



Agency for Healthcare Research and Quality
Advancing Excellence in Health Care

Session 3.2 Usability of Health IT

Lee Green MD MPH, University of Michigan
Kristen Werner MHSA, Altarum Institute

Moderator: Matt Quinn MBA, AHRQ

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Healthcare is Evolving.....

Role	Changing Paradigm
Healthcare	Combating Illness ➡ Managing Wellness
Physicians	Directors of Care ➡ Collaborators in Care
Patients	Passive Recipients ➡ Active Participants
Health Information	Siloed and Episodic ➡ Integrated and Longitudinal
Health IT	Supporting Tasks ➡ Broadening Understanding

The role of the EHR is growing.....

- Support patient care
- Manage workflows
- Prevent medical errors
- Improve quality
- Enhance cost effectiveness
- Promote shared understanding of health
- Support health surveillance
- Enhance research
- Etc.....

We aren't keeping up.....

➤ The problem:

"the health care IT systems of today tend to squeeze all cognitive support for the clinician through the lens of health care transactions and related raw data, without an underlying representation of a conceptual model for the patient showing how data fit together and which are important or unimportant. As a result, **an understanding of the patient can be lost amidst all the data...**"

➤ The solution

- "In the committee's vision of **patient-centered cognitive support**, the clinician interacts with models and abstractions of the patient that place the raw data into context and synthesize them with medical knowledge in ways that make clinical sense for that patient."

Active Projects

➤ Exploring Usability in the Design of HIT

- Use of Dense Display and Information Design Principles in Primary Care Health IT Systems

Through literature review, expert panel facilitation and vendor interviews, established a foundation of EHR user interface design considerations. Proposed an action-agenda for the application of information design principles to the use of health information technology (HIT) in primary care settings.

➤ Exploring Usability in Implementation of HIT

- IT Implementation by Cognitive Engineering of Organizational Routines

Use expert oriented cognitive engineering tools (Cognitive Task Analysis), to facilitate analysis and change of organizational routines supporting the use of clinical quality management systems in federally qualified health centers.



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James Bell Associates & Altarum Institute

Use of Dense Display and Information Design Principles in Primary Care Health IT Systems

Kristen Werner MHSA
Senior Health Information Analyst
Altarum Institute



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Usability Expert Panel Recommendations

- Build a base of evidence
 - Understand clinician-EHR interaction through development and evaluation of wide range of “use cases”.
- Evaluate and Measure EHRs
 - Develop metrics to describe EHR’s impact on ergonomic workload, cognitive workload and data comprehension.
- Create Standards and Guidelines
 - Use research, measurements and evaluations to develop design characteristics and style sheets with which become EHR design standards.
- Encourage Innovation
 - Encourage EHR functionality and design evolution to identify and incorporate new technologies and strategies into design.



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Vendor Interview Findings

- Vendor commitment to development and provision of usable EHR product(s) is strong, but there is still limited emphasis on a user-centered design process.
- There is a lack of EHR-specific standards and best practices in relation to design, testing and monitoring usability.
- Usability is chief competitive differentiator, which leads to little industry collaboration on developing usability standards and best practices.

Recommendations:

- Development of an independent body for vendor collaboration and standards construction.
- Encourage vendors to address key shortcomings that exist in current processes, particularly those that may negatively impact patient safety.



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AHRQ Reports

- **Electronic Health Record Usability: Interface Design Considerations** Provides recommended actions to support the development of an objective EHR usability evidence base and formative policies to systematically improve the usability of EHR systems.
- **Electronic Health Record Usability: Evaluation and Use Case Framework** Synthesizes the literature and best practices regarding the usability of EHRs, and it provides a set of use cases to evaluate information design in primary care IT systems.
- **Electronic Health Record Usability: Vendor Practices and Perspectives** Provides insight into the current processes, practices, and perspectives of certified EHR vendors with regard to key aspects of the usability of their products

Available at: <http://healthit.ahrq.gov>



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University of Michigan & Altarum Institute

A Cognitive Science Approach to Usability of Health Information Technology

Lee Green MD MPH
Professor
University of Michigan

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Value to the Customer

- Value: Less costly and disruptive implementation of HIT
 - Example: “TNTC” (too numerous to count)
- Value: Reduced risk of failure or “zombie success”
 - Example: A major health system's CPOE system works because of Post-It™ notes
- "IT solutions will almost always be distracting and be abandoned unless specific attention is paid to re-engineering workflows or integrating IT solutions into existing workflows!" (Zafar, 2005)

The Nature of Expertise

- Dual-Process Model of Cognition
 - Analytic or System 1
 - Slow, effortful, complete
 - Rules-based or System 2
 - Fast, economical, ecologically valid
- Expertise As A Rich, Deeply Encoded Ruleset
 - Brain locus and training time
 - Not fully accessible to introspection

Organizational Routines

- Recurrent, collective, interactive behavior patterns
- Cognitive and governance purposes
 - Governance: control of activities toward goals
 - Cognitive: knowledge of what to do and how
- Routines are group knowledge
 - Distributed vs. dispersed knowledge
 - Tacit knowledge
- Complex and *only partially observable*

Usability: Not Just A Pretty (Inter)Face!

- Design to support the work
- Requires understanding the work
- User input and observation are not sufficient
 - Encoded rules and tacit knowledge will be missed
- Cognitive science tools can help
 - Cognitive Task Analysis
 - Used in other settings with similar challenges (aviation, nuclear power plant operation, White House situation room)

Application of CTA

- Primary care physicians operate at or near cognitive task saturation most of the time
 - Break-in-task events cause errors
 - Filtering is active not passive
- CTA in system design
 - Primarily at the individual expert level
 - Was used in design of the clinical reminder system
- CTA in system implementation
 - Primarily at the organizational routine level
 - Our current project

Findings of CTA

- CTA in system design
 - Discovered important issues in visit structuring
 - Insertion opportunities for new information or action items
- Team CTA in system implementation
 - We have found heavy reliance on tacit knowledge
 - Across roles mostly dispersed knowledge
 - Within roles a mix of distributed and dispersed



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Questions?

For further information please contact:

- Lee Green, MD (greenla@umich.edu)
- Kristen Werner (kristen.werner@altarum.org)