pediatric oncology department, which used the model to evaluate its processes related to chemotherapy. The department used HFMEA to guide implementation of a computerized physician order entry (CPOE) system, with three essential functionalities identified: limiting choices (thereby emphasizing menus instead of free text); enforcing entry of required data so that users cannot navigate from a page until all required fields are entered; and alerting users to abnormal values.

ISTA and More

Another model for understanding how and why unintended consequences occur and developing solutions for them is Interactive Sociotechnical Analysis (ISTA), a method Koppel co-developed.

"In thinking of the role of technology, there are these recursive feedback loops that not only affect the way technology is used but also change the social code of the organization," he says.

An example occurred in an intensive care unit Koppel visited. "This ICU had state-of-the-art everything, but it turned out that the wireless connectivity didn't work throughout the unit. The plan was to have computers on wheels, but they didn't work in the entire ICU. So the doctors were taking written notes or creating a Word file on their personal computers and then retyping them in the CPOE system," he recalls. "That's an example of how a physical system interacts with the social environment."

As the guide explains, ISTA considers the work environment, its policies, workflows, and hierarchies, along with the organization's infrastructure, encompassing physical layout and other information technology, and compares the EHR as designed with the EHR as used. The goal is to reconfigure EHR features so that they meld with the realities of how the system is being used.

In addition to HFMEA and ISTA, the guide provides links to other frameworks that have been proposed for understanding EHR-related unintended consequences.

The Importance of Metrics

The guide also recommends that current EHR users track metrics to assess how their EHRs are being used and to identify potential unintended consequences and areas where functionalities can be improved. For example, the percentage of alerts triggered in a given period will provide a sense of the utility and sensitivity of the alerts.

Another means of assessing the functionality of an existing EHR is to make it easy for users to provide feedback or report errors, and likewise, for the organization to respond to such reports, the guideline emphasizes. The VHA, which was consulted in preparing the guide, has taken a comprehensive approach, says Gail Graham, deputy chief officer for healthcare information management.

"We've adopted the airline industry model of notification of near misses, not only when there are bad outcomes. We also report circumstances where, for example, updates are changing some aspects of the EHR that may be confusing," she explains. "Sometimes things look like they're isolated incidents. But this is a way to build a picture across the enterprise to identify whether things are working as designed or if there are flaws in the system."

Graham emphasizes that an issue log does not have to be a sophisticated software application. It could be maintained in a simple spreadsheet. The guide provides a detailed example of such a spreadsheet, which covers a description of the problem, where and by whom it was discovered, the impact and cause of the problem, and the tracking and remediation steps taken to address it.

Regardless of the tracking system used, the facility should have a method for staff to easily report incidents, near misses, and even subtle issues that could lead to problems down the road.

"You want people to report frustrations with the system so they're not ignored and workarounds don't become pernicious," according to Koppel.

While HIM staff would be a natural choice to maintain an issue log, Koppel notes that the department or individuals doing so should have the authority to act on the information and provide unbiased reporting of any problems. "You need a somewhat neutral person because there's a tendency to identify problems as user errors," he says. "You need someone to take a broader view."

Graham suggests that "those who know healthcare and the systems of healthcare probably are the best to track problems." The VHA utilizes a multidisciplinary team to analyze log reports and compare them against standards.

"When you have that kind of process, it doesn't matter who takes the lead," she says.

Addressing the Problems

As the guide points out, identifying, reporting, and understanding the causes of EHR problems is half the solution to unintended consequences. Equally important is determining the most appropriate corrective actions, which typically fall into broad categories including software changes, training for IT staff or end users, configuration changes, custom programming, care process changes, and policy changes.

Since most organizations do not have unlimited resources or the ability to implement multiple changes simultaneously, the guide outlines a series of factors to consider in determining which unintended consequences to address in which order.

Examples include analyzing who is affected by the unintended consequence, what issues (e.g., safety, productivity, financial) the unintended consequence creates, the types of activities or areas affected, and the downstream processes involved.

The guide also recommends evaluating how extensive and serious the effects of the unintended consequence are and how urgently remediation is needed. It includes a template adapted from the remediation planning process used by Kaiser Permanente of Colorado.

Guidance for Implementers and Future Users

While much of the guide focuses on issues around unintended consequences of EHRs that current users might face, a section also is devoted to considerations for those who have not yet implemented a system.

The guide discusses how to determine whether an organization is ready to implement an EHR and raises the importance of identifying objectives. It also provides a case study of three orthopedic practices that ran into unintended consequences in the form of costly customizations that were not covered in their original EHR contract.

In addition, the guide links to several resources designed to help organizations assess their workflows prior to implementing an EHR. As the guide observes, an EHR "will not magically improve your processes; in fact, preexisting problems can spread and worsen if they are not addressed prior to implementation."

If AHRQ's guide contains many words of caution, it also provides ample resources to help sites plan their implementations to minimize and manage unintended consequences. It also offers encouragement in the form of success stories from organizations that have adopted EHRs, and in that it may be a valuable resource, according to Graham.

"I hope this will educate the 50 percent of healthcare organizations that haven't adopted EHRs so that they're ready to purchase and have thought carefully about what they'll need to include in an implementation," she says.

Reference

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