Improving HIT Safety One Click at a Time

Strategies and Evidence Based Tools for Delivering Safer Care

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We Got Our Start As Safety Patrols...
Objectives

• Discuss the current evidence surrounding health information technology (IT) and patient safety

• Utilize three tools to assist in the safety assessment of a clinical IT system

• Discuss the role of the Nursing Informaticist in implementing and adopting a strong health IT safety program
EHR’s Potential to Improve Safety

• Legible handwriting!
EHR’s Potential to Improve Safety

- Immediate communication to ancillary departments reducing delays in treatment
- Access to patient information anywhere, anytime
- Better coordinated patient centered care
- Real time monitoring
- Real time clinical decision support
- Improved Medication Safety:
  - Can alert providers when attempting to order medications the patient is allergic to
  - Can provide automated dosing calculation and dose range limits
2005 Article by Ross Koppel et. al.

- Role of CPOE systems in facilitating medication errors
- Found 22 types of medication error risks:
  - Fragmented displays
  - Pharmacy inventory displays mistaken for dosage guidelines
  - Inflexible ordering formats generating wrong orders
Unintended Consequences of EHRs

- More/new work for clinicians
- Workflow issues
- Never ending demand for system changes
- Paper persistence
- Changes in communication patterns and practices
- Emotions
- New kinds of errors
- Changes in power structure
- Overdependence on technology

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Institute of Medicine Report: Nov. 2011

- Health IT and Patient Safety: Building Safer Systems for Better Care
IOM Report Recommendations

• The Secretary of Health and Human Services (HHS) should:
  • Publish an action and surveillance plan within 12 months that includes a schedule for working with the private sector to assess the impact of health IT on patient safety and minimizing the risk of its implementation and use.
  • Ensure insofar as possible that health IT vendors support the free exchange of information about health IT experiences and issues and not prohibit sharing of such information, including details (e.g., screenshots) relating to patient safety.
  • Fund a new Health IT Safety Council to evaluate criteria for assessing and monitoring the safe use of health IT and the use of health IT to enhance safety. This council should operate within an existing voluntary consensus standards organization.
IOM Report Recommendations

• The Secretary of HHS should;
  • Specify the quality and risk management process requirements that health IT vendors must adopt, with a particular focus on human factors, safety culture, and usability.
  • Establish a mechanism for both vendors and users to report health IT–related deaths, serious injuries, or unsafe conditions.
  • Recommend that Congress establish an independent federal entity for investigating patient safety deaths, serious injuries, or potentially unsafe conditions associated with health IT.
• HHS, in collaboration with other research groups, should support cross-disciplinary research toward the use of health IT as part of a learning health care system. Specific areas of research include
  • User-centered design and human factors applied to health IT,
  • Safe implementation and use of health IT by all users,
  • Sociotechnical systems associated with health IT, and
  • Impact of policy decisions on health IT use in clinical practice.
Office of the National Coordinator for Health Information Technology (ONC) - Response

- Health IT Patient Safety Action & Surveillance Plan for Public Comment (12/21/2012)
- Addresses IOM recommendations with goals and two main objectives
  - *Use health IT to make care safer*
  - *Continuously improve the safety of health IT*
- Comment period ended 2/4/2013
- How to handle safety in electronic records is evolving. Still learning.
- Tools........
Tool #1 - Reducing Unintended Consequences of Electronic Health Records

- AHRQ’s Guide to Reducing Unintended Consequences of Electronic Health Records
- [http://www.ucguide.org/](http://www.ucguide.org/)
AHRQ’s Guide to Reducing Unintended Consequences of Electronic Health Records

Guide to Reducing Unintended Consequences of Electronic Health Records

The Guide to Reducing Unintended Consequences of Electronic Health Records is an online resource designed to help you and your organization anticipate, avoid, and address problems that can occur when implementing and using an electronic health record (EHR). Our purpose in developing the Guide was to provide practical, troubleshooting knowledge and resources.

The Guide was developed with all types of health care organizations in mind—from large hospital systems to solo physician practices. We anticipate that the primary users will be EHR implementers such as Regional Extension Centers, chief information officers, directors of clinical informatics, EHR champions or “super users,” administrators, information technology specialists, and clinicians involved in the implementation of an EHR. Frontline EHR users (such as physicians and nurses) may also find the Guide useful.

