Diving for Medication Safety Pearls in an Ocean of Opportunities

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September 13, 2018

Objectives

- Describe three examples of interventions that have improved safety or quality of patient care in health-systems
- List steps for implementation of at least one safety improvement program
- Explain how to apply three strategies for preventing patient harm

Outline

Session 1
- Refrigerator Medication Management
- <USP 800>
- Interdisciplinary PI Collaboration
- Management Promotion of Safety
- High Reliability Concepts

Session 2
- Auditing Smart Infusion Pumps
- Immediate Use CSPs
- Acetaminophen Overdose
- Novel Oral Anticoagulants
- Septic Shock
Brrr! It's Cold!
Network Barrier Analysis Impact on Refrigerator Medication Management

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Objectives

• Discuss how a barrier analysis can be utilized as an improvement method for the refrigerated medication management at a network level.
• Describe implemented best practices to enhance refrigerated medication management.
• Discuss lessons learned when utilizing a barrier analysis to improve a process from a network perspective to ensuring reduction in process variation.

Overview

Background
• Refrigerated temperature monitoring, and ensuring the cold chain process is not broken, is a complex process.
• This process, observed in both the ambulatory and acute care settings, was reviewed by conducting a network barrier analysis.

Presentation
– Gaps discovered within refrigerator medication management
– Implemented best practice solutions
– Lessons learned when conducting a network focused barrier analysis
Problem Discovery

• Routine safety audit (conducted Fall 2017), discovered a concern at an ambulatory care site
• Medications and vaccines may have been exposed to temperatures outside the manufacturers’ recommended range
• Findings led other sites to investigate discovering similar events may have occurred
• Determined that the extent of the situation potentially crossed the network, including both acute and ambulatory sites, which lead to a network-wide Barrier Analysis to be commissioned

Barrier Analysis

1. Examines threats/hazards to people who require protection related to missing or inadequate barriers.
2. Accidents or events can be traced to the failure of barriers and safeguards.
3. Analyses works well for cluster events or when there is difficulty building an accurate timeline.
4. The goal of a Barrier Analysis is identification of a Root Cause and Root Solutions.

Team Members

• Executive Sponsors
  – Representing Ambulatory and Acute Care
• RCA Analysts
  – Network Medication Safety Director
  – Network Patient Safety Director
• Stakeholder group
  – Facilities
  – MedCheck
  – Information Technology
  – Community Physician Practices
  – Acute Care
  – Cancer Centers
  – Worksite Care Clinic
  – Community Care Clinic
Identified Process Variations

Root Cause Statement: Temperature monitoring process variation led to lack of understanding of scope of responsibilities and accountability

- Equipment
  - Cooling units: Medical grade vs Consumer grade
  - Temperature monitoring: Manual vs Digital Data Logger
  - Standardized process, including responsibilities, regarding ordering, preparation, and set up
- Profiles
  - Temperature profiles: Nearly 100 different identified
  - Alert profiles: Person/Role alerted, escalation process
  - Defined responsibilities and standardized monitoring workflows
- Preventative maintenance
  - Monthly reports: Appropriate personal reviewing, understanding importance, deploying corrective action
  - Equipment (cooling unit and temperature monitoring):outine maintenance
- Excursion response
  - Standardized response to excursions
- Education
  - Ability to understand monthly reports and system program

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Work Groups

After stakeholder group identified barriers (i.e. safe guards), these were bundled to become the following work groups

- Preparation Response
- Alert Profiles
- Inventory/Asset Management
- Policy/Procedure
- Excursion Response

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Identified Process Variations

<table>
<thead>
<tr>
<th>Identified Process Variations</th>
<th>Workgroup Assigned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment</td>
<td></td>
</tr>
<tr>
<td>Cooling units</td>
<td>Inventory/Asset Management</td>
</tr>
<tr>
<td>Temperature monitoring</td>
<td>Inventory/Asset Management</td>
</tr>
<tr>
<td>Standardized process</td>
<td>Inventory/Asset Management</td>
</tr>
<tr>
<td>Profiles</td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>Alert Profiles</td>
</tr>
<tr>
<td>Alerts</td>
<td>Alert Profiles</td>
</tr>
<tr>
<td>Preventative Maintenance</td>
<td></td>
</tr>
<tr>
<td>Monthly reports</td>
<td>Inventory/Asset Management</td>
</tr>
<tr>
<td>Routine maintenance</td>
<td>Inventory/Asset Management</td>
</tr>
<tr>
<td>Excursion Response</td>
<td></td>
</tr>
<tr>
<td>Standardize excursions</td>
<td>Excursion Response</td>
</tr>
<tr>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>Process understanding</td>
<td>Policy/Procedure</td>
</tr>
</tbody>
</table>
Work Groups

Preparation Response
- New/replacement product checklists to be utilized by person placing request

Inventory/Asset Management
- Developed inventory lists of all items needing to be requested developed vendor selection list
- Automated workflow regarding:
  - obtaining equipment (new and replacement)
  - preventive maintenance
- Standardized Workflows
  - Alarm Reset
  - New Cooling Unit Procurement
  - Replacement Ordering
  - Troubleshooting Alarms
- Preventative Maintenance
  - Appropriate personal receiving reports
  - Understanding importance
  - Deploying corrective action

Workflows Developed
- Alarm Reset

Profiles
- Developed profiles for temperature ranges
  - Reduced from nearly 100 to 18 across network
- Standardized alerts (when & who) and escalation profiles

Excursion Response
- Developed standard response to excursions

Policy/Procedure
- Gathered policy statements and procedure documents from other workgroups
- Created education once all information collected

