Managing High-Alert Medications

Brought to you by the
Washington Patient Safety Coalition
June 10, 2009
Goals of High Alert Medication Policies and Processes

- To eliminate harm to the patient from the use of high alert medications
- To develop standardized medication handling processes for high alert medications
- To monitor and continually improve the standardized delivery process for high alert medications
**High Alert Medications**


Narcotics/opioids, insulin and heparin combined for 33.7% of the errors in this review.

Between 3-5% of these errors actually caused harm to the patient.
Topics / Presenters

- **Insulin**
  - *Carol Lyn Vanevenhoven, PharmD, Pharmacy Clinical Operations Assistant Manager/Medication Safety Officer, Yakima Valley Memorial Hospital*

- **Narcotics/Opioids**
  - *Tim Lynch, PharmD, MS, FABC, Pharmaceutical Services Manager, St. Joseph Medical Center*

- **Heparin**
  - *Jackie Biery, PharmD, Medication Safety Pharmacist, University of Washington Medical Center*
Yakima Valley Memorial Hospital

Medication Safety Programs
Yakima Valley Memorial Hospital

Yakima, WA

225 bed acute care community hospital

Admission and Discharge rate: 50-80/day
Anesthesia-based Interventions for Error Reduction

Table 2
Error Reduction Techniques

<table>
<thead>
<tr>
<th>Error Reduction Technique</th>
<th>Supporting References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-filled syringes</td>
<td>3</td>
</tr>
<tr>
<td>Distinctive drug labels</td>
<td>2,3,4,5</td>
</tr>
<tr>
<td>Colored drug Labels</td>
<td>2,3,4,6</td>
</tr>
<tr>
<td>Check labels with second observer</td>
<td>3,6</td>
</tr>
<tr>
<td>Double check ampoule before labeling syringe, and syringe label before administration</td>
<td>2,3,6</td>
</tr>
<tr>
<td>Do not store concentrated solutions of hazardous medications (KCl) in OR</td>
<td>1,3</td>
</tr>
<tr>
<td>Standardization – drug preparation procedures</td>
<td>2</td>
</tr>
<tr>
<td>Standardization of layout of drug workspace</td>
<td>2,3,5,6</td>
</tr>
<tr>
<td>Standardization – syringe sizes</td>
<td>2,6</td>
</tr>
<tr>
<td>Bar codes on drug labels with audible reader</td>
<td>3,4,7,8,9,10</td>
</tr>
</tbody>
</table>
Medication Safety Programs

- Medication Safety Officer
- Quantros: Online error reporting
- MERT: Medication Error Review Team
  - 2 Pharmacy Representatives
    - Safety and Operations
  - 3 Nursing Representatives
    - Med/Onc, ICU/Tele, Surgery
High Alert Medications

- Insulin, narcotics, sedatives,
  anticoagulants, potassium, chemo

- Tracked quarterly for trends

- Proactive focus on actionable items
Insulin

- Where we started

- Initiation of Bed-Side Barcoding
  - Switching to pens
  - New problems

- New Process
New Process

Long Acting Insulins

Vs.

Short Acting Insulins
Insulin Fast Facts

- **Rapid acting insulin (aspart) and short acting insulin (regular)** are kept in the Accudose cabinets on most floors. They require a nursing double check documented in MAK.

- **Intermediate acting insulin (NPH) and long acting insulin (Glargine)** are sent from the pharmacy in pre-drawn up syringes. They do not require a nursing double check in MAK because pharmacy is the double check.

- **If a Patient is ever put on BOTH aspart and regular insulin** please call pharmacy to clarify the order.

- **You are part of every safe patient day!**
University of Washington Medical Center

- Seattle, WA
- 400 bed academic medical center
- Regional referral center
Medication Safety Structure

- Medication Safety Officer
- Safe Medication Practices Committee
  - Patient Safety Committee
  - Pharmacy & Therapeutics Committee
- Patient Safety Net (PSN): Online incident reporting system through UHC
- H.E.A.T. : Husky Event Analysis Team
  - Center for Clinical Excellence, Patient Safety Officer, Medication Safety Officer, Risk Management, Nursing, Transfusion, Radiology
UWMC High Alert Medications

- Heparin
- Insulin
- Concentrated Electrolytes
- Chemotherapy
- Opioids
Heparin Infusion Protocol

1. Provider, STOP! Has your patient had a recent neuraxial procedure (epidural/intrathecal/spinal)?
   - Yes
   - No
   If yes, I have consulted with _______ from Acute Pain Service (988-3334) prior to initiating IV Heparin. See ANTICOAGULATION GUIDELINES FOR NEURAXIAL PROCEDURES: https://depts.washington.edu/medica/clinicalresources.

