Improving EHR Usability Based on Human Factors

A HIMSS07 Annual Conference Presentation By:
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Learning Objectives

• Demonstrate the need for usability analysis on Electronic Health Record (EHR) workflows
• Evaluate efforts to improve EHR workflows
• Present a scalable methodology to evaluate EHR usability

Background of EHR at Partners

• Long history of clinical information technology innovation
• Internally developed, web-based EHR introduced in 2002
• Used by +4,000 physicians, system wide
• Initially primary care focused with current emphasis on community physician and specialist adoption
• Users have now brought up the usability issues due to productivity impact by EHR
What is Usability?

- "The quality of a user’s experience when interacting with a product or system"*
- Within the EHR, usability measures the quality of a user’s experience when performing clinical documentation tasks
  - Reviewing & writing encounter notes
  - Reviewing & writing medications prescriptions
  - Reviewing laboratory results
- One key way to measure quality is by measuring task efficiency, i.e. how quickly are tasks performed

*Source: U.S. Department of Health and Human Services, 2006

Why is Usability Needed?

“EHR is a benefit for patient care; however, it adds time to patient care.”*

*Source: Key Findings from a 2004 Strategic Planning Process

Usability Challenge for EHRs

- IT designers are challenged to enhance EHR’s efficiency and ease of use
- EHR users are challenged to re-engineer their clinical workflows in order to properly incorporate EHR systems
- Can we succeed?
  Let’s find out by studying one EHR
Introduction to the EHR

- Ambulatory electronic health record for:
  - Repository for: visit notes, medications, laboratory results, health maintenance procedures, etc.
  - Clinical decision support
    - Reminders, prescribing alerts, result follow up, etc.
- Product releases one to two times a year
- Has become a key clinical system strategy with many benefits

EHR Benefits

- Share clinical data with other providers
- Common patient data repository
  - Flexible data entry allows for dictation, voice recognition, templates, structured data entry
- Medication management
  - Paperless faxing, script history, payer formulary
- Result management
  - Paperless tracking of results
- Communication
  - Intra/inter office electronic messaging

Example: Chart Summary
EHR Hurdles

- EHR has different user, with different needs:
  - Providers of patient care
  - Clinical researchers
  - Health policy and compliance personnel
  - Informatics professionals
- EHR design continues to grow and expand
- EHR thus have multiple workflows for a dynamic set of clinical documentation tasks

Workflow analysis is needed!
Usability Improvement Strategy

- Survey further to investigate work flows
- Gather ideas on improving EHR
- Acquire deep understanding of workflows
- Craft detailed ideas on improving EHR
- Simulate proposed task workflows
- Prioritize EHR improvement ideas

Phase 1 - Improving EHR Effectiveness ("IT Challenge")

Audit Results: A Scarcity of Time

**Assumption:** Most clinicians like to complete their clinical tasks either during or shortly after an encounter

**Hypothesis:** Clinicians have little time for documentation

**Evidence:**
- Avg. scheduled encounter time: 23 mins.
- Avg. time spent in patient interview/exam: 14 mins.
- Avg. time spent on needed paper work (lab orders, encounter forms, routing forms): 2 mins.

**Deduction:** Residual time left for documentation: 7 mins.

**Recommendation:** EHR's performance be measured by its ability to both review and update notes, labs and meds in 7 minutes or less
**Survey: Workflow Challenges**

- Surveyed 131 physicians
- Documentation tasks occur at similar times

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Review notes &amp; labs</td>
<td>Review problems</td>
<td>Finish a visit note</td>
<td>Fill encounter note</td>
</tr>
<tr>
<td>Review allergies</td>
<td>Review meds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Write new Rx's</td>
<td>Order labs</td>
<td>Begin a visit note</td>
<td></td>
</tr>
</tbody>
</table>

- Some EHR decision support applications may shift this model to one where most tasks occur during the encounter