All work groups utilized literature (example: Jan 2018 CDC Vaccine Storage Toolkit) and contacted subject matter experts (example: vendors) as references to develop materials
### Lessons Learned

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Resolution</th>
</tr>
</thead>
</table>
| Front line staff serving as first time leaders | • Know the skills of team members when selecting workgroup facilitators  
• Ensuring all tools provided  
• Creating WebEx meetings  
• Guidance to shift thinking towards strategic instead of task oriented  
• Providing group checklist of tasks  
• Periodic workgroup facilitator meetings |
| Duplicative work | • Facilitator was assigned to each group  
• Providing groups checklist of tasks |
| Information required from other groups to proceed | • Facilitator was assigned to each group  
• Periodic workgroup facilitator meetings |
| Representation from all health care settings | • Workgroups included staff outside of the original stakeholder group as content experts were identified from Acute and Ambulatory care settings  
• Executive Sponsors established from both settings |
| Quickly implement approved solutions | • Don’t let perfect get in the way of good!  
• Prioritize tasks and deploy once approved; Waiting may result in becoming stagnant  
• Define progress/completed work |

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The Hazards with <USP 800>: Updates on Implementation  
Monica Macik, PharmD, BCPS, BCOP
Learning Objectives

1) Discuss the structure of an effective institution specific USP <800> implementation team
2) Discuss tactics to justify the cost of IV room updates, additional personal protective equipment (PPE), etc.
3) Review approaches to updating, creating, or writing policies for USP <800>
4) List effective education methods for nursing, pharmacy, physician staff on implementation of USP <800>
5) List effective education methods for patient notification and education regarding changes related to USP <800>

Background

- Created to identify requirements of hazardous drug (HD) handling to protect:
  - Patient
  - Healthcare workers
  - Environment
- USP <800> affects each step of Medication Use Process

Implementation Team

**Cost Justification**

- Ensure Senior Leadership is on board with implementation plan
  - USP <800> regulations are mandatory
- Obtain budget approvals for any necessary capital (i.e. IV room remodeling) well in advance
- Consolidate PPE vendors to potentially obtain discounted rates with increased volume

**Policy Approaches**

**USP <800> Master Policy**
- Once source of truth with all pertinent attachments

**USP <800> Policy Index**
- Table of contents with sub-policies & standard operating procedures (SOPs)
  - Example: Pharmacy Preparation & Dispensing Policy
  - Example: Spill Response Policy

**Staff Education**

**Physicians**
- High-level overview handout
- Education at monthly meetings

**Pharmacy**
- Education at monthly staff meetings
- Detailed overview policy changes
- SOP reviews

**Nursing**
- Education at monthly staff meetings
- Detailed overview policy changes
- PPE overview with drug administration
Patient Education

• Provide education handout to patients at USP <800> go-live
• Handout components
  - Explanation why nurses wearing various PPE
  - Describe how medication is “hazardous” to the nurse, but it safe for the patient to take
  - Explain how patient or caregivers should handle hazardous medications

The Hazards with <USP 800>: Updates on Implementation

Monica Macik, PharmD, BCPS, BCOP

Collaborative Model for Process Improvements

Julie Painter MSN RN AOCNS OCN
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Community Health Network
Indianapolis, Indiana
Objectives

• Describe various health care collaborative models that can be used for process improvement
• Understand different team member roles within patient care and how they may be utilized during process improvement initiatives
• Describe a method to utilize when deciding which members/health care disciplines should be key stakeholders in a workgroup

Collaborative Models

• Numerous collaborative models exist
• Many are specific to only one discipline
• Many models are created for non-healthcare settings yet lend themselves to be utilized fully in improvements
• Goal is to utilize a model that is adaptable to your setting, facility
Menefee Model (MM)

• Belief that evidence based plans of care without interdisciplinary team collaboration & patient engagement, are ineffective tools for patient care.
• Model relies on the presence of plans of care that are used to coordinate interventions that are based on goals & needs of patient.

The Value of Creating a Culture of Interdisciplinary Collaboration between Nursing & Pharmacy

• Pharmacy on every unit creates visibility & creates an awareness of the value of each team member
• Improved communication
• Enhanced communication allows greater understanding of care and interventions to enhance quality of care delivered
• Reduction of harm
• Improves care as a process rather than individuals
• Collaboration creates a sense of teamwork & engagement
• Assist in the improvements in provider orders

Specific Examples

We have found interdisciplinary collaboration to be crucial in initiatives related to:
• Adverse drug events-hypoglycemia; naloxone utilization; VTE prevention (Coumadin)
• Falls
• Medication Safety-Reviewing practice with potassium; heparin; oxytocin & high alert meds; Independent double check education
• Pump Library development & interoperability
Naloxone Improvement

- Reduction as a network with naloxone utilization
- Deep dive into medications intraoperatively & in PACU that can impact post operative sedation. Collaborative education (Pharmacy & CNS)
- Reviewed handoff communication between intra-op and PACU and PACU to Acute care
- Better understanding of non-opioid medications being used that can potentiate sedation
- Reduction in hypoglycemic events
- Reduction in INR elevations
- Insight into med

Hypoglycemia Improvements

- Work with Certified Diabetic Educators & pharmacy & unit staff to look at events from each building
- Order set improvements related to DKA
- Review of events related to insulin utilization for Hyperkalemia—order set developed & education

Medication Safety

- Nursing engagement at the network medication safety level, including bedside, operations, & CNS’s
- Medication Safety Committee’s in each building allowing interaction & dialogue between pharmacy and bedside nursing staff—has assisted in improved methods to reduce diversion; waste of controlled substances; port less tubing’s; and lock boxes
Independent Double Checks—Network Improvement

- Assessed as a need after several events with high dose opioids and insulin infusions
- Process already hardwired for Chemotherapy
- Different than dual signature and a dependent double check
- ISMP recommendations followed
- Selected high risk agents will include oxytocin, high dose opioids, insulin, heparin, OB magnesium, etc.

