

Use of Dense Display of Data and Information Design Principles in Primary Care Healthcare Information Technology Systems

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Target Population: Not Applicable

Summary: Recent articles in peer-reviewed and popular literature have identified usability and information design shortcomings as reasons for the poor adoption of electronic health records (EHRs) and for creating new categories of errors in care delivery. Yet the usability of EHR systems, while recognized as critical for successful adoption and meaningful use, has not historically received the same level of attention as software features, functions, and technical requirements (e.g., interoperability specifications). Although the Certification Commission for Health Information Technology (CCHIT) formed a Usability Workgroup, CCHIT criteria do not assess EHR product usability. As a result, little systematic evidence has been gathered on the usability of EHRs in practices and how their design affects cognitive task flow, continuity of care, and efficiency. Further, the role of EHRs in patient care is evolving significantly as adoption is incentivized, health information exchanges are activated, and new forms of comparative evaluations are codified and made available for clinical decision support.

Given the significant Federal investment in EHR adoption, promoting improvements in EHR usability through deliberations, action-based research, and policy recommendations are timely activities for the Agency for Healthcare Research and Quality (AHRQ). This project established a foundation and action agenda for the use of dense data display and other innovative information design principles in primary care health information technology (IT) applications.

Project Objectives:

- Establish a foundation and an action agenda in the areas of dense display of data and information design to provide insights into designing better primary care electronic EHRs. **(Achieved)**
- Complete a detailed background report containing a comprehensive summary of the literature to serve as the basis for the final report. **(Achieved)**
- Conduct an innovation meeting with a group of experts in diverse areas related to the EHR and its design. The innovation group will define an ideal user interface for a primary care physician. This involves indicating how EHRs are and are not being used optimally. Additional considerations include patient safety and risk, efficiency, and the impact of having scattered information. **(Achieved)**
- Compile a set of recommendations on principles and policy and a research agenda. **(Achieved)**
- Compile a set of “use cases.” **(Achieved)**
- Complete a final report that integrates the background report and the output from the innovation meeting. **(Achieved)**

- Interview a wide array of providers of ambulatory EHR products and develop recommendations to assess and improve the state of usability in EHR systems. **(Achieved)**

2010 Activities: Findings from the multidisciplinary panel and interviews with EHR vendors relevant for the final project deliverable were written and published in May 2010.

Impact and Findings:

The Technical Expert Panel resulted in several recommendations, including:

Research-related recommendations

- Document patterns of clinician information use in EHR systems.
- Develop and evaluate use cases and tools for evaluating EHR implementations for adherence to usability principles and best practices.
- Develop an understanding of and ways to measure the impact of usability and information design on ergonomic (navigating, documenting) and cognitive (reading, thinking, deciding) workload, data awareness and comprehension, patient safety, clinician decisionmaking, and efficiency of care delivery.
- Understand the effectiveness of adaptive displays, defined as those data displays that change the nature or format of information presentations in light of specific patient characteristics or physician preferences.
- Assess current vendor and health care organization practices regarding information design in EHR product development lifecycle and implementation.
- Identify and evaluate existing evidence-based style sheets and guidelines for EHRs.
- Identify and evaluate innovative ways to display complex information in EHRs.
- Identify best practices in the use of shared (patient-clinician) EHR views, including applicable privacy and confidentiality issues.
- Promote fellowships in the area of EHR usability and information design.

Policy-related recommendations

- Establish certification requirements for EHRs based on practical and fair usability criteria.
- Develop a national EHR usability laboratory to: 1) support public-private collaboration and sharing of best practices in this area, 2) develop tools and processes to support evaluation of products and implementations, and 3) assist health IT vendors in product development and health care organizations in effective implementation of EHRs.

In addition, the panel characterized the evolving role of four primary functions of the EHR in supporting clinical practice:

- **Memory aid:** Reducing the need to rely on memory alone for information required to complete a task.
- **Computational aid:** Reducing the need to mentally group, compare, or analyze information.
- **Decision support aid:** Enhancing the ability to integrate information from multiple sources to make evidence-based decisions.
- **Collaboration aid:** Enhancing the ability to communicate information and findings to other providers and patients.

Based on feedback from EHR vendor interviews, the project expert panel made the following recommendations:

- Encourage vendors to address key shortcomings in current processes and practices related to the usability of their products. Most critical are inadequate adherence to formal user-design processes and a lack of diversity in end users during testing and evaluation.
- Include variety of end users in the design and testing process and collect their feedback throughout the product life cycle. Potentially undersampled populations include people from nonacademic backgrounds with limited health IT experience and people with disabilities.
- Support an independent body for vendor collaboration and development of standards to overcome market forces that discourage collaboration, best practices, and harmonization.
- Develop standards and best practices for customization during EHR deployment.
- Encourage formal usability testing early in design and development as a best practice and discourage dependence on postdeployment review supporting usability assessments.
- Support research and development of qualitative and quantitative tools to evaluate and report EHR ease of learning, effectiveness, and satisfaction.
- Increase research and development of best practices to support patient safety designs.
- Design certification programs that focus on objective and important aspects of system usability.

Strategic Goal: Develop and disseminate health IT evidence and evidence-based tools to improve health care decisionmaking through the use of integrated data and knowledge management.

Business Goal: Synthesis and Dissemination