Improving Safety of Computerized Prescriber Order Entry Through Event-Based Testing

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ISMP
ISMP

• National Medication Errors Reporting Program (ISMP MERP) begun in 1974

• Published first *Medication Safety Alert!* In 1996

• Only non-profit 501(c)(3) organization dedicated entirely to medication error prevention and safe medication use
ISMP

To advance patient safety worldwide by empowering the healthcare community, including consumers, to prevent medication errors

• Accomplishing our mission
  – Disseminating safety information, tools, strategies
  – Educating about safe medication practices
  – Collaborating with other safety organizations
ISMP and HCIF Collaborations


• Best Practices on the Safe Use of Anticoagulants (2007)

• Improving the Safe Use of HYDROMorphine (2011)
The Project

Partners
- HCIF
- ISMP

Goal
- Evaluate the level of medication safety afforded by clinical decision support (CDS) in CPOE systems in regional hospitals; identify opportunities for improvement

Funding
- Partnership for Patient Care
- Cardinal Health Foundation
ISMP and CPOE Evaluation

- Assisted in development of test cases for the Leapfrog CPOE Evaluation Tool
- Expansion of cases
  - new test patients and orders based on error reports and observed shortcomings
  - developed additional probing questions designed to evaluate safety of CPOE
- Used by ISMP to assess performance of systems in small and large hospitals; customized to patient populations
ISMP Observations

- *Utilization increased significantly* to meet Meaningful Use goals
- Many new purchases and implementations
- Less than desired, expected, development of workarounds, errors
- Increased use of verbal/telephone orders; entry of orders by non-providers
  - *If alerts present not viewed by the intended recipient*
ISMP Observations

• Alerts not active for
  – Patient allergies
  – Maximum doses (single and daily)
  – Duplicate therapy
  – Severe drug-drug interactions
  – Age-related dose warnings
  – Drug-disease state warnings
  – Few or no hard stops

• Alerts implemented for pharmacists, but not prescribers
The project scope was 8 hospitals.
Six signed on to participate.

Time line: two visits over 12 months.

ISMP met with a team at each facility and tested their CPOE system.
*pharmacy verification

A summary report was sent to each hospital.
The Project

- Plan: give time for adjustments/updates to be made
- Hospitals were given the option of a follow-up
  - Two hospitals requested visits
  - Others declined as they were still working on changes
## Case Report

### Hospital Test – *Initial Visit*

- No maximum dose warnings activated
- No duplicate therapy alerts fired for prescribers (some alerted pharmacist)
- No alert when wrong route is ordered (insulin glargine)
- No alert for serious drug interactions
- No warning for excessive dose of drug based on renal function
Case Report

Hospital Test – *Follow Up Visit*

- Several maximum dose alerts now functional (benzodiazepines)
- Duplicate alerts activated for several drug classes
- Some dosing alerts built for renal function
- Contraindicated routes of administration activated
- Hard stops for morphine and HYDROmorphone
- Working on methotrexate
Maximum Dose Warnings

*Initial visit data*

- Atenolol 100 mg QID – 4 of 6
- Amphotericin 220 mg – 3 of 6
- Acetaminophen – 3 of 5
  - CPOE will allow as needed orders for multiple agents; tested at medication administration
  - Two sites (different systems) user gets a hard stop after 4 g have been administered in 24 hours
Pediatric Dosing Alerts

Morphine 10 mg IV to 17 kg, 4 year old child

- 2 systems alerted
- 1 organization requires use of a weight-based order set
- 3 sites it could be ordered
- ED issues:
  - May not be screened by pharmacy-autoverified orders
  - Decision support unknown or known to be lacking in separate ED system
Pregnancy and Lactation

Metronidazole and lactation

- 4 of 5 systems alerted to a potential problem

Isotretinoin and pregnancy

- 3 of 6 systems alerted users of a problem
- Other sites either had no alert for this combination, or had no alerts at all for medications contraindicated in pregnancy
<table>
<thead>
<tr>
<th>Laboratory Alerts</th>
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</thead>
<tbody>
<tr>
<td><strong>Levaquin with creatinine clearance less than 50 mL/min</strong></td>
</tr>
<tr>
<td>• 5 tested, none alerted</td>
</tr>
<tr>
<td><strong>Metformin and elevated serum creatinine</strong></td>
</tr>
<tr>
<td>• 2 of 5 tested alerted</td>
</tr>
<tr>
<td><strong>Rivaroxaban with decreased creatinine clearance</strong></td>
</tr>
<tr>
<td>• 3 had no alert</td>
</tr>
<tr>
<td>• 1 had alert for pharmacy only</td>
</tr>
<tr>
<td>• 1 had built a rule that was not functioning</td>
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</tbody>
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Ongoing Issues & Challenges

• Different systems in use
• Old platforms; functionality available in newer versions
• Struggles moving to next level of decision support
  – warnings/stops for pregnancy and lactation
  – drug orders and laboratory results
  – Decision support for non-formulary medications
  – methotrexate
Project Feedback

- Quicker and more simple than other CPOE assessments
- Much better than other CPOE assessments
- We found this very informative
- We thought we had this fixed
- This was very revealing
Project Benefits

• **How did participating organizations benefit?**
  – Outside eyes
  – Learning environment
  – Brought CPOE and clinical decision support back into focus
  – Realization/reminder that there is still work to be done
  – Changes made to improve safe prescribing using CPOE systems
Thanks

• Hospital participants
• Partnership for Patient Care
• Cardinal Health Foundation
• Partnership with The Healthcare Improvement Foundation