Collaborating with network nursing education to develop interactive learning to allow this process and cultural change to occur.

Strategies to Enhance Interdisciplinary Collaboration

- Review each project as a process
- Determine key stakeholders that could impact the information needed to improve
- Determine key stakeholders in the process—who is direct in the process & who is an indirect influence to the process
- When in doubt just ask, dialogue & communicate----

Lessons Learned with Nursing Pharmacy Collaboration

- Collegial relationships exist on units
- Engagement with shared governance at the unit & building levels
- Engagement with shared governance has resulted in spread in improvements across the network
"The ability for a group of people to do remarkable things hinges on how well those people can pull together as a team."
Simon Sinek

Collaborative Model for Process Improvements
Julie Painter MSN RN AOCNS OCN
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Indianapolis, Indiana

Management promotion of patient safety, communication openness, and event reporting in hospital pharmacy

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Manchester University

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Parkview Health

* At the time of this study, Maryam Noureldin was a PGY2 Ambulatory Care Pharmacist at IU Health.
Introduction

- The Hospital Survey on Patient Safety Culture (H-SOPS)
  - used by institutions to evaluate current patient safety culture
- Contains 12 domains, including communication openness, management support, and teamwork.

Previous literature/gap

- Pharmacists who report high levels of communication openness at their institution were more likely to report medical errors that occur.
- There is limited research evaluating other patient safety culture domains and what factors might influence frequency of error reporting.

Objectives

Examine the relationship between:
1. hospital pharmacists’ perception of management’s promotion of patient safety and their perception of communication openness
2. hospital pharmacists’ perception of management’s promotion of patient safety and frequency of event reporting
Methods

- Hospital pharmacist data from the 2016 AHRQ H-SOPS
  - De-identified data obtained via a data-use agreement
- Study variables:
  - Management promotion of patient safety: 4 item composite score
  - Communication Openness: 3 item composite score
  - Frequency of Events Reporting: errors that could harm the patient but did not

Data analysis

- Composite scores were calculated based on item percent positive responses. Higher score represent more positive perceptions.1
- Descriptive statistics and mixed linear and logistic regression modeling
  - accounted for presence of multiple pharmacists within the same hospital
- Control variables
  - hospital and pharmacist characteristics.
- STATA 15.0 (College Station, TX)

Results

- A total 7,671 pharmacists responded to the 2016 H-SOPS, representing 1.9% of all respondents.

  When a mistake is made that could harm the patient, but does not, how often is this reported? (N=7,419)

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Always</td>
<td>32.0%</td>
</tr>
<tr>
<td>Most of the time</td>
<td>40.1%</td>
</tr>
<tr>
<td>Sometimes</td>
<td>22.0%</td>
</tr>
<tr>
<td>Rarely</td>
<td>4.9%</td>
</tr>
<tr>
<td>Never</td>
<td>0.9%</td>
</tr>
</tbody>
</table>
### Results

<table>
<thead>
<tr>
<th>Supervisor/Manager Expectations &amp; Actions to Promote Patient Safety</th>
<th>% positive responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Says a good word when a job is done according to established patient safety procedures</td>
<td>74.2%</td>
</tr>
<tr>
<td>Seriously considers staff suggestions for improving patient safety</td>
<td>79.1%</td>
</tr>
<tr>
<td>Wants us to work faster even if we take shortcuts (negatively worded)</td>
<td>78.5%</td>
</tr>
<tr>
<td>Overlooks patient safety problems that happen over and over (negatively worded)</td>
<td>78.5%</td>
</tr>
<tr>
<td><strong>Mean composite score (N=7,238)</strong></td>
<td><strong>77.6 ± 31.3</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Communication Openness</th>
<th>% positive responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>In our hospital work unit, staff</td>
<td></td>
</tr>
<tr>
<td>Freely speak up if they see something that may negatively affect patient care</td>
<td>74.3%</td>
</tr>
<tr>
<td>Feel free to question the decisions or actions of those with more authority</td>
<td>52.3%</td>
</tr>
<tr>
<td>Are afraid to ask questions when something does not seem right (negatively worded)</td>
<td>70.4%</td>
</tr>
<tr>
<td><strong>Mean composite score (N=7,315)</strong></td>
<td><strong>65.7 ± 37.0</strong></td>
</tr>
</tbody>
</table>

### Multivariate Regression

#### Multivariate Linear Regression - Communication openness

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient (Std Error)</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management promotion of patient safety</td>
<td>0.02 (0.01)</td>
<td>0.00, 0.04</td>
</tr>
</tbody>
</table>

#### Multivariate Logistic Regression - Error Reporting Frequency

<table>
<thead>
<tr>
<th>Variable</th>
<th>Crude OR (95% CI)</th>
<th>Adjusted OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management promotion of patient safety</td>
<td>1.51 (1.45, 1.54)</td>
<td>1.49 (1.41, 1.57)</td>
</tr>
</tbody>
</table>

Central variables include pharmacist characteristics (patient interaction, average weekly hours worked, number of years worked), and hospital characteristics (bed size, type of hospital, and geographic region). Std Error = Standard Error; CI = Confidence Interval.

### Discussion

- **Hospital pharmacists nationwide**
  - Favorable view of their managers’ actions to promote patient safety
  - Felt comfortable communicating issues impacting patient care
- **Positive perceptions of managers’ actions toward patient safety were associated with**
  - Higher communication openness scores
  - Increased likelihood of error reporting frequency
Conclusion/Implications

- Only 1/3 indicated that errors that could harm the patient are always reported
- Management plays essential role in facilitating a work culture focused on open communication and patient safety

References


Thank you!