2. Patient's total body weight: _______ kg

3. □ Administer loading dose of _______ units heparin IV (round to nearest 500 units)
   (suggested PREVENTION dose: including cardiovascular indications: 50-70 units/kg)
   (suggested TREATMENT dose: including DVT and PE: 100 units/kg)
   □ NO LOADING DOSE (consider no loading dose in patients without acute thrombosis or who are already anticoagulated with unfractionated heparin or low molecular weight heparin)

4. Begin infusion at _______ units heparin IV/hr (rounded to nearest 100 units). Use standard heparin infusion concentration of 25,000 units/50 mL DSW and infusion pump.
   (suggested PREVENTION dose: 12-15 units/kg/hr; suggested TREATMENT dose: 16 units/kg/hr)

5. Provide bolus heparin IV and adjust infusion rate as follows, based on aPTT results. Record rate of infusion at the time changes are made.
   - Boluses and infusion rate per table below
   - NO BOLUS DOSES FOR ANY SUBTHERAPEUTIC aPTT with infusion rate per table below

<table>
<thead>
<tr>
<th>aPTT (seconds)</th>
<th>Bolus Dose</th>
<th>Infusion hold time</th>
<th>Infusion rate change</th>
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<tbody>
<tr>
<td>Under 50</td>
<td>4000 units</td>
<td>none</td>
<td>Increase by 200 units/hr</td>
</tr>
<tr>
<td>50 - 69</td>
<td>2000 units</td>
<td>none</td>
<td>Increase by 100 units/hr</td>
</tr>
<tr>
<td>69 - 100</td>
<td>no bolus</td>
<td>none</td>
<td>No rate change</td>
</tr>
<tr>
<td>101 - 110</td>
<td>no bolus</td>
<td>none</td>
<td>Decrease by 100 units/hr</td>
</tr>
<tr>
<td>111 - 120</td>
<td>no bolus</td>
<td>30 minutes</td>
<td>Decrease by 200 units/hr</td>
</tr>
<tr>
<td>121 - 150</td>
<td>no bolus</td>
<td>60 minutes</td>
<td>Decrease by 200 units/hr</td>
</tr>
<tr>
<td>151 - 199</td>
<td>no bolus</td>
<td>90 minutes</td>
<td>Decrease by 200 units/hr</td>
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<td>200*</td>
<td>no bolus</td>
<td>Until aPTT &lt; 200</td>
<td>Repeat STAT aPTT immediately using peripheral blood draw (or protocol on reverse) then follow protocol above if aPTT &lt; 200 or steps below if aPTT = 200</td>
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<td>Until aPTT &lt; 100</td>
<td>Repeat STAT aPTT hourly using peripheral blood draw (or protocol on reverse) until aPTT &lt; 100. Then, decrease the last infusion rate by 300 units/hr and repeat aPTT in 6 hrs.</td>
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* If aPTT was drawn less than 6 hrs after bolus, or if sample was drawn from a heparinized line, recheck aPTT using correct timing and peripheral or proper line sample technique (See Reverse)

6. Labs:
   a) baseline and gain CBC (for platelet count and Hct)
   b) baseline and gain aPTT
   c) aPTT 6 hours after starting heparin AND
   d) aPTT 6 hours after any change in infusion rate

7. Notify MD: a) for any signs of bleeding, b) if unable to obtain blood sample, c) if no IV access for > 1 hr

8. OTHER HEPARIN ORDERS (rate change, hold, etc):__

PHYSICIAN SIGNATURE

PT NO: UHN Medicine
    Harborview Medical Center + UW Medical Center
    University of Washington Physicians
    Seattle, Washington

NAME: IV HEPARIN ADMINISTRATION ORDERS

DOB: U101

U1794 REV JAN 09

WHITE - MEDICAL RECORD
CANARY - PHARMACY
PINK - NURSING

PHYSICIAN ORDER - YELLOW
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5. Provide bolus heparin IV and adjust infusion rate as follows, based on aPTT results. Record rate of infusion at the time changes are made.