The Guide is based on the research literature, other practice-oriented guides for EHR implementation and use, research by its authors, and interviews with organizations that have recently implemented EHR. The Guide represents a compilation of the known best practices for anticipating, avoiding, and addressing EHR-related unintended consequences. However, this area of research is still in its infancy. Therefore, the Guide is a work in progress. We invite you to revise its tools and recommendations in keeping with your own experience and in response to emerging research findings.


See suggested citation format »

Note: The Guide represents the opinions of the authors and does not necessarily represent the opinions or best practice recommendations of the Agency for Healthcare Research and Quality, the United States Government, or any of the other organizations with which the authors are affiliated.

Learn more about the organizations and individuals who contributed to the development of the Guide »
• AHRQ’s Guide to Reducing Unintended Consequences of Electronic Health Records
AHRQ’s Guide to Reducing Unintended Consequences of Electronic Health Records

• Current EHR Users:
• What are some recommendations for avoiding UC’s of EHR use?
• How do you monitor EHR use?
• How do you survive system upgrades?
AHRQ’s Guide to Reducing Unintended Consequences of Electronic Health Records

- **Future EHR users:**
- Are you ready for an EHR?
- Why do you want to implement an EHR?
- How do you select an EHR?
- How do you conduct a workflow assessment?
- What are the recommended practices for avoiding UC’s of EHR implementation?
Tool #2 - CPOE Configuration Guide to Reduce Medication Errors

• 46 Item list with evidence based recommendations for the configuration of computerized provider order entry

• [http://www.himss.org/content/files/jhim/24-4/9_SENGSTACK.pdf](http://www.himss.org/content/files/jhim/24-4/9_SENGSTACK.pdf)
### Tool #2 - CPOE Configuration to Reduce Medication Errors (cont’d)

#### Table 1: CPOE Design Checklist.

<table>
<thead>
<tr>
<th>Category</th>
<th>Description/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CLINICAL DECISION SUPPORT</strong></td>
<td></td>
</tr>
<tr>
<td>Allergies and cross allergies.</td>
<td>Display alert when an allergy has been documented or an allergy to another drug in same category is documented. Provide alert of potential allergy at time of order entry, not order submission.</td>
</tr>
<tr>
<td>Duplicate order checking.</td>
<td>Display alert when the same medication is ordered and when separate doses of the same medication are to be given within a “closely spaced time”.</td>
</tr>
<tr>
<td>Single and cumulative dose limits.</td>
<td>Display alert when ordered dose exceeds recommended dose ranges for both single and cumulative doses.</td>
</tr>
<tr>
<td>Contraindicated route of administration.</td>
<td>Display alert when order specifying a route of administration that is not appropriate for the ordered medication. (e.g. Antifungal topical cream ordered with route of IV)</td>
</tr>
<tr>
<td>Drug-drug interaction.</td>
<td>Display alert when there is a potentially dangerous interaction when the medication is administered with another medication.</td>
</tr>
<tr>
<td>Drug-food interaction.</td>
<td>Display alert when there is a potentially dangerous interaction when the medication is administered with a particular food group.</td>
</tr>
<tr>
<td>Contraindication/drug - based on patient diagnosis.</td>
<td>Display alert when drug is contraindicated based on the patient’s diagnosis.</td>
</tr>
</tbody>
</table>
Tool #2 - CPOE Configuration to Reduce Medication Errors (cont’d)

<table>
<thead>
<tr>
<th>ORDER FORM CONFIGURATION</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mandatory fields for drug, dose, frequency and route.</td>
<td>Cannot submit order without completing these fields.</td>
</tr>
<tr>
<td>All ordering screens should be designed in a similar fashion. Fields for drug, dose, route, frequency, etc should be in the same place on all screens.</td>
<td>There should be consistency of screen control, behavior, clarity of meaning and data labels for fields. Order entry screens for IV bolus injections should be configured similar to those for IV fluids with medication additives.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HUMAN FACTORS CONFIGURATION</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Use alternate line colors between patients to help visual separation of names.</td>
<td>Helps keep rows separated visually – to reduce wrong patient choice</td>
</tr>
<tr>
<td>Do not put patient lists in alphabetical order.</td>
<td>This places similar patient names next to each other making it easier to choose the wrong patient</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WORKFLOW PROCESS CONFIGURATION</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide way to alert caregivers to new orders.</td>
<td>Without face to face interaction, nurses may not be aware that a new medication order has been entered. Provide flag or notification that new order is pending.</td>
</tr>
<tr>
<td>Provide access to medication information that is convenient and does not disrupt workflow.</td>
<td>Medication knowledge deficiency was noted in one study to contribute to over half of the prescribing errors noted that could have potentially been preventable.</td>
</tr>
<tr>
<td>Provide method to access view of all patient’s medications (including dose and frequency) on one screen.</td>
<td>Screens that list active medication orders also should list IV drip orders</td>
</tr>
</tbody>
</table>