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Using High Reliability Concepts to Develop Actions that Promote Consistency & Reliability

Karen Scott RPh, MBA
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Christian Hospital 2017 Statistics

Employees: 1864
Registered Nurses: 444
Physicians: 541
Allied Health: 102

Staffed Beds: 220
Admissions: 12,142
ED Visits: 106,301
Surgical Procedures: 6379
Cath Lab Procedures: 2225
<table>
<thead>
<tr>
<th>What Happened?</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>[Include specific accounts of the event, descriptions from the various staff members involved, actions and leading up to the event, etc.]</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Why Did It Happen?</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>[Errors are inadvertent so what was the cause of the error; every behavior should have an explanation; in order to prevent future situations, you have to understand the cause behind the behavior]</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Just Culture Algorithm Utilized</th>
<th>Just Culture Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>[May have multiple issues/behaviors per event]</td>
<td>Human Error</td>
</tr>
<tr>
<td>Duty to Avoid Causing Unjustifiable Risk or Harm</td>
<td>At-Risk Behavior</td>
</tr>
<tr>
<td>Duty to Follow a Procedural Rule (need to identify what rule applied)</td>
<td>Reckless Behavior</td>
</tr>
<tr>
<td>Duty to Produce an Outcome</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Solutions/Action Plan</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>[Identify and demonstrate you will take to prevent further occurrences, identify owners and milestones for next steps, how you plan to track for sustainability]</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Who did you speak with as part of the investigation?</th>
<th></th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>How will you be sharing the learning from this event, with whom, by whom?</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Could this event, or similar event, occur in any other departments? If so, what steps?</th>
<th></th>
</tr>
</thead>
</table>

| What is your plan for sharing the learnings with these departments, by whom? |  |
Metrics Measured for HRO

SEMS reporting volume (Safety Event Management System)

- % Near Miss reporting
- % Harm Event reporting
- SEMS reporting: % close in 30 days

* Using National Coordinating Council for Medication Error and Prevention Index

Investigation looks like …

- Talk to staff involved (delegate to Supervisor)
- Chart Review
- Consider a Timeline
- Equipment involved
  - If yes, was it sequestered?
  - Were all parts saved, e.g., tubing, bag, and IV pump?
  - Check for Serial Numbers etc. in SEMS report
- Process / Equipment / Person issue
- Timeline: Investigation occurs close to time of event
- Involved people: Please enter the name so Medical Staff Office can track

Follow-up looks like …

- Results of Investigation: Answers to Just Culture:
  - What should happen?
  - Why didn’t it happen?
- Action Plan: What strategies should you put into place to prevent reoccurrence?
- Status of patient
- Final actual Harm Score Recommendations

Closing Loop:

- Follow-up with employee who reported concern in your area
- Recognition: Great Catches
- Share in weekly huddles (good and possible negative outcomes from near misses)

SEAT: Serious Event Action Team

- Monthly
  - Physicians, Leadership, Risk, & Executives
  - Prepped in advance
  - Strength of Intervention focus
  - Action items brought back for Follow-up

Remember the goal!
The SEAT process offers us the opportunity for collaboration to increase situational awareness, better assess risk, and promote a safer environment for our patients, visitors, and co-workers.
### Strength of Intervention

<table>
<thead>
<tr>
<th>Description</th>
<th>Example</th>
<th>NCPS Hierarchy of Actions</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forcing/Functions</td>
<td>Create a “hard stop” in a process</td>
<td>Strong</td>
<td>Not dependent on staff to remember to do the right thing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Strong controls</td>
</tr>
<tr>
<td>Automation and</td>
<td>Use processes and tasks to limit reliance on memory</td>
<td>Intermediate</td>
<td>Somewhat dependent on staff remembering to do the right thing</td>
</tr>
<tr>
<td>computerization</td>
<td></td>
<td></td>
<td>Provide tools to remember or promote clear communication</td>
</tr>
<tr>
<td>Standardization</td>
<td>Create a uniform model to adhere to</td>
<td>Intermediate</td>
<td>Somewhat dependent on staff remembering to do the right thing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Provide tools to remember or promote clear communication</td>
</tr>
<tr>
<td>Redundancies</td>
<td>Incorporate duplicate steps or force additional checks in</td>
<td>Weak</td>
<td>Dependent on staff remembering training or what is written in the policy</td>
</tr>
<tr>
<td>Reminders and Checklists</td>
<td>Make important information readily available</td>
<td>Weak</td>
<td>Dependent on staff remembering training or what is written in the policy</td>
</tr>
<tr>
<td>Rules and Policies</td>
<td>Provide guidance toward an intended outcome</td>
<td>Weak</td>
<td>Dependent on staff remembering training or what is written in the policy</td>
</tr>
<tr>
<td>Education and Information</td>
<td>Providing training</td>
<td>Weak</td>
<td>Dependent on staff remembering training or what is written in the policy</td>
</tr>
</tbody>
</table>

### What Happened?

- Patient had order for Fentanyl IV 50 mcg from a transfer med rec
- Medication was administered to patient
- Specific Unit cannot push IV Fentanyl
- No double check performed

### WHY?/ACTIONS

- RN not aware IV fentanyl could not be given
- Agency RN
- IV fentanyl not addressed on transfer med rec
- Transfer med rec compliance to be tracked and trended
- Transfer med rec not completed
- IV fentanyl to be on override only with witness required to remove from ADC for this specific unit
### What Happened?
- Rapid Response Team was called for patient
- Upon assessment 2 fentanyl patches were in place
- Patient was ordered to be moved to Stepdown for closer monitoring at 1150.
- The bed was assigned at 1410.
- The patient needing a higher level of care remained on floor for 2 hours and 20 minutes.
- Patient improved and stayed on floor.