**Survey Results**

% of Notes Completed During or Within 5 mins. of a Pt. Encounter

<table>
<thead>
<tr>
<th>Method</th>
<th>Total Responses*</th>
<th>% Notes Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone-in Dictation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voice Recognition</td>
<td></td>
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<tr>
<td>Tape Recorder</td>
<td></td>
<td></td>
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<tr>
<td>Free Text Note</td>
<td></td>
<td></td>
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<tr>
<td>Template Text Note</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note – Not mutually exclusive

**Survey Results**

Reasons Why Notes Are Not Done During or Within 5 mins. of a Pt. Encounter

<table>
<thead>
<tr>
<th>Reason</th>
<th>Total Responses*</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Time To Document</td>
<td></td>
</tr>
<tr>
<td>Waiting for lab results</td>
<td></td>
</tr>
<tr>
<td>Waiting for other info.</td>
<td></td>
</tr>
<tr>
<td>Document at the end of the day</td>
<td></td>
</tr>
<tr>
<td>Document in a different day</td>
<td></td>
</tr>
</tbody>
</table>

*Note – Not mutually exclusive
Focus Groups: Workflows in Detail

<table>
<thead>
<tr>
<th>Current Workflow</th>
<th>Proposed Workflow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discuss Previous Lab Results</td>
<td>21 11 1 15 7 1 10</td>
</tr>
<tr>
<td>Review Medications</td>
<td>14 7 2 9 4 2 8</td>
</tr>
<tr>
<td>Perform Physical Exam</td>
<td>1 1</td>
</tr>
<tr>
<td>Write New Medications</td>
<td>0</td>
</tr>
<tr>
<td>Write Lab Orders</td>
<td>0</td>
</tr>
</tbody>
</table>

Legend: Paper Clicks Scrolls New Windows Typing Savings

"Click Count" Task Simulation for a User's Workflow (Partial)

Task Analyses: Need for Speed

- 5 task analyses were completed
- +30 design enhancements were analyzed
- Enhancements were collated into IT usability enhancement projects
- Projects were then prioritized by their ability to save steps in the workflows
- Goal for each project was thus to decrease task time for EHR documentation
Prioritization of EHR Enhancements

<table>
<thead>
<tr>
<th>Proposed EHR Improvement Projects</th>
<th>Projected Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Better integrate other admin. systems (ex. scheduling)</td>
<td>3%</td>
</tr>
<tr>
<td>2. Take advantage of common use case scenarios, pre-populate forms whenever possible</td>
<td>9%</td>
</tr>
<tr>
<td>3. One step navigation between notes and its sections</td>
<td>10%</td>
</tr>
<tr>
<td>4. Increase encounter note heading specificity</td>
<td>1%</td>
</tr>
<tr>
<td>5. Update the patient’s chart without leaving a note</td>
<td>30%</td>
</tr>
<tr>
<td>6. Better integrate laboratory results into the EHR</td>
<td>10%</td>
</tr>
<tr>
<td>7. One-step access to common laboratory resulting tasks</td>
<td>20%</td>
</tr>
<tr>
<td>8. One-step to common medication tasks</td>
<td>25%</td>
</tr>
<tr>
<td></td>
<td>100%</td>
</tr>
</tbody>
</table>

Projected Savings

- 3%
- 9%
- 10%
- 1%
- 30%
- 10%
- 20%
- 25%
- 100%

EHR Notes Module, Circa 2005

- User had to navigate away from the note in order to perform certain common tasks like discontinue a medication.
- User had to select each section of this note and wait for that section to appear on the screen.

EHR Notes Module, Today

- Highly interactive modules
- All sections are available in the same screen
EHR Notes Module, Today
Accomplish other tasks without leaving the note

EHR Notes Module, Proposed
Less clicks to perform common medications tasks
Order Medications with less steps

Next Step, Continuous Improvement
Improving EHR Effectiveness
IT Challenge
Objective: Provide EHR design suggestions

Improving EHR Utilization
User Challenge
Objective: Work with clinicians to improve the way they utilize the EHR
Conclusions

- EHRs are complex, evolving systems
- EHRs add benefit to patient care; however they may add time to patient care
- EHR usability can be improved by both software design and workflow reengineering
  - Focus on gaining efficiencies in common tasks
- EHR designers should utilize task time as a performance metric

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We welcome your questions & thanks for the opportunity!

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