



Children's Hospital Colorado

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Evaluation of a Smart Labeling System and its Impact on Charge Capture and Medication Errors

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Background

- Medication errors (ME) continue to be problematic in healthcare. Labeling errors are the most common ME occurring 24.2% of the time¹
- Perioperative ME rates have been reported as high as 1 per 20 cases and have been attributed to the medication management system and safety checks.
- Codonics 500i Safe Label System (SLS) is a labeling system that claims to improve patient safety and labeling compliance.

Objectives

- To improve labeling compliance in operating rooms (OR).
- To improve charge capture of medications administered intraoperatively
- To improve workflow user satisfaction

Methods

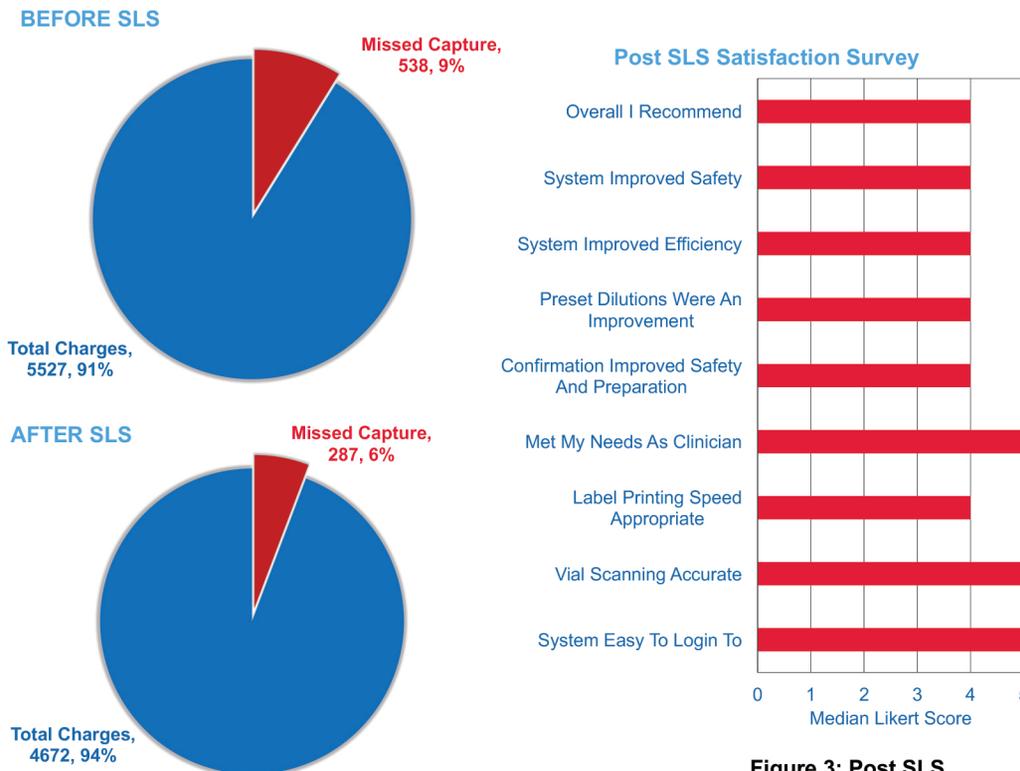
- Colorado Medical Internal Review Board, IRB exempt, single center, prospective cohort study.
- During the months Nov-Dec, we audited a cohort of ORs to evaluate baseline compliance of syringes containing medication with each of the Joint Commission(TJC) label elements, our primary dependent variable
- During this time, the EMR was audited to assess what medications were administered in comparison to what medications were charged to establish a baseline charge capture rate, our secondary dependent variable
- We implemented our SLS intervention in Jan-Apr 2016 and the ORs were audited again post intervention for labeling compliance and charge capture rate from Apr-Jul 2016
- Afterward, an anonymous user satisfaction survey was to providers to determine our third dependent variable, user satisfaction.

Results

Figure 1: Labelling compliance pre-SLS and post-SLS



Figure 2: Charge capture before and after SLS. Before implementing the SLS, the average daily rate of missed charges was 9.7% (538 of total 5527) resulting in an estimated cost of \$8,098.97 per month to the pharmacy. After implementing SLS, the average daily rate of missed charges was 6.1% (287 of 4672) resulting in an estimated cost of \$640.22 per month cost total to the pharmacy