### Why Delay?
- Delay in patient transfer
- Delay in bed assignment
- Unable to differentiate RRT from any other transfer
- No secretary
- Abnormal amount of patient movement
- ICU RN late
- Multiple patients had to be escorted for tests and procedures
- 9 admissions: 3 of which were RRTs
- 4 transfers-out
- 1 Direct admit

### Why Two Patches?
- Change in patient condition
- Over sedation
- 2 fentanyl patches in place
- No independent double check process
**What Happened?**

- Hand written order for phenylephrine to keep SBP >90 on PACU order sheet
- RNs heard verbal order for EPHEDrine to treat low BP
- RN pulled EPINEPHrine out of pyxis by mistake and gave to patient
- Anesthesia stated he meant phenylephrine

**Why?/Actions**

- RN removed EPINEPHrine from pyxis instead of EPHEDrine
- EPINEPHrine and EPHEDrine next to each other on pyxis screen
- Not sure after use
- RN heard EPHEDrine instead of EPINEPHrine
- RN pulled EPINEPHrine out of pyxis by mistake
- Anesthesia stated he meant phenylephrine
- EPINEPHrine removed from Pyxis stock
- Pharamacy to remove from stock house-wide where it is not needed
- EPINEPHrine removed from Pyxis stock
- Pyxis not needed
- Look alike meds
- Sound alike medications
- Hospital active for JCAHO algorithm
- Update lists of sound alike medications
- Increase awareness for sound alike medications
- Update look alike medications
- Increase awareness for look alike medications
- All pyxis stations

---

**Actions**

- New transfer process standard work for RRTs to step down
- Code transfers to RRTs in prioritising
- Heads up call to step down by house sup./RRT lead
- Nurse sup./RRT lead to transfer patient and settle in when applicable
- Heads up call to step down by house sup./RRT lead
- Coached on use of sound alike and look alike medications
- Heads up call to step down by house sup./RRT lead
- RRT Team to monitor RRT transfer times
- Coached per just culture algorithm with RNs
- Event used as education in staff meetings and huddles
- Actions already in place. Heads up in QIC to remove previous patch
- Coaching per just culture algorithm with RNs
- RRT Team to monitor RRT transfer times
- Coached per just culture algorithm with RNs
- Event used as education in staff meetings and huddles
- Actions already in place. Heads up in QIC to remove previous patch
Why?/Actions

EPINEPHrine administered instead of ephedrine.
RN didn’t follow the six rights of medication administration.
Stressful situation felt rushed.
Coach employee remedial action per Just Culture algorithm.
Discuss event at staff meeting to increase situational awareness and re-enforce the importance of the six rights.

Accountability Tracker

<table>
<thead>
<tr>
<th>MEAT Date</th>
<th>Action Item</th>
<th>Strength of Intervention</th>
<th>Owner</th>
<th>Goal Date</th>
<th>Status</th>
<th>Completed Prior To Seat</th>
<th>Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/18/18</td>
<td>Random daily audits on radiology rounding</td>
<td>Yellow Crystal</td>
<td>1/18/18</td>
<td>x</td>
<td>Yes</td>
<td>1/18/18</td>
<td></td>
</tr>
<tr>
<td>1/18/18</td>
<td>Coaching</td>
<td>Red Crystal</td>
<td>x</td>
<td>x</td>
<td>1/18/18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/18/18</td>
<td>Transporters to assist with checking on patients in holding rooms</td>
<td>Red Drew/Kelly Walker</td>
<td>1/18/18</td>
<td>x</td>
<td>Yes</td>
<td>1/18/18</td>
<td></td>
</tr>
<tr>
<td>2/15/18</td>
<td>Patient profile fixed to reflect correct medications</td>
<td>Green Karen Scott</td>
<td>2/15/18</td>
<td>x</td>
<td>yes</td>
<td>2/15/18</td>
<td></td>
</tr>
<tr>
<td>2/15/18</td>
<td>Medication fixed in Epic to not offer incorrect substitution</td>
<td>Green Karen Scott</td>
<td>2/15/18</td>
<td>x</td>
<td>yes</td>
<td>2/15/18</td>
<td></td>
</tr>
<tr>
<td>2/15/18</td>
<td>Risk Med no longer available as an option in right</td>
<td>Green Willow Team</td>
<td>2/15/18</td>
<td>x</td>
<td>yes</td>
<td>2/15/18</td>
<td></td>
</tr>
</tbody>
</table>

Risky Business

What’s trending in SEMS?

- There were 5551 SEMS reports submitted last year.
- Highest reported general event type was treatment and care.
- Highest reported specific event type was hypoglycemia followed by hyperglycemia.
- The glycemic control team has been working diligently to help us improve and keep our patients safe.
Safety is....

- A culture and a lifestyle
- A leadership quality
- A priority
- Accountability
- Developing situational awareness
- Patient/employee/leadership responsibility
- The platform that supports all necessary efforts to become a highly reliable organization.

Safety is NOT....

- Telling someone to be more careful
- Telling someone to try harder
- Placing blame on others
- Assigning a new project
- Explaining that our patients are “sicker”
- Just a clinical or hospital problem.

Responding to a Near Miss today can prevent tomorrow’s Serious Event........

Thank You/Questions?

