CDSS CHANGE IMPACTS PATIENT SAFETY

Programming Error Leads to Missed Alert

Clinical decision support systems (CDSS) aim to improve health care quality, safety and effectiveness by providing alerts to providers based on criteria (such as identifying drug interactions). However, a malfunctioning CDSS can actually reduce patient safety when physicians rely on these alerts.

"CDSS malfunctions are widespread and often persist for long periods. The failure of alerts to fire is particularly difficult to detect. A range of causes, including changes in codes and fields, software upgrades, inadvertent disabling or editing of rules, and malfunctions of external systems commonly contribute to CDSS malfunctions, and current approaches for preventing and detecting such malfunctions are inadequate."

- Analysis of clinical decision support system malfunctions: a case series and survey
  Adam Wright, Thu-Trang T. Hickman, Dustin McEvoy, Skye Aaron, Angela Al, Jan Marie Andersen, Saliman Hussen, Rachel Ramoni, Julie Fiskio, Dean F. Sittig, David W. Bates
  Journal of the American Medical Informatics Association Mar 2016, DOI:10.1093/jamia/ocv005

**Cause Map**

<table>
<thead>
<tr>
<th>Problem</th>
<th>Analysis</th>
<th>Solutions</th>
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</table>
| Problem(s) | Problem: Missing alert; potential for missed testing
Date | November 2009 to February 2013 |
Time | N/A |
Where | Internal code for drug changed
Facility, site | Hospital |
| Task being performed | Clinical decision support system (CDSS)
| | Evaluation of patients treated with amiodarone |
| Impact to the Goals | Patient Safety: Potential for untreated thyroid issues
Patient Services: Potential for missed thyroid testing |
| Frequency | 93% of surveyed Medical Information Officers experienced at least 1 CDSS malfunction |

**Basic Cause-and-Effect**

The CDSS malfunction in this case study involved a stopped alert for annual thyroid testing in patients prescribed amiodarone. When the issue was noticed and resolved in February 2013, it was determined that the alert had been stopped since November 2009, when the internal code for the drug amiodarone was changed.

**More Detailed Cause Map**

- **Evidence:** Common side effect of hypothyroidism is less common side effect of hyperthyroidism
- **Effect:** Potentially untreated patients will not receive annual thyroid testing
- **Cause:** Amiodarone patients who had an annual thyroid test ordered are flagged for continued monitoring.

**Step 3. Solutions**

The issue was identified during a demonstration of this particular feature of the CDSS and fixed the next day. While the details aren’t known, this issue identifies an ineffective change management program. When changes are made within systems, change management processes are necessary to ensure there are no unintended consequences. While updating the amiodarone code in the alert logic fixed this particular problem, a robust change management program is necessary to ensure that there are no other unintended consequences that could affect patient safety.

**CDSS CHANGE IMPACTS PATIENT SAFETY: Programming Error Leads to Missed Alert**

- **Problem:** Missing alert; potential for missed testing
- **Date:** November 2009 to February 2013
- **Time:** N/A
- **When:** Internal code for drug changed
- **Where:** Hospital
- **What:** Clinical decision support system (CDSS)
- **Impact to the Goals:**
  - Patient Safety: Potential for untreated thyroid issues
  - Patient Services: Potential for missed thyroid testing
- **Frequency:** 93% of surveyed Medical Information Officers experienced at least 1 CDSS malfunction

**Cause Mapping**

**Problem Solving:** Incident Investigation • Root Cause Analysis

**Step 1. Problem**

- **What’s the Problem?**
- **Why did it happen?**
- **What will be done?**

**Step 2. Analysis**

- **Basic Level Cause Map**
  - Start with simple Why questions.
  - Many medications have side effects that require ongoing treatment.

**Step 3. Solutions**

- **Immediate solution:** Update alert logic to include new drug code
- **Long-term solution:** Implement robust change management program

**Why?**

- **Effect:** Potentially untreated patients will not receive annual thyroid testing
- **Cause:** Amiodarone patients who had an annual thyroid test ordered are flagged for continued monitoring.

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