Electronic health records: Patient safety, usability, and workflow

March 17, 2014

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Usability/Safety Framework

- NIST Interagency Report 7804
  http://www.nist.gov/healthcare/usability/index.cfm
- NIST R&D towards these objectives:
  - Distinguish between usability aspects that pertain to user satisfaction and usability features that impact clinical safety
  - “Barrier to entry” in marketplace: Limited critical usability aspects that pertain to the clinical safety embedded into the system and required as core functionality
  - Anyone can go above and beyond the minimum standards for usability in safety enhanced design
Definitions

**Usability**: How useful, usable, and satisfying a system is for the intended users to accomplish goals in the work domain by performing certain sequences of tasks.

**Workflow**: A set of tasks – grouped chronologically into processes – and the set of people or resources needed for those tasks that are necessary to accomplish a goal.

**Workaround**: Actions that do not follow explicit rules, assumptions, workflow regulations, or intentions of system designers.
Relating Usability and Patient Safety

Use Error Root Cause (I)
- Wrong patient record open
- Wrong mode for action
- Inaccurate data displayed
- Incomplete data displayed
- Non-standard measurement system, convention, or terms
- User required to recall information
- Inadequate feedback about automation
- Corrupted data storage

Severity
Frequency
Detectability
Complexity

Risk Parameters (II)

Adverse Events (IV)
- Wrong patient
- Wrong treatment
- Wrong medication
- Delay of treatment
- Unintended treatment

Evaluative Indicators (III)
- Workarounds
- Redundancies
- User burnout
- Low task completion rate

Patient Harm
- Sub-standard care
- Morbidity
- Mortality
Relating Workflow and Patient Safety

- Poorly supported work processes → suboptimal nonstandard care, poor decision support, dropped tasks
- Missed information → delays in diagnosis, missed/redundant treatment, wrong patient
- Inefficient clinical documentation → copy/paste, “smart text”, templates, scribes
- Provider dissatisfaction → workarounds, slower adoption rates in specialty areas
- High rates of false alarms → ignored alarms, alerts, reminders
Methods: Modeling with SMEs

- Ambulatory care physicians; collegial discussions
- Interdisciplinary team meetings – human factors, informatics, physicians
- Process maps
- Goal-means decomposition diagram
- Insights for moving towards “patient visit management system”
Workflow “Buckets” in Ambulatory Care

Before patient visit

During patient visit

Physician encounter

Discharge

Visit documentation
Before Patient Visit

- **Does pt have significant complexity?**
  - yes: Clinical overview and review new findings/labs
  - no: Review prior history and physical

Balance workload
Before Patient Visit

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Balance workload
Visit Documentation

Docm history, physical, assessment, plan

Docm for billing

Docm meds reconciled

Docm for others (legal, research, compliance, MU)

Is referral needed?

Docm for consult

yes
Visit Documentation

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Docm meds reconciled

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Is referral needed?

yes

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Goal-Means Decomposition

- Patient Care
- Reimbursement
- Physician Quality of Work-life
Goal-Means Decomposition

- Patient Care
  - Assess/ Diagnose

- Reimbursement

- Physician Quality of Work-life
  - Good relationship with patient
Goal-Means Decomposition

- Patient Care
- Reimbursement
- Physician Quality of Work-life

Plan

Bill
Goal-Means Decomposition

Patient Care

Support QI/Research

Reimbursement

Bill

Physician Quality of Work-life

Medical Center
Recommendations for EHR developers

- Increase efficiency:
  - Reviewing results with the patient
  - Drafting pre-populated orders to be formally executed later
  - Supporting drafting documentation with shorthand notations without a keyboard
- Design for empathetic body positioning/eye contact
- Support dropping tasks and delaying task completion
- Verification of alarms and alerts and data entry without “hard stops”
Recommendations for ambulatory care

- Moderate organizational design flexibility
- Design room to support patient rapport & EHR access
- Minimize redundant data entry from interoperability
- Reduce clinic pace or increase flexibility of pace
- Ensure functionality that supports continuity in task performance in the case of interruption
- Relax requirements to enter detailed data for others during fast-paced patient visits
Stepping Back

- Unique healthcare concern: patient safety
- Vendor usability ≠ hospital usability
- Multiple levels of usability/workflow
  - User: When, "do not show again", templates, hardware
  - Unit: Who, headers, reminders/alerts
  - Organization: Thresholds, time windows, required docm
  - National: ONC, accrediting bodies, Medicare…
- Usability/workflow issues interact with regulatory constraints
- Transitioning from billing-centered design
Acknowledgement

This research was supported by the National Institute of Standards and Technology. The views expressed in this presentation are those of the author(s) and do not necessarily represent the view of NIST.
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Reviewers (THANK YOU!)

- Michael A. Wittie
- Joseph Bormel
- Mary Frances Theofanos
- Brian Stanton
- Kristen K. Greene
- Eswaran Subrahmanian
- Michael L. Hodgkins
- Steven E. Waldren
- Jason M. Mitchell
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- Korrie J. Mapp
- Emilie M. Roth
- Kevin Jones
- Michael Kordek
- Nicholas Gibson
- Thomas H. Elmquist
- Leigh Burchell
- HIMSS Electronic Health Record Association
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