Karen Scott
Christian Hospital Pharmacy Manager
Karen.Scott@bjc.org
Using High Reliability Concepts to Develop Actions that Promote Consistency & Reliability

Karen Scott RPh, MBA
Christian Hospital
St. Louis, MO

Q & A
Refrigerator Medication Management
<USP 800>
Interdisciplinary PI Collaboration
Management Promotion of Safety
High Reliability Concepts

Break
Information Overload: Auditing the Clinical Utility of Smart Pump Reporting Tools

Elizabeth Rodman, PharmD
PGY2 Health-System Pharmacy Administration Resident
Froedtert & the Medical College of Wisconsin
Froedtert Hospital

Purpose
• Assessment of smart pump reporting tools available at Froedtert Hospital
• Development of a CQI process for optimal utilization of smart pump reporting tools

Interoperability Scope
• Interoperability does not capture:
  – Medications administered in procedural areas
    • Operating room
    • Emergency department
    • Interventional radiology
  – Out-of-scope medications
    • Blood products
    • Penicillin G
    • Selected chemotherapeutic agents
Definitions

• **Interoperability**: two-way interface between smart pumps and electronic health record (EHR)

• "**Near miss**" related to interoperability: differences in medication, dose, rate, concentration, or patient weight

---

**Figure 1. Comparison of Select Features from Smart Pump Analytics Reporting Tools Available at Froedtert Hospital**

<table>
<thead>
<tr>
<th>Server Reports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device data set update status</td>
</tr>
<tr>
<td>Server status</td>
</tr>
<tr>
<td>Cost avoidance numbers</td>
</tr>
<tr>
<td>Alarm reports</td>
</tr>
<tr>
<td>Dashboard summary</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Smart Pump Reports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device event log update status</td>
</tr>
<tr>
<td>Device event log utilization history</td>
</tr>
<tr>
<td>Alarm reports</td>
</tr>
<tr>
<td>Dashboard summary</td>
</tr>
<tr>
<td>Programming protocol</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EHR Reports</th>
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<td>Device event log update status</td>
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<tr>
<td>Dashboard summary</td>
</tr>
<tr>
<td>Programming protocol</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Peer Collaboration Network</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soft and hard alert data</td>
</tr>
<tr>
<td>Near miss details</td>
</tr>
<tr>
<td>Compliance data</td>
</tr>
</tbody>
</table>

---

**Study Primary Outcomes**

• Identify top 10 medications implicated in smart pump near miss events

• Reduce number of near miss events related to smart pump programming
Figure 2. Continuous Quality Improvement Process for Smart Pump Reporting Tools

Figure 3. Top 10 Medications Implicated in Smart Pump Near Miss Events for Q2 & Q3 2017 (n=4,440 near misses in 291,503 infusions)

<table>
<thead>
<tr>
<th>Medication</th>
<th>n</th>
<th>Infusion Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium chloride 0.9%</td>
<td>1094</td>
<td></td>
</tr>
<tr>
<td>25% potassium chloride</td>
<td>656</td>
<td></td>
</tr>
<tr>
<td>15% potassium chloride</td>
<td>544</td>
<td></td>
</tr>
<tr>
<td>12% magnesium sulfate</td>
<td>461</td>
<td></td>
</tr>
<tr>
<td>10% propofol 1000 mg/100 mL</td>
<td>417</td>
<td></td>
</tr>
<tr>
<td>10% lactated ringers</td>
<td>361</td>
<td></td>
</tr>
<tr>
<td>8% albumin human 25% 25 g</td>
<td>236</td>
<td></td>
</tr>
<tr>
<td>5% ondansetron 16 mg/50 mL</td>
<td>231</td>
<td></td>
</tr>
<tr>
<td>5% fentanyl 1000 mcg/100 mL</td>
<td>222</td>
<td></td>
</tr>
<tr>
<td>5% heparin 25,000 units/500 mL</td>
<td>218</td>
<td></td>
</tr>
<tr>
<td>5% magnesium chloride 33 mL/100 mL</td>
<td>218</td>
<td></td>
</tr>
</tbody>
</table>

Example Near Misses
Determining Intervention

- Risk matrix
- Modified Delphi approach

Risk Matrix

Intervention

- Adjusted propofol order sets to promote ordering of bolus from the bag
- Paired propofol order panel with nursing order for sedation vacation to increase ordering from panel
Future Directions

• Collect and evaluate post-intervention results
• Repeat CQI process using smart pump-specific reports
• Biannual reporting to Medication Safety and Pharmacy Quality Committees

Conclusions

• Evaluation of interoperability reports demonstrates technology is working well
• Interoperability reports are useful for workflow and patient-specific information
• Out-of-scope medications and areas not on interoperability were not captured

Acknowledgements

• Megan Holsopple, PharmD, BCPS
• Shannon Werner, PharmD
• Tina Wagner, PharmD
• Kristin Hanson, BPharm, MS
• Philip Brummond, PharmD, MS
Information Overload: Auditing the Clinical Utility of Smart Pump Reporting Tools

Elizabeth Rodman, PharmD
PGY2 Health-System Pharmacy Administration Resident
Froedtert & the Medical College of Wisconsin
Froedtert Hospital

Immediate-Use Compounded Sterile Preparations: Ensuring Institutional Compliance with USP <797>

Andrew C. Fritschle, PharmD, BCPS, BCCCP
Clinical Pharmacy Specialist – Adult Critical Care

USP <797>: Sterile Compounding

Purpose: Ensure preparation of quality products free from contaminants and are consistent in intended identity, strength and potency for patient use

• Outlines responsibilities of personnel, training, facilities, environmental monitoring, and storage and testing of finished compounded preparations
• All Compounded Sterile Preparation (CSPs) must comply with the standards of practice defined by The United States Pharmacopeia (USP) Chapter 797
• Noncompliance risks patient safety, regulatory repercussion, and reimbursement
Compounding vs. Immediate-Use CSP