Post SLS Satisfaction Survey

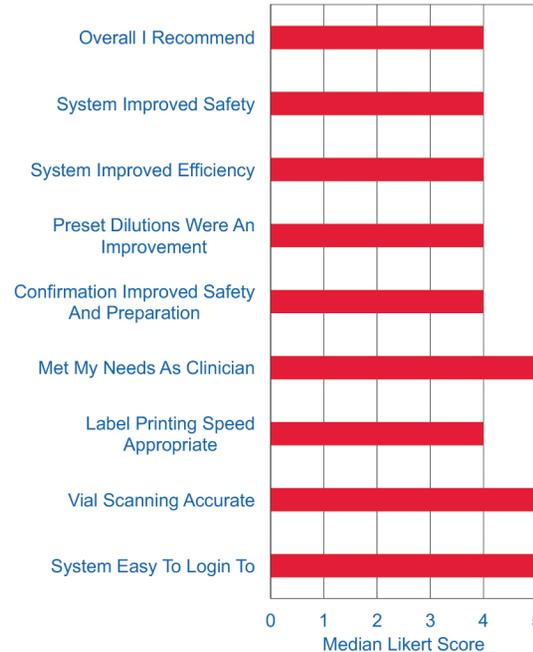


Figure 3: Post SLS Satisfaction (5 indicating highest agreement)

Statistical Analysis

- Frequencies were calculated for categorical outcomes and presented with Wilson 95% confidence intervals.
- Chi square test was used to compare the rate of missed labels between time periods
- A two tailed unpaired T test was used to analyze the difference between two population proportions.
- Descriptive statistics were also utilized

Conclusions

- This research project demonstrates how implementation of a SLS can increase labeling compliance, increase charge capture and increase user satisfaction.
- Potential limitations of our study
 - 1) Our results come from specific ORs in a single hospital
 - 2) Seasonal and secular effects could not be captured in 9 months.

Future Directions

- Follow up in multiple different hospitals over longer periods could improve validity by limiting these biases.
- More research is needed to evaluate the clinical impact of SLS in reducing medical errors.

References

- Nanji KC, Patel A, Shaikh S, Seger DL, Bates DW. Evaluation of Perioperative Medication Errors and Adverse Drug Events. Anesthesiology. 2016;124(1):25-34

Disclosures

- Authors disclose Omnicell provided the 500i Safe Labeling Systems (SLS) used in this study

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Purpose: Patient safety challenges unique to the perioperative setting can potentially increase the risk of medication errors (MEs). Perioperative ME rates have been reported as high as 1 per 20 cases and have been attributed to the medication management system and safety checks used in each hospital. The purpose of this collaborative project between the Department of Anesthesia and Department of Pharmacy was to evaluate the impact of the Codonics Safe Label System (SLS) on MEs and charge capture. Secondary objectives included identifying factors related to charge capture associated with MEs and adverse drug events.

Methods: The Children's Hospital Colorado Quality Improvement Review Panel approved this retrospective chart review. An EPIC report identified all perioperative patients from November 2015 to July 2016. Patients of all ages were included if they received at least one medication from the Omnicell Anesthesia Workstation (AWS) in the main operating rooms (ORs) or procedure center. Cardiac OR, maternal-fetal OR, and off-site encounters were excluded. Codonics SLS machines were installed in four ORs in February 2016. Data were not collected for 2 months after installation to allow for staff training. Data collection post implementation was restricted to the four rooms that housed a Codonics SLS machine. Data collected included date and time of procedure, patient medical record number, procedure location, staffing anesthesiologist, medications with charge capture discrepancy, and medication cost. Medication costs were updated before and after implementation to represent actual cost. The primary outcome measure was the frequency and cost associated with discrepancies between the documented medication administration report in EPIC and the medications charged to the

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patient. Secondary outcome measures included medication name and route of administration. It was determined that a minimum sample size of 1,354 patients would yield an 80% power to detect a difference between groups. A one-tailed z-score test was used to analyze the difference between two population proportions. All analysis was performed with PRISM GraphPad, version 6.

Results: There were 1,014 patients in the pre-Codonics group and 958 patients in the post-Codonics group. Implementation of Codonics SLS improved charge capture by 3.62%. This improvement is statistically significant (z-score 6.66, p-value < 0.05). A charge capture improvement of \$26,774 and revenue realization of \$9,639 were observed. These values were extrapolated to a potential annual savings of \$384,172 per 30,000 patients. Medications most frequently associated with discrepancies were topical lidocaine (n=100, 12%), cefazolin (n=99, 12%), ketorolac (n=99, 12%), and dexamethasone (n=94, 11%). Route of administration most frequently associated with discrepancies were intravenous (n=681, 83%) and topical (n=144, 17%).

Conclusion: Medication management systems with built-in safety checks can improve charge capture and have the potential to decrease ME. Investigators expect to see an increase in revenue after large-scale implementation of Codonics SLS at Children's Hospital Colorado. More research is needed to evaluate the clinical impact of Codonics SLS in reducing ME.