Patient Safety Tip of the Week

May 3, 2016 Clinical Decision Support Malfunction

We are big fans of clinical decision support systems (CDSS) as patient safety tools, keeping in mind that too much CDSS may lead to alert fatigue and unintended consequences. But well-reasoned clinical decision support rules that are also adequately tested for both validity and usability may be very effective tools.

Brigham and Women's Hospital (BWH) in Boston probably has the most robust CDSS of any healthcare organization anywhere and they just reported some disturbing findings on malfunctions of CDSS alerts (Wright 2016). Serendipitously, the lead author had noted one such alert malfunction while he was demonstrating the CDSS. It happened to be an alert that would remind physicians to check the TSH level in patients who had been on amiodarone for at least a year. The research team subsequently identified three other examples of CDSS alert malfunctions and conducted a sample survey of CMIO's at various hospitals and found most of them had also experienced CDSS malfunctions.

Alarmingly, they found that the alert malfunctions were often very difficult to detect and some had eluded detection for long periods of time (weeks or even years!). Moreover, the causes for the malfunctions were sometimes even more difficult to elucidate. They were, however, able to identify several contributing factors:

- EHR software updates
- Changes to data codes or clinical terminology
- Inadvertent changes to logic for the rules

Changes to some of the data codes or data fields are often made by IT staff or external vendors who are not part of the CDSS team and such changes may not be apparent to the CDSS team members. For example, in the TSH/amiodarone example, a change had been made to the drug code for amiodarone.

Alert malfunctions were most often first identified by end-users. But those most often occurred when suddenly there was a spike in the frequency of alerts for one or many alerts. Alerts that failed to fire after malfunction were far more likely to elude detection.

The authors have several important recommendations:

- CDSS rules (for both new and existing alerts) should be tested any time there is a major EHR software upgrade
- Any changes in coding or clinical terminology must be communicated to all CDSS staff
- Tools must be developed and implemented to test downstream effects of any changes in coding or terminology

- Proactive monitoring tools must be developed to detect possible alert malfunctions
- There must be proactive monitoring of any external services that may impact CDSS
- Such external systems, such as those impacting coding or clinical terminology, need to be more fault-tolerant and robust
- CDSS logic, rules and alerts should be tested by a different analyst than the one who built the content
- Better quality assurance testing is needed to ensure CDSS's function properly

The BWH researchers have identified a significant vulnerability in our CDSS operations, one that has important patient safety implications. This is a study that every healthcare organization needs to pay careful attention to and evaluate their own actual or potential vulnerabilities.

And, of course, most of you by now have seen the results of The Leapfrog Group's most recent report on how hospitals perform on their CPOE evaluation tool (Leapfrog 2016). We've written about the Leapfrog tool in several prior columns (see our previous columns for July 27, 2010 "EMR's Still Have a Long Way to Go" and June 2012 "Leapfrog CPOE Simulation: Improvement But Still Shortfalls" and March 2015 "CPOE Fails to Catch Prescribing Errors").

To fully meet Leapfrog's standard, hospitals must:

- Demonstrate that the system alerts physicians to at least 50% of common, serious prescribing errors; and
- Order at least 75% of inpatient medication orders through a CPOE system.

In 2015 nearly two-thirds of hospitals (64%) fully met the standard, showing a considerable improvement compared to 14% in 2010. The hospitals also demonstrated improved performance in medication reconciliation. However, on the 2015 Leapfrog Hospital Survey, hospitals' CPOE systems failed to flag 39% of all potentially harmful drug orders, or nearly two out of every five orders. The systems also missed 13% of potentially fatal orders.

The Wright study and the Leapfrog study demonstrate that it is never enough to simply implement a CPOE system or e-prescribing system with clinical decision support systems and assume your patients will be safe from medication errors. Clearly, ongoing evaluation and assessment using validated tools are important to identify vulnerabilities that may be unexpected. We, of course, should expect better design and function from our IT vendors. However, the Wright study clearly shows that problems may arise even when the initial design and implementation were good yet changes to systems or files result in gaps that may go unidentified for long periods.

See some of our other Patient Safety Tip of the Week columns dealing with unintended consequences of technology and other healthcare IT issues:

- June 19, 2007 "Unintended Consequences of Technological Solutions"
- May 20, 2008 "CPOE Unintended Consequences – Are Wrong Patient Errors More Common?"
- June 17, 2008 "Technology Workarounds Defeat Safety Intent"
- August 26, 2008 "Pattern Recognition and CPOE"
- September 9, 2008 "Less is More….and Do You Really Need that Decimal?"
- December 16, 2008 "Joint Commission Sentinel Event Alert on Hazards of Healthcare IT"
- February 2009 "Healthcare IT The Good and The Bad"
- March 3, 2009 "Overriding Alerts…Like Surfin' the Web"
- October 2009 "A Cautious View on CPOE"
- November 24, 2009 "Another Rough Month for Healthcare IT
- April 20, 2010 "HIT's Limited Impact on Quality To Date"
- March 22, 2011 "An EMR Feature Detrimental to Teamwork and Patient Safety"
- June 26, 2012 "Using Patient Photos to Reduce CPOE Errors"
- June 2012 "Leapfrog CPOE Simulation: Improvement But Still Shortfalls"
- July 17, 2012 "More on Wrong-Patient CPOE"
- January 2013 "More IT Unintended Consequences"
- April 30, 2013 "Photographic Identification to Prevent Errors"
- October 8, 2013 "EMR Problems in the ED"
- March 11, 2014 "We Miss the Graphic Flowchart!"
- October 2014 "Ebola Exposes Fundamental Flaw"
- January 2015 "Beneficial Effect of EMR on Patient Safety"
- March 2015 "CPOE Fails to Catch Prescribing Errors"
- March 31, 2015 "Clinical Decision Support for Pneumonia"
- August 2015 "Newborn Name Confusion"
- December 2015 "Opioid Alert Fatigue"
- January 12, 2016 "New Resources on Improving Safety of Healthcare IT"
- January 19, 2016 "Patient Identification in the Spotlight"
- February 9, 2016 "It was just a matter of time…"
- April 5, 2016 "Workarounds Overriding Safety"

References:

Wright A, Hickman T-T T, McEvoy D, et al. Analysis of clinical decision support system malfunctions: a case series and survey. JAMIA 2016; First published online: 28 March 2016
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The Leapfrog Group. Hospitals' Computerized Systems Proven to Prevent Medication Errors, but More is Needed to Protect Patients from Harm or Death. The Leapfrog Group 2016; April 7, 2016

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