Compounding
Reconstitution or manipulation of a commercial product that may or may not require addition of one or more ingredient
- Irrigation solutions
- IV admixtures
- Removal of a dose from a multi-dose vial
- Transfer of a product from a vial to a syringe

Immediate-Use CSP
Compounded medications needed for immediate or emergency use for a particular patient and are not to be stored for anticipated needs

Immediate-Use CSPs
Emergent or Immediate Administration
Cardiopulmonary resuscitation
Emergency Medicine care
Diagnostic Agents
Operating Room procedures
Not Intended for Storage
Low-Risk Level CSPs
Medium-Risk Level
High-Risk Level
Anticipated Need
Batch Compounding

Requirements for Immediate-Use CSP
Products must meet all criteria to be considered safe:

1. Contain 3 or less ingredients
2. Administration begins within 1 hour of preparation
3. Under continuous supervision by the person who prepared it, until it is administered
4. If not continuously supervised, then it is appropriately labeled

APPROPRIATE FOR USE
Requirements for Immediate-Use CSP

Products must meet all criteria to be considered safe:

- Contain 3 or less ingredients
- Administration begins within 1 hour of preparation
- Under continuous supervision by the person who prepared it, until it is administered
- If not continuously supervised, then it is appropriately labeled

Labeling Requirements

All Medications
- Medication name, strength, and amount/quantity
- Diluent name and volume
- Expiration date/time*
  *Except for short procedures

Immediate-Use CSPs
- Patient identification information
- Names and amounts of all ingredients
- Initials of person who prepared it
- Exact 1-hour expiration date/time

Evaluation of Current Practices

Review Practices for All Care Areas
- Emergency Department
- Operating Room
- Interventional Radiology
- Specialty Clinics
- Radiology
- Cardiac Diagnostics

Competency and Training
- Aseptic technique
- Safe handling and proper labeling

Workflow
- Evaluate timing of product administration related to procedure
- Consider urgency of product administration
Modifications to Practices

- Appropriate to reduce ingredient(s)
- Product can be prepared and administered begun in 1 hour
- Trained staff
- Labeling requirements met
- Compound in Central Pharmacy

Key Takeaways

- Consider if workflow will allow for preparation under sterile procedures by Central Pharmacy
- Limit compounding practices to situations that are emergent or require immediate administration
- Label all prepared medications appropriately
- Use aseptic technique
- Ensure yearly competencies of compounding practices where Immediate-Use CSPs are administered
- Evaluate new preparations as they are introduced to practice, procedures, and care areas

Immediate-Use Compounded Sterile Preparations: Ensuring Institutional Compliance with USP <797>

Andrew C. Fritschle, PharmD, BCPS, BCCCP
Clinical Pharmacy Specialist – Adult Critical Care
3+3+2 = Danger!

Simplifying treatment of acetaminophen overdose

Acetaminophen OD Is Prevalent

Dated Protocol?

Paul E. Milligan, Pharm.D.
System Medication Safety Pharmacist
BJC HealthCare- St. Louis, MO

Acetaminophen OD Is Prevalent

Dated Protocol?

1979
Complex to Prepare and Administer

**Amplified Risk Points**
- Dose Determination
- Preparation
- Administration
- Programming
- Bag Changes
- Transfers of Care!

NAC is Dangerous

Errors Occur
Serious Errors Occur

Received Gms not mLs!

One Bag Solution

One Bag Solution
BJC One Bag Protocol: Used Since 2008

- 70 Patients
- 22 administration errors
  - 19 Related to Loading Dose
    - Did not allow bolus programming from smart pumps
- 3 interruptions longer than 60 minutes
- No ADE associated with admin errors
- All patients successfully discharged

Prescott Protocol- 3 Bags


BJC Protocol: One Bag Solution
3+3+2= Danger!

Simplifying treatment of acetaminophen overdose

Paul E. Milligan, Pharm D
System Medication Safety Pharmacist
BGC Healthcare- St. Louis, MO
Small Interventions with an Epic Impact

Karishma Deodhar, PharmD, BCPS
Eskenazi Health
September 13, 2018

- Use only oral unit-dose products, prefilled syringes, or premixed infusion bags
- Use approved protocols for the initiation and maintenance of anticoagulant therapy.
- Assess the patient’s baseline coagulation status
- Use authoritative resources to manage potential food and drug interactions.
- Use programmable pumps in order to provide consistent and accurate dosing.
- A written policy addresses baseline and ongoing laboratory tests that are required for anticoagulants.
- Provide education regarding anticoagulant therapy to prescribers, staff, patients, and families
- Evaluate anticoagulation safety practices, take action to improve practices, and measure the effectiveness of those actions

Identify Problem Areas

- Gather information from prescribers, nurses, students, or patients
- Review Institute for Safe Medication Practices (ISMP) Quarterly Agenda Items
- How is institution addressing NPSGs?
- Look for patterns in medication errors
Medication Error Categorization

<table>
<thead>
<tr>
<th>Type of Error</th>
<th>Follow Up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prescribing</td>
<td>Individual education</td>
</tr>
<tr>
<td>Dosing or Monitoring</td>
<td>Group education</td>
</tr>
<tr>
<td>Dispensing</td>
<td>Protocol or process change</td>
</tr>
<tr>
<td>Administration</td>
<td>CPOE safety check</td>
</tr>
</tbody>
</table>

Dosing and Monitoring of Direct Oral Anticoagulants

- Specific to indication
- Affected by renal function
- Dependent on when therapy started
- BPAs are subject to alert fatigue or warnings being overridden
Future Directions

• Dosing guidance during order entry phase
• Minimize daily checkoffs
• Using reports to identify issues
• Communication of warfarin regimens between inpatient and outpatient providers
Barriers

- Alert fatigue
- Too much information on screen
- Learning curve for Epic users and analysts

Small Interventions with an Epic Impact

Karishma Deodhar, PharmD, BCPS
Eskenazi Health
September 13, 2018

The SHOCKing Truth About Novel Therapies for Treatment of Sepsis

Allison N. Boyd, PharmD
Clinical Pharmacy Specialist – Trauma/Burn
Rhode Island Hospital
Finding the Right Balance

MANAGING SHOCK

Vit C
Hydrocortisone
Thiamine

ANG II

Medication Safety

Regulatory Requirements

Finding the Right Balance

MANAGING SHOCK

Vit C
Hydrocortisone
Thiamine

ANG II

Medication Safety

Regulatory Requirements

Pop Quiz!

