Medication Safety: “Bolus from the Bag”

**Problem**
- Lack of standardization of process led to variation in medication administration via smart infusion pumps
- Costs were incurred from nursing time and single dose medication use when boluses were given from individual vials rather than the running infusion bag of the same medication

**Background**
- The organization supports high reliability processes and efforts to improve outcomes
- The Clinical Nurse Specialist (CNS) role at Aurora St. Luke’s Medical Center is one of leadership, collaboration, education, and implementation of evidence-based practice to achieve improved patient outcomes. The CNS’s on this project were part of an inter-professional leadership team whose goal was to improve process and outcomes
- Smart infusion pumps incorporate safety guardrails and had the ability to leverage and align current technology
- The electronic medical record (EMR) did not currently support documentation of administering a bolus of medication from a running intravenous (IV) infusion.
- Root cause analysis of a safety event revealed variation in medication administration of many intravenous drugs, including lidocaine
- Analysis revealed workarounds in nursing practice and documentation
  - Nurses administered appropriate bolus doses through smart infusion pumps but did not document appropriately, leading to diversion investigation

**Setting & Population**
- 938-bed acute care urban medical center
  - Six intensive care units and 18 inpatient units
  - One hospital as part of a large integrated health system utilizing an EMR for documentation
- The CNS role is unit-based and works within a dyad team model consisting of the unit Nurse Manager and CNS

**Methods**
- Plan
  - Inter-professional team, led by two CNS’s and a Pharmacist, collaborated to leverage and align current technology
  - This collaboration led to a proposed change in current process of medication administration and EMR documentation
  - Proposed change, at the system level, was to allow nurses to administer medication boluses in adult patients through the existing IV line on the infusion pump
  - Prior to implementation, the smart infusion pump technology had 32 medications with bolus from bag options that were not being utilized

- Do
  - A time study on the current administration process was done in an intensive care unit to evaluate initial nurse workflow efficiency with administration of IV push fentanyl
  - June 2017, the team met with stakeholders involved and proposed change-system teams included informatics, nursing, pharmacy, system shared governance council, and system medication safety committee
  - Proposed alignment of new workflow with concurrent Joint Commission titratable infusion project
  - August-December 2017, EMR build including building Medication Administration Record (MAR) orders to allow for charting of bolus from the bag
  - December 2017, January 2018, training for nursing done by unit based CNSs and Nurse Clinicians
  - Go-live date of January 25, 2018

- Study
  - Provides clear medication instructions to the nurses on how to administer bolus dose
  - Ensures bolus is administered within safety guardrails
  - Prevents workarounds
  - Allows easier complete documentation

- Act
  - Effective process change as evidenced by resource utilization and efficiency measures

**Findings**
- Fentanyl infusion utilization in Aurora Health Care Emergency Departments, Operating Rooms, and Intensive Care Units included 1,969 patients and 10,082 bolus doses during January-June, 2018
- Before go live 10,082 IV fentanyl doses were estimated to take a nurse 10 minutes for each administration. This equated to a total of 1,680 nursing hours or $67,213.00 in nursing time
- After go live fentanyl from the bag doses were estimated to take 1.5 minutes per dose. This equated to a total of 252 hours or $10,080.00 in nursing time compared to the same number of doses utilized
- If nurses had given the same volume of doses in the pre and post time frames, difference of spending 1680 hours and $67,213 instead of 252 hours and $10,080
- With the additional 30 medications added to the EMR bolus from the bag functionality, this has resulted in 12,433 bolus from the bag doses utilized
- Annualized to a cost savings of over $110,000

**Conclusions**
- Bolus from the bag functionality ensures boluses are administered within safety guardrails
- New functionality has translated to financial savings
- Standardization of workflow and process eliminated variation present before implementation
- Allows for accurate documentation and improves medication safety with elimination of previously identified workarounds
- New process contributed to cost savings from decreased RN time per dose, improving workflow and efficiency
- Implementation of best practice can be difficult when proposing system level changes. Overcoming these challenges through leadership commitment to zero harm and high reliability (Chassin & Loeb, 2013) were instrumental to the success of this project
- CNS leadership of this project was instrumental to identifying high risk processes and developing workable solutions for improving patient safety
- Technological functionality via Smart Pumps available to end users should be leveraged to improve patient safety

**References**

**Acknowledgements**
Melissa Dahlgren, Pharm D, BCPS, Specialty Pharmacy Coordinator
Hsieng So, MD, ASLMC Chief Medical Officer
Theresa Voe, MS, BSN, RN, CRRN, ASLMC Chief Nursing Officer
Lee Jeske, MS, RN, GCNS-BC, Director of Advanced Practice Nursing
Sara Marzinski BSN, RN, CCRN-K, Magnet Program Manager
Aurora System Clinical Documentation and Willow Pharmacy Teams
Aurora System Medication Safety Team

**Table: Comparison of Cost Pre/Post Implementation of Bolus from the Bag**

<table>
<thead>
<tr>
<th>Cost (Dollars)</th>
<th>Pre 6-month</th>
<th>Post 6-month</th>
</tr>
</thead>
<tbody>
<tr>
<td>$-</td>
<td>$10,082.00</td>
<td>$30,000.00</td>
</tr>
<tr>
<td>$5,000.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$10,000.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$15,000.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$20,000.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$25,000.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$30,000.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$35,000.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$40,000.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$45,000.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Graph: Bolus from the Bag Utilization Pre/Post Comparison**
- Jan - Jun, 2017 Pre - Bolus from the Bag
- Jan - Jun, 2018 Post - Bolus from the Bag
- Comparison of Cost Pre/Post Implementation of Bolus from the Bag

**Figure:**
- Picture of a medication administration protocol

**Figure:**
- Picture of a medication administration protocol

**Figure:**
- Picture of a medication administration protocol