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### Tool #3 – The Pick-List Checklist

<table>
<thead>
<tr>
<th></th>
<th>Avoid abbreviations in drop down lists</th>
<th>Having similar abbreviation choices right on top of one another in a drop down list such as IV and IP for medication route can create errors.</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>By default, there should not be an item pre-selected when opening the list</td>
<td>A pre-selected item may not always be the desired choice. Over reliance on assuming the default is the right choice can lead to errors</td>
</tr>
<tr>
<td>9</td>
<td>Do not truncate items on pick-list</td>
<td>The truncated information may be critical to the choice</td>
</tr>
<tr>
<td>10</td>
<td>Font size at least 12</td>
<td>The average age of the nurse is 47. The age range for most physicians is between 45 and 54. Difficult to see smaller fonts with presbyopia.</td>
</tr>
</tbody>
</table>

AHRQ’s Hazard Manager - Beta

• Software tool with which to share information about health IT hazards—a tool that supports the characterization and communication of hazards and their potential and actual adverse effects.

• Such a tool would support the creation of consistent, comparable information and support shared learning about hazards

HIT Hazard Manager

Not all categories may be applicable. If something is not applicable, leave it blank.
When entering a Hazard, use the tabs to navigate back and forth. Do not use the back button.

|----------------|---------------------|--------------|--------------|----------|------------------------|----------------|----------------------|

**Usability: (Check all that apply.)**
- Information hard to find
- Difficult data entry
- Excessive demand on human memory
- Sub-optimal support of teamwork (situation awareness)
- Confusing information display
- Inadequate feedback to the user
- Mismatch between real workflows and HIT
- Mismatch between user expectations (mental models) and HIT
- Other (specify)

**Data Quality: (Check all that apply.)**
- IT design contributed to entry of data in the wrong patient's record
- Organizational policy contributed to entry of data in the wrong patient's record
- Patient information/results routed to the wrong recipient
- Discrepancy between database and displayed, printed, or exported data
- Faulty reference information
- Unpredictable elements of the patient's record available only on paper/scanned documents
- Lost data
- Inaccurate natural language processing
- Virus or other malware
- Other (specify)

**Decision Support: (Check all that apply.)**
- Excessive non-specific recommendations/alerts
- Faulty recommendation
- Missing recommendation or safeguard
- Inadequate clinical content
- Inappropriate level of automation
- Other (specify)

**Vendor Factors: (Check all that apply.)**
- Sub-optimal interfaces between applications (and devices)
- Non-configurable software
- Faulty vendor configuration recommendation
- Unusable software implementation tools
- Inadequate vendor testing
- Inadequate vendor software change control
- Inadequate control of user access
- Faulty software design (specification)
- Other (specify)

**Local Implementation: (Check all that apply.)**
- Faulty local configuration or programming
- Inadequate local testing
- Inadequate project management
- Inadequate software change control
- Inadequate control of user access
- Sub-optimal interface management
- Other (specify)

**Other Factors: (Check all that apply.)**
- Inadequate training
- Excessive workload (including cognitive)
- Inadequate organizational change management
- Inadequate management of system downtime or slowdown
- Unclear policies
- Compromised communication among clinicians (i.e., during hand-offs)
- Interactions with other (non-HIT) care systems
- Physical environment (e.g., hardware location, lighting, engineering)
- Hardware failure
- Inadequately secured data
- Use error in the absence of other factors
- Other (specify)

Save Hazard and Exit
EHR’s Potential to Cause Errors – Examples

- Wrong weight – chemo dose wrong
- Ordered dose on K+ based on old result that displayed on the order form (one was pending)
- Plan of care copied forward from previous entry yesterday and patient treated based on old data
- No place to indicate right vs. left on procedure order forms
- Workarounds that bypass safety checks
What’s wrong with this picture?
Role of the Nursing Informaticist: HIT Safety Strategies
Fukushima Disaster: “Totally Preventable”
Informatics Role: Six Steps for Implementing and Adopting a Health IT Safety Program