1. Which vasopressor is more expensive?
   - Norepinephrine
   - Vasopressin

2. Who has added angiotensin II to formulary?
3. Who has adopted the vitamin C protocol?
4. Do you know the dosing units for angiotensin II?
**Cost Information: Vitamin C**

- Dose: 1500 mg IVPB Q6hrs x 4 days (or until ICU discharge if sooner)
- Preparation: 1.5 gm/100 mL
- Cost per vial: $82.89/vial (25 gm/50 mL)
  - Expiration: 4 hours once opened; 24 hours in IVPB
  - One vial could provide 16 doses, but due to stability restrictions is limited to 4 doses
- Cost per treatment course: $331.56*

*Does not include cost of thiamine/hydrocortisone

---

**Cost Information: Vasopressors**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Normal Concentration</th>
<th>Average Cost</th>
<th>Maximum Concentration</th>
<th>Average Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norepinephrine</td>
<td>8 mg/250 mL</td>
<td>$27.48</td>
<td>16 mg/500 mL</td>
<td>$54.96</td>
</tr>
<tr>
<td>Vasopressin</td>
<td>40 units/100 mL</td>
<td>$17.86</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Angiotensin II</td>
<td>2.5 mg/500 mL</td>
<td>$1500</td>
<td>5 mg/500 mL</td>
<td>$3000</td>
</tr>
</tbody>
</table>

---

**Storage Issues**

<table>
<thead>
<tr>
<th>Issue</th>
<th>Vitamin C</th>
<th>Angiotensin II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refrigeration required?</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Stability/Expiration</td>
<td>4 hours room temp 24 hours once compounded</td>
<td>24 hours once compounded at room temp or refrigerated</td>
</tr>
<tr>
<td>Vial sizes</td>
<td>25 gm/50 mL</td>
<td>2.5 mg/mL</td>
</tr>
<tr>
<td>Vials needed to compound</td>
<td>1 vial per day (up to 4 days)</td>
<td>1-2 vials per infusion bag (duration varies)</td>
</tr>
</tbody>
</table>
## Vitamin C Protocol Order Set

<table>
<thead>
<tr>
<th>High dose ascorbic acid (for treatment of sepsis)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel for high dose</td>
</tr>
<tr>
<td>- Ascorbic acid (VITAMIN C) 1,500 mg in sodium chloride 100 mL IVPB 1,500 mg, intravenous, at 206 mL/hr, Administer over 30 minutes, every 6 hours standard Protect from light</td>
</tr>
<tr>
<td>- Thiamine (B-1) 200 mg in dextrose 5% (D5W) 100 mL IVPB 200 mg, intravenous, at 200 mL/hr, Administer over 30 minutes, every 12 hours standard</td>
</tr>
<tr>
<td>- Hydrocortisone sodium succinate (Solu-CORTEF) infection recon soln 50 mg 50 mg, intravenous, every 6 hours standard Reconstitute the diluent included in the product by pushing the cap down. Concentration of mixed product equals 50 mg/mL</td>
</tr>
</tbody>
</table>

## Angiotensin II Dosing

```
```

## Angiotensin II Product Label

```
```
Angiotensin II Concentrations

Criteria for use?

http://giapreza.com/Resources.pdf

Angiotensin II Alaris® Guardrails
Behind the Scenes

<table>
<thead>
<tr>
<th>Dosing units</th>
<th>Wildcard mg/mL</th>
</tr>
</thead>
<tbody>
<tr>
<td>ng/kg/min</td>
<td></td>
</tr>
<tr>
<td>Soft min</td>
<td>1.25</td>
</tr>
<tr>
<td>Soft max</td>
<td>40</td>
</tr>
<tr>
<td>Hard max</td>
<td>80</td>
</tr>
<tr>
<td>Additional information</td>
<td></td>
</tr>
<tr>
<td>No initial value</td>
<td></td>
</tr>
<tr>
<td>No bolus</td>
<td></td>
</tr>
<tr>
<td>Central line advisory</td>
<td></td>
</tr>
</tbody>
</table>

Adverse Effects of Vitamin C

Osmotic diuresis

- Can lead to acute kidney injury and/or hypovolemia

Oxalate nephropathy

- Due to calcium oxalate accumulation (metabolite)
- Can worsen kidney injury or delay kidney recovery

False elevation in POC glucose testing

- Lab draws required for all glucose measurements while on vitamin C therapy

Oxalate nephropathy

- Can worsen kidney injury or delay kidney recovery
Adverse Effects of Angiotensin II

Pop Quiz!
1. Which vasopressor is more expensive?
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   - Vasopressin

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Q & A

Auditing Smart Infusion Pumps
Immediate Use CSPs
Acetaminophen Overdose
Novel Oral Anticoagulants
Septic Shock

Diving for Medication Safety Pearls in an Ocean of Opportunities

Thank you to all of our presenters!