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Improving Patient Safety: Reducing Medication Errors in the Microsystem

University of San Francisco

Erica Dent

Specific Aim Statement: We aim to improve the process of medication management and administration and reduce medication errors by 20% in the medical-surgical/telemetry units within eight months.

Background:
There has been a fifteen percent increase of medication errors that the pharmacy department has detected across nursing, and pharmacy departments, as well as with physicians from both day and night shifts. Over the last month there has been a total of eight medication errors including the transcription, administration, evaluation, and documentation processes. The institution is a 72-bed for-profit long-term acute care (LTAC) hospital located in an urban setting. The institution is JCAHO accredited and meets standards for staffing ratios. The microsystem consists of a telemetry/medical-surgical unit as well as a small intensive care unit consisting of ten beds. The pharmacy director and director of nursing have been working together in identifying medication errors over the last two years and have been providing the appropriate amount of follow up, counseling and education for each specific error.

Supportive Data:
A Failure Mode and Effects Analysis (FMEA) was completed in order to understand the impact of the medication management process and contributing factors leading to errors and identified multiple errors in relation to this project. The Fishbone Diagram, Figure 1 in Appendix A, indicates fifteen issues that contribute to medication errors within the current microsystem. Among the fifteen issues, three major issues are the focus of this project: policy and procedures, the transcription process, environmental distractions.

The hospital policies and procedures, dated 2010, for medication administration are in need for revision to include the Computerized Physician Order Entry (CPOE) policy and the transcription process for physician orders into the EMR is inconsistent as well. Handwritten orders remain the practice by some physicians with subsequent legibility issues that contribute to errors and the time needed for clarification.

A LTAC hospital is comparable to a step-down Intensive Care Unit in regards to the types of patients on the unit. Ninety percent of the patients on the floor are “total care” patients. Meaning they rely on the nurse or CNA with every aspect of care and ADLs. Due to the nature of this fast paced demanding workload, many distractions occur when administering medications and may contribute to medication errors.

In order to make steps to improve the medication management process, current policies and procedures regarding medication management need to be updated, transcription processes need to be consistent, and efforts should be made to find ways to decrease distractions during medication administration.
The Process Map/Flow chart, Figure 1 in Appendix B, indicates current steps in the medication administration process specific to hospital policies and procedures. If any of the steps in the process is omitted, error can occur in relation to medication administration. Areas colored blue indicate a major problem in the medication administration process that contributes to medication errors.

Microsystem Status Relative to the Project:
The SWOT Analysis, Figure 1 in Appendix C, indicates considerable support and opportunities for the project and addresses three threats for the project. The threats are the potential costs, staff compliance and time for training.

Summary of Evidence:

Search Strategies: The references in this review support the project of improving medication management processes and reducing medication errors in the hospital. The term “medication administration errors” and “nursing” led to the following selections ranging from 2008 to 2013 publications.

Databases Used: Ebscohost through the USF Online Library, Pub Med, and Google Scholar.

Evidence:

Barnsteiner, J. explains that incorporating culture of safety content into the education of healthcare professionals is necessary and important for new and experienced nurses.

Cheragi et al explains and evaluates the possible different types and causes of medication errors from the viewpoint of the nurses selected and found that the most important cause of medication errors was a lack of pharmacological knowledge. The most common types of errors that occurred involved wrong dosage and infusion rate and the most common types of causes of errors was using abbreviations instead of full names of drugs and similar drugs.

Flynn, L. et al argues that the nursing practice environment, staffing levels, nurses’ error interception practices, and rates of non-intercepted medication errors has a direct correlation with threats to patient safety as a result of medication errors reaching the patient.

Frith, K.H. et al asserts that nursing staffing, time pressures, unit environment and fatigue contributes to medication administration errors.

Garrett, S.K. et al argues that a reduction in work complexity and time spent gathering medication and supplies reduces medication errors.

Taylor, J.A. et al asserts that implementation of computerized physician order entry (CPOE) is associated with a reduction in medication administration variances.

Theoretical Direction:
The Diffusion of Innovation theory by Everett Rogers argues that diffusion is the process by which an innovation is communicated through certain channels over time among the participants.
in a social system. Considerations include factors associated with adaptation to change at certain rates.

Early adapters or staff champions will be identified in order to initiate the innovation and influence the social system currently in place and will be explained further in the Methods section.

**Stake Holder Analysis:**
- Four Pharmacists, six Pharmacy Technicians that provide professional pharmacy services including preparing and dispensing medications, as well as providing safety with medication management. There is a moderate to high level of influence within the organization in relation to medication management.
- Fifty-two Registered Nurses, twenty-four Licensed Vocational Nurses that provide professional nursing services to patients on medical-surgical and intensive care units, which includes the administration and monitoring of routine and PRN medications. They have moderate level of influence when they organize and group together.
- Eighteen Physicians and specialists that guide care to the patient. The physicians write orders for new and current medications. They have moderate to high level of influence
- Six administrators, including the Pharmacy Director, Director of Quality Assurance, Director of Nursing, the CCO, and CEO, that oversee patient care and quality control measures. They have a high level of influence due to planning the budget and costs for medication management, as well as improving overall safety in the hospital.

