VIEWPOINT

A Decade of Health Information Technology Usability Challenges and the Path Forward

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The 2009 Health Information Technology for Economic and Clinical Health (HITECH) Act successfully promoted the adoption of health information technology (HIT), specifically electronic health records (EHRs). The majority of US hospitals and ambulatory clinicians have adopted an EHR and some benefits, such as easier access to patient information and the ability to more easily order certain medications, laboratory tests, and diagnostic tests, have materialized. However, usability—defined as the extent to which technology can be used efficiently, effectively, and satisfactorily—remains suboptimal.[1] Usability challenges in the last decade have had unintended consequences. Poor EHR usability contributes to errors that are associated with patient harm.[2] It also results in clinicians spending extra time using the EHR, contributing to clinician frustration, which, in turn, has been reported to jeopardize patient safety.[3]

Efforts to encourage HIT usability have had modest effect. Federal certification programs, established by the Office of the National Coordinator for Health Information Technology (ONC), require a design and development process that promotes usability and requires usability testing, but some vendors have not adhered to these requirements.[4] There has been federal investment in usability research by the ONC and the Agency for Healthcare Research and Quality. While this led to a better understanding of HIT-related nuances and complexities, the scope of usability challenges is much larger than anticipated, and useful research findings have not been effectively translated by industry. Industry investment by some vendors has been minimal, and market forces to encourage usability have not resulted in sufficient usability improvements.[5] In addition, many existing HIT products are built on technical frameworks that limit the scope and frequency of design improvements necessary to improve usability.

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Clinician and patient expectations for better usability are high. Usability of commonly used software tools has improved exponentially in the past decade (smartphones, office computing software, productivity utilities), in contrast to HIT usability. The next step for improving usability is a shared responsibility that requires collaboration and action by HIT vendors; policy makers, including federal regulators; clinicians; health care organizations; patients; and researchers.[6] Based on lessons from a decade of initiatives to attempt to solve usability challenges, we describe 5 suggested priorities to help achieve progress.

1. Create a National Database of Usability and Safety Issues

To monitor and improve HIT usability and safety, a national reporting system should be established, much like the US Food and Drug Administration's Manufacturer and User Facility Device Experience database for medical devices. To create such a reporting system, clinicians must be permitted to report and illustrate various types of usability issues, and resources must be allocated by the ONC, HIT vendors, and health care organizations for appropriate investigation into root causes of these issues so they can be resolved. This database should allow sharing of safety-related software information among vendors, health care organizations, and clinicians, including screenshots and comparative user experiences, to prevent similar events from happening with other products. The 21st Century Cures Act, passed with bipartisan support in 2016, may provide the legal authority and regulatory framework to establish this database through ONC, which should be accessible by the public and allow anyone to report issues. This level of transparency would make the public aware of HIT risks and encourage better accountability and patient engagement in solving these challenges. Vendor concerns about intellectual property would need to be addressed and should not be a barrier to sharing this information.

2. Establish Basic Design Standards

The science of human factors offers evidence-based principles for how to design optimal computer interfaces. Most high-risk industries, such as aviation and ground transportation, have established design standards based on these principles. For example, there are standards for font color and size in aviation displays. But there has been reluctance to establish HIT design standards because some vendors and policy makers believe they may stifle innovation. Design standards focused on HIT features and functions associated with patient safety hazards should be established through an effort led by ONC, with participation from vendors, clinicians, and health care organizations. While ONC traditionally has not promoted

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usability standards, its 2018 draft strategy plan for reducing clinician burden from HIT use discusses standards. These standards should become part of ONC's voluntary certification program to incentivize vendors to participate, they should promote innovation, and they should be regularly updated by a multi-stakeholder advisory board composed of vendors, researchers, clinicians, and health care organizations to incorporate new knowledge from human factors research.

3. Unintended Harms Must Be Addressed

Usability issues that contribute to patient harm may stem from several different sources, such as vendor design and development, vendor and health care organization implementation, and customization by the health care organization. For example, a usability issue, such as an order entry screen that truncates important medication information so that it is not easily visible to the clinician, may be due to multiple sources. Identifying the source(s) of the issue and developing solutions requires shared responsibility and collaboration. To achieve this type of collaboration, alignment of vendor, health care organization, and clinician accountability, such as shared liability for harms caused by poor usability, is required. One challenge with accountability is that many contracts between HIT vendors and health care organizations include "hold harmless" clauses that shield the vendor from liability.[7] Policy makers should examine these clauses to determine whether they prevent accountability and remove these clauses from contracts.

4. Simplify Mandated Documentation Requirements That Affect Usability

Some federal documentation requirements invoke HIT to capture data elements that enable measurement of clinical quality. These requirements can have the unintended consequence of enhancing clinician "busy work" of documenting a clinical encounter by increasing mandatory data elements that may not be clinically relevant to the encounter. Supporting the collection of this information increases the complexity of HIT interfaces and reduces usability. Although the ONC's burden reduction efforts begin to address these issues by identifying the least necessary documentation requirements, there must be collaboration with vendors to ensure that HIT interfaces and workflows will be simplified as these documentation requirements are eliminated.

5. Develop Standard Usability and Safety Measures So Progress Can Be Tracked and the Market Can React

Currently, no standard measures of usability are being used, which prevents the direct comparison of HIT products. Standard measures of subjective clinician and patient experience and objective measures of usability and safety should be developed. As a starting point, standardized test case scenarios should become part of the ONC's certification program and should be used by health care organizations on their implemented products. Through the development of a common set of measures, these standard scenarios could allow consistent evaluation of clinician interaction with HIT to identify usability and safety challenges across the entire lifecycle, from initial product design to local implementation followed by periodic evaluations postimplementation. Results from scenario testing should drive iterative product improvement and direct comparison of products to encourage market adoption based on quality in actual practice settings. These measures should be established through a collaborative process between policy makers, health care organizations, clinicians, and vendors, and researchers. The 21st Century Cures Act lays the foundation for a HIT reporting program that could address this need and allow for examination of progress over time.

Conclusions

Overcoming usability challenges that have affected HIT for the last decade will require shared responsibility and greater collaboration among vendors, researchers, policy makers, health care organizations, clinicians, and patients. While policy makers need to initiate many of these actions, success is dependent on true engagement from all groups, particularly vendors who should now consider greater transparency of their products. This shared commitment is imperative because another decade of poor usability and related patient safety challenges would be unbearable, especially for patients.

ARTICLE INFORMATION

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