1. Implement an Organizational structure for Nursing Informatics
2. Participate in the development and implementation of an EHR Risk Mitigation strategy
3. Lead efforts to monitor and address workarounds
4. Measure and report EHR safety events
5. Develop contingency planning for Disaster Informatics
6. Promote ongoing education, collaboration, and optimization
Ongoing Structure & Support: Key Considerations For Monitoring EHR Safety

- Number of FTEs needed
- Reporting structure
- Rounding Hours
- Bi-directional feedback
- Enhancements: Recommendations to improve safety?
Who, What, When, Why?: Evaluate For Safety

![Bar chart showing the number of issues in various categories.]

- **Training**: 21
- **Access**: 12
- **General Question**: 10
- **Does Not Work**: 8
- **Provisioning Issue**: 7
- **Log-on/off**: 5
- **Locating Documentation**: 5
- **Documenting Correctly**: 3
- **Process Issue**: 2
- **Order Entry**: 2
- **Customization**: 2
- **Troubleshooting**: 1
- **Training- Registration & Initiation of WBTs**: 1
- **Medication Reconciliation**: 1
- **Documentation Modification**: 1
- **Dithered Button**: 1
- **Data Entry Error**: 1
- **Configuration Error**: 1
Step 2: EHR Risk Mitigation Strategy

- Does your organization have a plan?
- Who is managing this in your organization?
- What is your role in the EHR risk mitigation plan?
- How is Risk Management aligned in the plan?
Joint Commission 13 Suggested Actions

1. Examine workflow processes and procedures prior to HIT implementation
2. Actively involve clinicians and staff who will use/be affected by the HIT (full life cycle)
3. Assess HIT needs; require IT staff to interact with users outside their facility; reduce interfaces
4. Continuously monitor HIT for problems; address resultant workarounds/incomplete error reporting early
5. Provide training program for all types of clinicians and staff with refresher courses; focus on benefits
6. Create and communicate policies specifying staff authorizations and responsibilities
7. Prior to taking a technology live, ensure all guidelines/standardized order sets are developed & tested
8. Develop a graduated system of safety alerts to aid clinicians in determining urgency and relevancy
9. Mitigate harmful drug orders by requiring dept/pharm review & signoff on orders created outside parameters
10. Provide an environment that protects staff involved in data entry from undue distractions when using HIT
11. Post implementation, continue to reassess/enhance safety effectiveness and error-detection capability
12. Post-implementation, continually monitor/report errors, near misses or close calls caused by HIT
13. Re-evaluate applicability of security and confidentiality protocols as more medical devices interface with the IT network

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E-iatrogenesis is where patient harm occurs at least partially due to HIT

- Associated with any aspect of a HIT occurring as a result of social or technical implications
- HIT includes all clinical information systems

Best Practice and Risk Mitigation
Coordinate through Risk Management
Minimize Interfaces

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Step 3: Optimization Focus

“And this is where our ED workflow redesign team went insane.”
Meaningful Use

• “The pace is too d--high,” says John Glaser, chief executive officer of Health Services at Siemens Healthcare, a major vendor. People are just cramming this stuff in.”
Examples of Common Workarounds

- Scan orders and medications of multiple patients at once instead of doing it each time the medication is dispensed
- Placing pillows over smart pumps to quiet alarms
- 20 foot extension cords for BCMA
- Bypassing dose mode safety features because doses not in smart pump library
- Others?
Tool # 4: STOP Workarounds

- **Hardwiring the Change Action Plan:**
  - Checklist of activities by week, month, year that super users, managers, directors, and C suite should perform to monitor and address workarounds

- **Workflow localization**
Tool # 5: Do You Have a Manager Toolkit?