**Steps for Implementation, Timeline and Evaluation Methods:**
The implementation of this project will occur over eight months following approval by the stakeholders. Improvements of the medication management and administration process will require the support and collaboration of multiple disciplines to address several issues.

The timeline, Figure 1 in Appendix D, begins in January of 2015 and indicates a continuation of the medication administration audits by the pharmacy director, director of nursing, and CNL. Nursing supervisors will work directly with staff responsible for the errors, as is the current usual process. During the same month, work orders and requests will be placed for repairs of necessary equipment by nursing supervisors. The purchasing department will place orders for new equipment in order to replenish missing or lacking equipment. During February and March the CNL and DON will be focused on reviewing, evaluating, and updating policies and procedures regarding medication administration, as well as planning/preparing for providing education sessions to staff members and getting super users on board. During months April and May, education sessions will be implemented and super users will be available on the floor for assistance with the MAR and CPOE. At this time, the nurse educator and CNL will update staff members with recent copies of policies and procedures for medication administration and preventing errors. Sessions will also be provided for CPOE use. During months June and July, staff will continue to be provided with a resource nurse/super user to assist with issues arising in regards to medication administration and CPOE. During August 2015 medication administration error rates will be assessed and serve as an outcome evaluation that followed revision of procedures, staff education and new equipment. Surveys will be given to the staff by the CNL at three months, six months, and nine months in order to receive feedback and determine effectiveness of the project for early adopters and laggards. Surveys may also provide information for additional improvements and additional PDSA cycles.
**Business Case:**
The cost associated with making improvements to the medication administration process on medical-surgical units includes staff education, project planning, the addition of new equipment/equipment repairs, and associated time for reviewing and updating medication administration policies. IT and engineering employees will complete the necessary repairs to broken equipment and employees from the purchasing department will order necessary equipment.

Staff and estimated education time is 6 hours per session for approximately 25 staff members at a time, with a total of three sessions per month over the course of six months. The average staff hourly rate range is $20-80/hour (staffing consists of: Licensed Practical Nurses, Registered Nurses, physicians, Pharmacists, and Pharmacy technicians). The education plans will differ depending on the role of the staff member. Overall costs for education sessions are estimated at $47,248 (see Education Session Costs, Table 1 in Appendix E).

A CNL and DON will spend 8 hours per week for 4 weeks reviewing and evaluating current medication administration policies and procedures and updating as necessary, but will be included in their normal hours for the DON. The project director is a contribution by the CNL student and includes 220 hours at a rate of 45 dollars per hour = 9,900. The effort includes meetings, research, data collection, teaching sessions and collaborating with staff, creating a timeline and professional presentation. A registered nurse/super user will provide on shift assistance in 8 hour shifts to physicians and nurses with CPOE, as well as assistance in the medication administration process to the staff at a rate of $40 which will be a total of $360 per shift = $1080 per day for one month. Thirty new machines to measure patient vital signs at the bedside that will enable nurses to easily complete pre-administration assessments prior to administering medication were recently ordered at 1,100 per monitor = $33,000.

Despite the initial costs of education, repairing and replenishing equipment, and reviewing current procedures for medication administration, improving the medication administration process will allow for cost benefits by reducing medication errors and enhancing patient safety. A 2012 study of community hospitals estimates that each preventable adverse drug event increases costs by $3,511 per patient and increases each length of stay by 3.37 days (Hug, Keohane, Seger, Yoon, & Bates, 2012). According to the National Priorities Partnership, preventable inpatient medication errors account for 16.4 billion dollars annually (2010). In addition, improving the medication administration process and reducing medication errors will reduce patient care costs by avoiding unnecessary problems associated with medication errors, such as length of stay and additional medical supplies and intervention.

**Results:**
Activities indicated in the timeline (Appendix D) are up to date with a slight delay in the educational sessions. Vitals machines were ordered and placed at the bedside for each patient in order to ensure pre-administration assessments were no longer an issue or leading to prolonged medication administration. Updating policies and procedures as well as planning education curriculum has been completed. Super users for problem solving with the MAR and CPOE system have been implemented on all floors. Education sessions have been organized and are in currently place, however they are a week behind schedule.
The overall response has been energetic in particular to receiving new vitals machines and implementing super users. The physicians in particular have needed extra time to learn the CPOE system, but are now inputting orders into the system on their own accord. All scheduled staff members attended the education sessions thus far.

**Outcomes:**
Implementation of the project is continues to take place and the Specific Aim has not yet been met. Staff surveys for evaluation purposes will be distributed upon completion of the teaching sessions, which is projected to finish by August.