- **NO BOLUS DOSES FOR ANY SUBTHERAPEUTIC** aPTT with infusion rate per table below

6. Labs:  
a) baseline and qam CBC (for platelet count and Hct)  
b) baseline and qam aPTT  
c) aPTT 6 hours after starting heparin AND  
d) aPTT 6 hours after any change in infusion rate
Using the UWMC Heparin Protocol

Nursing Education

- Mandatory Nursing Education
- Case-based
- Self-study or Nursing Ed Days Presentation
- Online competency exam
JA is a 65 year old male with a history of atrial fibrillation who was admitted to the hospital for an acute exacerbation of heart failure. He is receiving heparin by IV infusion as a substitute for his usual outpatient warfarin therapy, which is used for stroke prevention, and to prevent left ventricular thrombus formation. He has been on heparin for several days at a stable rate, with aPTTs all between 60 and 100.
1. Drip running at 1800 units/hr 0100
2. qam aPTT blood draw due 0700
3. aPTT results available (aPTT = 200) 0900
5. Turn off heparin infusion 0900
4. HOLD HEPARIN INFUSION until aPTT<200
5. Redraw aPTT immediately = 0900
6. aPTT results available (aPTT = 96) 1000
7. Resume drip at 1800 units/hr 1000
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200 (potentially contaminated or improperly timed sample)  
(possibly timed, non-contaminated sample)  
NOTIFY MD  

| aPTT was drawn less than 6 hrs after bolus, or if sample was drawn from a heparinized line, recheck aPTT using correct timing and peripheral or proper line sample technique (See Reverse)
ANTICOAGULATION COMPETENCY QUESTIONS

Please review the Heparin Protocol Education Content. Take the Quiz and submit your responses, review your answers. If you did not get a question correct review the educational content. Print the completed quiz and submit it to your Nurse Manager.

Question 1.
Before starting a heparin drip, the nurse should be sure that:
Required.
- A baseline aPTT and CBC have been drawn
- The patient has been weighed
- The infusion dose is programmed into the Alaris pump, followed by the bolus dose (if one was ordered)
- All of the above

Question 2.
When a patient is started on a heparin drip, the first aPTT is due.
Medication Errors with Harm at UWMC
FY2009

Number of Events
Heparin Drips Errors at UWMC
FY2008 vs. FY2009
This Website contains multiple evidence-based tools called the **VTE Safety Toolkit**, for the prevention, diagnosis, and treatment of venous thromboembolism (VTE).

The development and implementation of the toolkit was funded by the Agency for Healthcare Research and Quality (AHRQ) for the purpose of increasing the implementation of safe practice interventions for patients at risk for or who are diagnosed with VTE, through use of an evidenced-based and system-supported interactive **VTE Safety Toolkit**.

**DEDICATION**

This project is dedicated to the late Dr. D. Eugene Strandness, Jr., MD, who was a Professor of Surgery at the University of Washington School of Medicine. Dr. Strandness had consecutive NIH funding for 15 years studying the natural history of venous thromboembolism. He was an outstanding clinical researcher, mentor, friend and colleague.

This project was supported by grant number 1 U18 HS015898 from the Agency for Healthcare Research and Quality.
Additional Heparin Safety Initiatives

- Limiting Heparin Concentrations
- Limiting the use of Heparin Flushes
- Neuraxial Guidelines and Order Entry Alert
- Heparin Induced Thrombocytopenia Alert
- Smart Pump Infusion Technology
Franciscan Health System (FHS)

- 5 Hospitals located in Pierce and King County
  - St. Joseph Medical Center 320 Beds, Level II Trauma
  - St. Francis Hospital 130 Beds, Level IV Trauma
  - St. Clare Hospital 110 Beds
  - St. Anthony Hospital 65 Beds
  - Enumclaw Regional Hospital 23 Beds, Critical Access

- Inpatient Hospice Facility
Medication Safety Leadership Team (MSLT)

- Regional committee charged with improving medication safety throughout FHS
- Meets monthly to review quality information related to medication safety.
- Composed of VP of Quality, Safety Officer, Directors of nursing from all hospitals, the chairs of the nursing-pharmacy committees from all hospitals and educators.
- Chaired by a pharmacy manager and nursing director.
Med Safety Process for Narcotics

- IRIS-incident Reporting Information System
- Electronic system where errors are reported via the FHS intranet for review by department managers and risk managers.
- Data from events collected and reviewed for trending and problem identification.
- Events classified by standard error reporting nomogram as category D and above reviewed by nursing-pharmacy committee to identify system issues.
- System problems and solutions are brought to MSLT for discussion and possible implementation system-wide.
In early 2007 anecdotal reports were presented to MSLT of increased over sedation events associated with narcotics.