- Easy access
- Update as new material available
- Clear ownership
Example Toolkit Safety Topics: Accountability

- Manager’s Day in the Life Checklist
- Patient Handoff
- Chart Checks
- Reporting: Reports Catalogue
- Downtime
- Using and Caring for Devices
- Tips for Coaching Changes in Processes
- Educate managers on UACs
## Step 4: Measure & Report

### Service - Clinical Adoption and Clinician / Physician Satisfaction

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Executive Champion</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standardized care is given in ED-nurses*</td>
<td>xx</td>
<td>3.01</td>
<td>2.75</td>
<td>3.84</td>
<td></td>
</tr>
<tr>
<td>Clinical (non-physician) team satisfaction with access to information*</td>
<td>xx</td>
<td>2.75</td>
<td>3.09</td>
<td>3.42</td>
<td></td>
</tr>
</tbody>
</table>

### Outcomes - Safety and Quality

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Executive Champion</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
</tr>
</thead>
<tbody>
<tr>
<td>% utilization of EMR documentation (PowerNote) by ED physicians</td>
<td>xx</td>
<td>96.8%</td>
<td>95.2%</td>
<td>95.9%</td>
<td>91.8%</td>
</tr>
<tr>
<td>% ED CPOE</td>
<td>xx</td>
<td>85.1%</td>
<td>89.2%</td>
<td>91.3%</td>
<td>93.4%</td>
</tr>
<tr>
<td>Decrease in medication error rates in ED</td>
<td>xx</td>
<td>0.24</td>
<td>0.38</td>
<td>0.27</td>
<td>0.21</td>
</tr>
<tr>
<td>Reduction in # of clinically reported cases of urinary catheter associated UTIs</td>
<td>xx</td>
<td>2.07</td>
<td>3.89</td>
<td>2.25</td>
<td>3.21</td>
</tr>
<tr>
<td>Reduction in rate of clinically reported significant hospital falls</td>
<td>xx</td>
<td>0.08</td>
<td>0.08</td>
<td>-</td>
<td>0.10</td>
</tr>
<tr>
<td>Utilization of bar-coded patient identification bands in medication administration at point of use</td>
<td>xx</td>
<td>88.8%</td>
<td>86.4%</td>
<td>89.7%</td>
<td>89.3%</td>
</tr>
<tr>
<td>Inpatient verbal orders co-signed within 48 hours</td>
<td>xx</td>
<td>93.7%</td>
<td>91.4%</td>
<td>93.6%</td>
<td>92.7%</td>
</tr>
</tbody>
</table>
Step 5: Disaster Planning

Policies and Procedures

• Planned and unplanned Downtime Scenarios

• Practice: Mock drills

• Annual training and competency
Potential Medication Safety Issues During Downtime

• Literature scant for downtime impact
• Upgrades, patches, viruses, network issues...
• Survey: Self reported events
  – 39 medication errors
    • 14 reached patient; intervention required (1) and increased LOS (1)
  – Medication errors occurred despite backup systems and standard protocols
  – AVOID downtime at all costs

Example Downtime Drill Questions

1. Where are downtime materials located on your unit?
2. For a planned downtime, how do you know which components of the EHR will be down and for how long? Where can you find this information? What about for unplanned downtime?
3. How do you get Results during downtime?
4. How do you handle Orders during downtime?
5. How do you document vital signs and assessments during downtime?
6. How do you document medications during downtime?
7. What should be back-documented when the EHR is down less than 2 hours?
8. What should be back-documented when the EHR is down for more than 2 hours?
Step 6: Education and Training

“We didn’t know what we didn’t know…”

- Share information and safety concerns with staff across geographic locations and vendor users
  - Participate in Nursing Informatics councils (vendor and professional)
- Promote Continuous learning
  - Advanced training with safety focus
  - Safety focused tailored tips and updates
  - Grow Informatics competencies
Keep Your Super Users Engaged...

Implementation  Super Users  Safety & Optimization

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More Tools On The Way...
SAFER

- Based on Sociotechnical Model for HIT
  - Hardware/Software computing infrastructure
  - Clinical content
  - Human Computer interface
  - People
  - Workflow and communication
  - Internal organizational policies, procedures, and culture
  - External rules, regulations and pressures
  - System measurement and monitoring

- Self assessment guides for 9 high risk areas (CPOE, CDS, Test results Reporting, Communication between providers, Patient identification, Downtime, Customization and Config, Interfaces, HIT human skills)
Summary

• While EHRs can improve safety, they can also cause harm if not properly designed, used, and monitored

• Organizations need to have an EHR Risk Mitigation strategy in place with clear roles and responsibilities

• Accountability is paramount to safety

• Be prepared for disasters (downtime)
Questions?

1. Has your organization experienced any EHR safety related events?

2. What can you take back to your organization to improve EHR safety?
Contact Information

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