**Recommendations:**
Continue with the educational sessions and providing super user assistance on all floors. Schedule make-up education sessions if needed. Continue to gather medication administration error data in order to determine if the Specific Aim has been met. Distribute surveys for evaluation purposes.
Appendix A: Fishbone Diagram

Equipment
- Broken equipment
- Missing equipment
- Not enough computers
- Low Inventory
- Missing medications
- Missing medication administration-related supplies
- Lab results missing

People
- Clinical staff inconsistent
- Providers prolonging admission/discharge process
- Understaffed
- Stressful work environments leading to distractions
- Lack of training with and use of CPOE by physicians

Materials

Process
- Controlled substances are manually checked out
- Poor communication between staff
- Medication administration procedures not up-to-date

Medication Errors
Appendix B: Process Map/Flow Chart

1. **Need/order for new medication**
2. **Verification of patient allergies**
3. **Transcription of medication order into patient chart**
4. **Input medication order into EMAR**
5. **Pre-administration assessments**
   - **Check expiration date and integrity of medication**
   - **Notes and compares allergies to medication**
6. **Verifies 5 Rights of Administration (Patient, drug, dose, time, route)**
7. **Review of order with sent medication**
8. **Understand med purpose**
9. **IV med: Check Compatibility**
10. **Correct interval and volume of administration for IV med**
11. **Evaluation of medication**
12. **Notify physician of med refusal when necessary**
13. **Documentation**
14. **Double verification if high risk medication**
15. **Documentation of medication evaluation/efficacy**
## Appendix C: SWOT Analysis

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Strong leadership and management</td>
<td></td>
</tr>
<tr>
<td>• Cost saving advantages</td>
<td></td>
</tr>
<tr>
<td>• Improving technology</td>
<td></td>
</tr>
<tr>
<td>• Greater efficiency of processes</td>
<td></td>
</tr>
<tr>
<td>• Competent staff</td>
<td></td>
</tr>
<tr>
<td>• High costs</td>
<td></td>
</tr>
<tr>
<td>• Limitation on interoperability</td>
<td></td>
</tr>
<tr>
<td>• Requires personnel training</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Innovation and production</td>
<td></td>
</tr>
<tr>
<td>• Utilization of new services</td>
<td></td>
</tr>
<tr>
<td>• New technology and equipment</td>
<td></td>
</tr>
<tr>
<td>• Research projects</td>
<td></td>
</tr>
<tr>
<td>• Bad economy/high costs</td>
<td></td>
</tr>
<tr>
<td>• Staff compliance</td>
<td></td>
</tr>
<tr>
<td>• Reform and changes</td>
<td></td>
</tr>
</tbody>
</table>
Appendix D: Timeline

January
Continuation of medication administration record audits and identification of med errors by DON and Pharmacy Director
Compare chart audits over the last 6 months to chart audits done the previous two years with identified med errors
Counseling for errors found by CNL
Equipment repairs/order placement for new equipment by purchasing

February-March
Review, evaluate, update policies and procedures regarding medication administration by CNL
Planning education curriculum involving medication administration and CPOE by nurse educator and CNL
Arrange for Super Users

April-May
Staff education sessions by nurse educator and CNL of new information and CPOE
Implement super users on floors

June-July
Application of new practices
Resource nurse/super user assistance
Survey for feedback of new system

August
Secondary chart audit to compare to original
Staff surveys
## Appendix E: Table 1
### Education Session Costs

<table>
<thead>
<tr>
<th>Role</th>
<th>Number of staff</th>
<th>Hourly wage</th>
<th>Number of Staff per Education Session</th>
<th>Education Sessions over a 6 Month Period</th>
<th>Total Cost per 6 Hour Session</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>RN</td>
<td>52</td>
<td>$44</td>
<td>13</td>
<td>4</td>
<td>$3430</td>
<td>$13720</td>
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<tr>
<td>LPN</td>
<td>24</td>
<td>$27</td>
<td>6</td>
<td>4</td>
<td>$972</td>
<td>$3888</td>
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<tr>
<td>Pharmacist</td>
<td>4</td>
<td>$53</td>
<td>1</td>
<td>4</td>
<td>$318</td>
<td>$1272</td>
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<tr>
<td>Pharmacy Technician</td>
<td>6</td>
<td>$22</td>
<td>1</td>
<td>4</td>
<td>$132</td>
<td>$528</td>
</tr>
<tr>
<td>Physicians</td>
<td>18</td>
<td>$91</td>
<td>5</td>
<td>8</td>
<td>$2730</td>
<td>$21840</td>
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<tr>
<td>Super Users</td>
<td>6</td>
<td>$40</td>
<td>4</td>
<td>4 (teaching)</td>
<td>$240</td>
<td>$960</td>
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<tr>
<td>DON</td>
<td>1</td>
<td>$75</td>
<td>2</td>
<td>2 (teaching)</td>
<td>$450</td>
<td>$900</td>
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<tr>
<td>CNL</td>
<td>1</td>
<td>$45</td>
<td>6</td>
<td>6 (teaching)</td>
<td>$270</td>
<td>$1620</td>
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<tr>
<td>Nurse Educator</td>
<td>1</td>
<td>$70</td>
<td>6</td>
<td>6 (teaching)</td>
<td>$420</td>
<td>$2520</td>
</tr>
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Total Cost = $47,248.00
References


