EHR Usability: Get It Right from the Start

Kathryn M. Kellogg, Rollin J. Fairbanks, and Raj M. Ratwani

As an emergency physician prepares to start a shift, she makes sure she has a few essential items: her stethoscope, safety glasses, a pen, and paper sticky notes. The stethoscope, pen, and safety glasses seem fairly logical, but sticky notes? Why would a physician, working in a hospital with a modern electronic health record (EHR) system, need sticky notes?

The physician attaches the sticky notes to her desk to keep track of patients, to keep personal to-do notes, and to remember who needs what. Most physicians have their own version of this paper system for cognitive support (usually for tracking patients and tasks), despite also having an EHR. Robert Wears has referred to this as the “shadow chart.” Everyone has seen the frantic intern running through the hospital trying to find “the list” that he has misplaced, without which he feels like he’s lost a limb. These workarounds highlight one of the ways in which EHRs do not fully support workflow as it actually occurs in healthcare.

The 2009 Health Information Technology for Economic and Clinical Health (HITECH) Act provided funding to stimulate a substantial increase in the adoption of EHRs in healthcare systems nationwide, with four of five hospitals now using a basic EHR.2

Alongside this widespread adoption has been the recognition that most of these systems do not meet the needs of clinical end users.3 Most EHRs are developed in a vacuum, separated entirely from the work environments in which they will need to function. Only minimal certification requirements exist to guide vendors in the design process, and the effectiveness of even these requirements remains unknown.4,5 Customization during implementation adds further variability around usability principles.6

Following implementation, EHRs offer improvements in patient safety in many respects, but they also introduce new hazards. Challenges with basic user interface design have been linked to errors compromising patient safety.7,8 In reviewing safety events, our research team has repeatedly uncovered examples that highlight this connection. For example, when a nurse didn’t click on a rarely used comment field, she had no way to know the physician had ordered the medication be held before surgery. These comment field contents were hidden unless she hovered over the medication order—something she had never seen previously.

In our recent review of thousands of patient safety events, we repeatedly found reports of physicians and nurses having difficulty finding where and how to properly record patient weight in different EHRs, leading to medication dosing errors. Similar events have been reported elsewhere.9 In addition to safety concerns, poor usability of EHRs has been linked to provider dissatisfaction.10

These issues highlight how EHRs fail to meet the needs of the end user by not supporting workflow and the way that clinicians view, consider, and make decisions with clinical information. These types of single-user interface problems have been the topic of considerable attention in recent years. To overcome these failures, a major push is currently underway to optimize EHRs following implementation.

However, using this model, to create appropriate solutions we must first identify the problems. The hidden-comments field or confusing location for entering weight must either be coincidentally realized by an end user or discovered in researching the contributing factors to a patient safety event. After discovering the hazard, a solution must be subsequently designed and executed. This trial-and-error process of identifying and correcting all the ways in which EHRs do not meet end-user needs is cumbersome and comes at the cost of patient safety, clinician dissatisfaction, and increased cognitive burden. Given that most healthcare providers are now using an EHR, some focus on optimization and correcting current flaws is needed. Yet, we must also think about developing the next generation of EHR systems and how we can set out to get those systems right from the beginning.

To truly achieve excellence in EHR design, these systems must be designed from the start through user-centered design—by putting the cognitive needs of the clinician at the forefront of development, with a better understanding of the cognitive support...
clinicians will need. Further, these systems must be developed with consideration for the environment in which they will be required to function, the workflows of individual users, and multidisciplinary teams. Finally, developers must recognize the existing health (IT) infrastructure and consider how the EHR will interact with other health IT systems already in place. Currently, EHRs support information storage and billing but fall short of the expectation that they will be integrated into the workflow and support healthcare providers in delivering safe, efficient patient care.11–14

Interruptions are a key environmental factor that are not tested in EHR development. They are extremely frequent in healthcare, and many of these interruptions are task-based requests. However, EHRs rarely have functionality to support real-time team communication of tasks to divert the need for many of these interruptions.15,16

Although triage of patients is a key feature of patient flow in an emergency department, EHRs do not support visualization of workload or patient acuity across the team. Finally, despite different members of the healthcare team having widely divergent roles, most EHRs use similar pathways for all roles and thereby fail to support the unique needs of team members.

This concept of cognitive-based design is currently not well integrated into commercial EHR system design, though research on cognitive-based EHR design is being done.17,18

Truly supporting the cognitive work of teams of healthcare providers in their actual work environment is a complex goal. Much work remains to be done in understanding healthcare workflow and processes. This effort must begin with observations and qualitative work to characterize the true intricacies of healthcare systems.

After these findings are incorporated into a truly user-centered EHR redesign, the systems must be tested with simulation, either in laboratories or in situ, to fully understand how they will be used in a healthcare environment. Of note, this method is time and labor intensive and does not coincide with vendor needs to develop and implement new products quickly. Advances are needed in human factors techniques for design improvement, in order to develop a cycle that fits more closely with an industry timeline and to cultivate a partnership between researchers and vendors.

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