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

The Healthcare Improvement Foundation
Partnership for Patient Care Leadership Summit 2017

THE HEALTH CARE IMPROVEMENT FOUNDATION
Building Partnerships For Better Health Care

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Partnership for Patient Care

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

- Regional Medication Safety Program for Hospitals [RMSPH] (2002-2003)
- Best Practices on the Safe Use of Anticoagulants (2007)
- Improving the Safe Use of HYDROmorphone (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*

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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

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

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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

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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

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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

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Laboratory Alerts

Levaquin with *creatinine clearance* less than 50 mL/min	• 5 tested, none alerted
Metformin and elevated serum creatinine	• 2 of 5 tested alerted
Rivaroxaban with decreased creatinine clearance	• 3 had no alert • 1 had alert for pharmacy only • 1 had built a rule that was not functioning

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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

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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

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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