EMR usability: Bridging the gap between nurse and computer

By Edna Boone, MA, CPHIMS

Health information technology (HIT) and electronic medical record (EMR) adoption within hospitals, physician practices, long-term-care facilities, and home health agencies has been growing as care providers seek to improve workflow efficiencies and the quality of patient care. This growth is expected to increase as the healthcare industry receives over $20 billion in research and incentive funding from the American Recovery and Reinvestment Act of 2009 to stimulate automation and the meaningful use of EMRs. With over 2.5 million RNs making up over a third of the healthcare workers in the United States today, the increase in HIT and EMR adoption places nurses in a key end-user role.1,2 Ensuring usability of EMRs is essential for all nurses on the front lines of healthcare delivery because it will lead to increased end-user satisfaction and productivity and reduced training hours, costs, and HIT unintended consequence errors.

Usability bridges the gap between people and machines, promising the completion of tasks with minimum effort, maximum end-user satisfaction, and reduced errors and increased patient safety through enabling and ensuring the correct use of systems.3 Usability also allows nurses to focus on their patients rather than the technology.4 As adoption of EMRs increases, the nursing profession must understand basic usability principles; look for these principles when selecting EMR systems; demand usability by engaging system analysts, developers, and vendors when articulating workflow requirements; and follow and support the industry’s usability activities.

Usability defined

The International Organization for Standardization defines usability as: “the effectiveness, efficiency, and satisfaction with which specific users can achieve a specific set of tasks in a particular environment.”5 Usability principles stem from human-computer interaction (HCI) and human factors (HF) studies, along with input from behavioral sciences, psychology, industrial engineering, computer science, and neuroscience. HCI and HF are well-established disciplines that inform and guide the design and testing of software for a given user population. Usability principles for the design and use of EMRs are a relatively new research focus.

Usability in the healthcare industry

The past year has brought several significant industry articles on usability, as well as the first measurement of EMR usability by a certifying body.

- The Health Information and Management Systems Society’s (HIMSS) EMR Usability Taskforce provided the industry with guidance on principles of usability and suggestions for how best to measure usability in June 2009. The taskforce described methods of usability evaluation, offering several methods for measuring efficiency and effectiveness, including patient safety.6
- The Certification Commission for Health Information Technology (CCHIT) announced its plans to begin measuring and rating the usability of ambulatory EMRs during its certification process in September 2009. The rating system reviews the effectiveness, efficiency, and satisfaction of EMR use through CCHIT’s new testing guide. The rating doesn’t affect a vendor’s certification outcome, and publication of rating is voluntary at this time.7
- The Agency for Healthcare Research and Quality (AHRQ) released two reports on usability in October 2009: “Electronic Health Record Usability: Evaluation and Use Case Framework,” which provides a set of use cases to evaluate information design in primary care health information systems, and “Electronic Health Record Usability: Interface Design Considerations,” which provides recommended
actions to support development of an objective EMR usability evidence base and policies to systematically improve the usability of EHRs.8,9 Many disciplines, including medicine, information science, usability engineering, cognitive sciences, psychology, and HE, offered insight into the design improvements possible for EMRs.

- The Technology Informatics Guiding Education Reform (TIGER) Initiative released “Designing Usable Clinical Information Systems: Recommendations from the TIGER Usability and Clinical Application Design Collaborative Team.” The team analyzed how to further define key concepts, patterns, and trends to HIT vendors and practitioners to ensure usable clinical systems at the point of care. This report describes the background, methodology, findings, and recommendations for future work in this area.10 Core usability principles identified by the Tiger Initiative include an early and consistent focus on users of the product, iterative design processes (multiple versions matched to users, tasks, and environments), and systematic product evaluations (with product users and metrics).

Usability principles
The HIMSS EMR Usability Taskforce defines usability principles in its white paper “Defining and Testing EMR Usability: Principles and Proposed Methods of EMR Usability Evaluation and Rating.”11 The following is a brief overview of these principles:

- **simplicity.** Concise information is displayed and only the functionality and data needed to effectively accomplish tasks and decision making are included.
- **naturalness.** The end-user should be immediately comfortable and familiar with the system.
- **consistency.** The application’s structure, interactions, and behaviors match a user’s experience with other software applications and are consistently applied throughout the EMR.
- **minimizing cognitive load.** This ensures density, poor end-user feedback, and inadequate data entry field cues don’t lead to sensory overload.
- **Efficient interactions.** Workflow is optimized by setting good default tabs: large enough list and text boxes to limit scrolling and prevent the need for frequent switching between keyboard and mouse.
- **forgiveness and feedback.** User forgiveness occurs when errors are made, such as the use of the undo button found in many applications. Feedback ensures users that their input has had the desired effect, such as immediately indicating a critically high fever in red when entered.
- **effective use of language.** Language used in an EMR is concise, unambiguous, familiar, and meaningful to end-users in the context of their work. Abbreviations and acronyms should only be displayed when they’re commonly understood and unambiguous. Text in upper case should never be displayed because it takes longer to read and increases perceived density.
- **effective information presentation.** This ensures the appropriate density of data, readability, and the meaningful use of color. Comprehensive guidelines on use of color have recently been developed by the Human Factors and Ergonomics Society:
  - red: stop, hot, danger, error, extreme warning, severe alert, emergency, alarm
  - yellow: caution, potential or mild warning, requires attention, slow, moderate alert

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What's next for 2010?
- The HIMSS EMR Usability Taskforce recently completed a clinical user “Pain Points” survey and results will be disseminated at the HIMSS Annual Conference in March 2010. The taskforce is developing a common sense set of mobile design best practices and principles to be used with the evolving mobile handheld platforms, which will be released in April 2010.
- AHRQ has commissioned a report on EMR vendor best practices in developing usability, which will be released and shared with the industry later this year. Comparative effectiveness research funding will also become available for EMR usability studies.
- CCHIT will expand its usability ratings beyond ambulatory EMRs.
- TIGER will move forward with integrating the full set of recommendations into the nursing community from the reports of nine collaborative teams, along with colleagues from disciplines across the continuum of care, addressing the following core concepts: standards and interoperability, national HIT agenda, informatics competencies, education and faculty development, staff development, usability and clinical application design, virtual learning, leadership development and consumer empowerment, and personal health records.
- The National Institute of Standards and Technology, which develops and promotes measurement, standards, and technology, will explore expanding benchmark usability standards for HIT.
- Several academic institutions, including the Universities of Maryland, Michigan, Missouri, and Wisconsin; Northwestern; Michigan State University; and the Massachusetts Institute of Technology, are currently engaged in EMR usability studies and activities. Results from their research will continue to inform the industry.

I invite you to engage in usability activities and education if you haven’t already. NM

REFERENCES

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