- A proposed cause for this was the movement from meperidine to hydromorphone.
- Lack of familiarity with dosing of hydromorphone by all providers was thought to be the reason for increased events.
- Increased focus on pain related issues and aggressive treatment.
Narcotics - HFMEA

- MSLT determined that an HFMEA process would be used to identify issues and provide recommendations for preventing over sedation events.

- An HFMEA team, chaired by pharmacy and nursing was formed in October 2007.
  - Included physician, pharmacy and nursing representation.
Review of incident reports and analysis of events to determine scope of problem.

Review of literature as well as other hospitals to determine benchmark rate.
- Literature referenced over sedation rate between 0.1 and 1 %
- Literature supported our observation of increased over sedation events associated with narcotics.
- Links drawn towards new standard of care with pain as the fifth vital sign and aggressive management of pain issues.
Narcotics - HFMEA

- FHS Baseline rate determined through analysis of Code Green events (rapid response team) and IRIS reports.
- HFMEA performed on PCA administration process from pre-op screening to post-op care, including PCA without surgery.
  - Focus on items with hazard score >16 (Severity and probability)
  - Areas for improvement identified:
    - H & P, high risk screening
    - OR hand off to PACU
    - PCA set up and admin PACU
    - PACU hand off to floor
    - RN knowledge and skill
    - Protocols and procedures
Narcotics - HFMEA

- FY07 rate of 0.47 established (Rate (%) = OSD (patients with over sedation by PCA) per PDC (adults/peds discharges) / 1000
- Goal of HFMEA reduce rate of over sedation events by 50% for FY08
- HFMEA Goals:
  - Improved patient selection and screening tool
  - Patient/family education on both PCA and post-op pain expectations
  - Policy, procedure, protocol, flow sheet review and revision.
    - Increased nurse double checks, increase patient monitoring.
  - Nurse competency validation
    - Skill testing with pump set up and problem solving
    - Pain management; sedation assessment
  - Equipment
    - Smart PCA pumps at all sites
    - Continuous pulse-ox/heart rate monitoring on all post-op patients
Rate declined from a high of 1.8 to current rate of 0.5 at one of our hospital and from 1.65 to 0.25 at another.

Current overall FHS rate approximately 0.23, down from 0.47 FY07

Implemented pulse-ox and heart rate monitoring for all post-op patients for 24hrs after surgery and for all PCA patients for duration of PCA therapy.

- Ideally, capanography was the desired monitoring tool as it is a better measure of oxygenation but cost concerns did not allow for implementation.
- HFMEA indicated that post-op patients at greatest risk for up to 24hs post surgery and for duration of therapy for PCA patients.
- Alarms:
  - Oxygen sat <90, HR >120, <50
Narcotics: Event Monitoring

- With HFMEA conclusion, still need for additional monitoring for over sedation events.
- IRIS system not used consistently for reporting events.
- Use of PYXIS CDC for all naloxone removal to capture possible over sedation events.
  - All naloxone removals documented as “treatment for over sedation” reviewed by nurse-pharmacy committee and by department where events occur.
  - Results reported to MSLT on monthly basis to identify system issues and make recommendations for corrective action.
Narcotics – High Risk Medications

- **PYXIS CDC**
  - Good tool to track removal and alert nursing
  - Identified over sedation events associated with unfamiliarity with dosing differences between hydromorphone and morphine.
    - Implemented CDC to alert nursing when removing hydromorphone: “hydromorphone 1.5mg IM/IV = 10mg morphine IM/IV”
      - Force “yes, I am aware” response upon removal
  - All High Risk medications (insulin's, heparins, warfarin, narcotics, etc.) have CDC alert:
    - “High Risk Med***Double check required”
  - All LASA medications have CDC alert: “look alike/sound alike alert”
Narcotics

Still room for improvement!

- HFMEA work continues with goals of implementing all recommended improvements.
- Increased awareness of over sedation
- Better use of technology to track and trend, resulting in improved patient safety.
Resources

- **Go to Washington Patient Safety Coalition**
  - [http://www.wapatiensafety.org/](http://www.wapatiensafety.org/)
  - Today’s slide set
  - YVMH Insulin “Fast Facts”
  - UWMC Heparin Infusion Protocol

- **The Institute for Safe Medication Practices**
  - ISMP.org
  - Lists, Newsletters, process improvement ideas
Your turn.
Questions
Thanks to Carol, Jackie and Tim!

Please submit your evaluations