Medication Safety

Improving Patient Care

Outline

• Medication Safety and Delivery information and processes need to be reviewed continually.
  • These topics may seem common, but should always be present prior to and at the time of medication delivery.

• Medication Safety:
  • JACHO, NPSG
  • 5 Million Lives Campaign
  • Preventing Adverse Drug Events
  • Unsafe Abbreviations
  • Potential for Harm
  • The 5 Rights
The term High-Risk, High-Alert has been used consistently, with regards to this power point the terms high risk and high alert will be used interchangeably.

- Remember all medications have a risk when patients take them, though there are medications that need a double check performed for increased safety.

- High Alert Medications:
  - Look alike sound alike medications
  - What is a double check? How do you perform one?
  - List of high alert (risk) medications
  - Use of the Smart Pumps, drug libraries for safety

### Medication Overview:

- Anticoagulants
  - Types of Anticoagulants. Lab Test associated
  - Risk with Epidurals
  - Order Sets
- Sedation
  - Dosing and Concentration Errors
- Chemotherapy
- Insulin
  - Symptoms
  - Types of Insulin
  - Order Sets
- Common Mistakes to Avoid
The organization safely manages high-alert and hazardous medications

1. The organization identifies, in writing, its high-alert medications
2. The organization has a process for managing high-alert medications.
3. The organization implements its process for managing high-alert medications
4. The organization minimizes risks associated with managing hazardous medications.

Medication Safety

This power point will describe many components of medication safety to include high risk medications. Both MultiCare Pre and Good Samaritan Hospital have different medications that they have determined to be High Alert.

A majority of the emphasis of this Power Point will be on two of the following high alert drug categories:

ANTICOAGULANTS
INSULIN

Additional information on other high alert drug medications, will be included that need a specialized knowledge base. These medications also have special policies and competencies and training:

Chemotherapy
Epidural medications
Sedation
Scope of Problem

Institute of Medicine Report: *To Err is Human* (1999)
- 44,000 to 98,000 die as a result of medical errors each year
- Medication errors account for 7,000 deaths each year
- Estimated costs of $17-29B on nonfatal medical errors
- Additional consequences include:
  - Loss of trust in health care system by patients
  - Decreased satisfaction for patients & health professionals
  - Decreased productivity and lower levels of health among the general population

5 Million Lives Campaign

- Extension of 100,000 Lives Campaign
- Sponsored by Institute for Healthcare Improvement
- Est. 37M hospital admissions yearly
  - 40 injuries per 100 admissions
  - ~15 million injuries per year, many preventable
- Suggest initiatives for improvement
  - Goal of 4000 participating hospitals
Swiss Cheese Model

Defensive Layers in the Medication System

Potential Medication System Errors

Prescribe medication ➔ Transcribe order ➔ Interpret order ➔ Enter order ➔ Select drug ➔ Labeling ➔ Check Rx ➔ Dispense Rx ➔ Administer Rx ➔ Monitoring ➔ NEAR MISS ➔ ERROR ➔ Reaching patient

Preventing Adverse Drug Events (ADEs): High-Alert Medications

- Drugs that have a heightened risk of causing significant patient harm when used in error
- Mistakes may/may not be common
- List available at www.ismp.org

- Some examples of high-alert drug classes:
  - Anti-arrythmics
  - Anti-coagulants
  - Chemotherapy
  - Vasopressors
  - Insulins
  - PCA/Epidural medications
### Unsafe Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Intended Meaning</th>
<th>Common Error</th>
<th>Instead Use…</th>
</tr>
</thead>
<tbody>
<tr>
<td>U</td>
<td>Units</td>
<td>Mistaken as IV, 10 cc</td>
<td>“unit”</td>
</tr>
<tr>
<td>IU</td>
<td>International units</td>
<td>Mistaken as IV, 10</td>
<td>“international unit”</td>
</tr>
<tr>
<td>QD, Q.D.</td>
<td>Every day</td>
<td>Confused for one another or mistaken as QID</td>
<td>“daily”</td>
</tr>
<tr>
<td>QOD, Q.O.D.</td>
<td>Every other day</td>
<td>“every other day”</td>
<td></td>
</tr>
</tbody>
</table>

- **Trailing zero (2.0 mg)**
  - two milligrams
  - Missed decimal (read as 20 mg)
  - “2 mg”

- **Lack leading zero (.2 mg)**
  - two-tenths milligrams
  - Missed decimal (read as 2 mg)
  - “0.2 mg”

- **MS, MSO₄**
  - Morphine sulfate
  - Confused for one another
  - “morphine sulfate”

- **MgSO₄**
  - Magnesium sulfate
  - “magnesium sulfate”

### Unsafe Abbreviations (cont.)

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>mcg</td>
<td>ug</td>
<td>Mistaken for “mg”</td>
<td></td>
</tr>
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</table>

- **Use the metric system**
  - Dram
  - Minim
  - Grain
  - Misunderstood or misread (symbol for dram misread as “3” and minim misread as ml)

- **Spell out all chemotherapy drug names**
  - Chemotherapy drug names
  - Misread and wrong agent administered
Potential for Harm

- **All medications** have a potential for harm
- **Must always** follow 5 rights
  - NSAIDS can potentiate kidney failure check BUN/Creatinine before admin.
  - Double check allergies, an ASA can kill if pt allergic!
  - Is the medication appropriate to the patient care plan, age, weight?

The 5 Rights

**The nurse administering the medication is responsible for:**

- The right patient
- The right medication/concentration
- The right dose
- The right route
- The right time and frequency
  - *Even if there is a double sign off!*
- Documentation of the medication administration occurs upon administration and not at the time of the double check
Slow Down!

- Don’t interrupt your co-workers while they are preparing medications

- Help your co-workers do the right thing!
  - *Speak up if you note a violation of the 5 rights!*

- Nurses who have been involved with medication error sentinel events have stated
  - “I wish I had just slowed down before I gave that med”

What Do the 5 Rights Really Mean?

1. **The right patient**
   - Use 2 pt identifiers, bring source document (MAR, or chart, WOW (workstation on wheels) to patient
     - 2 patient identifiers are pt name and MRN, if outpatients can use DOB

   - Check patient ID even if you “know” the patient

   - Check identifiers even if patient “tells” you who they are
     - Check EVERY time a medication is given
What Do the 5 Rights Really Mean?

2. The right medication
- Bring MAR to the patient
- Confirm correct medication in MAR
- Check for allergies/contraindications
- Inform patient what you are administering
- Be vigilant for look alike, sound alike meds
- Note any auxiliary caution stickers

What Do the 5 Rights Really Mean?

3. The right dose/concentration
- Check label for dosage and compare to MAR
- Check medication label for concentration
- Check manufacturer’s label on IV bag and pharmacy label for contents. If you can’t see the manufacturer’s label do not administer the IV
- Watch patients on multiple drips make sure the correct bag is being hung and its going in the correct line.( bag, tubing, pump are all correct)
4. The right route

- Bring MAR to patient and check MAR for route
- Is route appropriate? Do we need an IV? Can the patient take po?
- Does the med need to be diluted? Flushed?
- Even if the med arrives in a syringe do not assume the medication will be injected. It may be a po med.
- Did patient have a previous dose? Is time lag interval appropriate?

5. The right time and frequency

- Bring MAR to patient and double check time for administration.
- Use 24 hr clock time. If unsure ask!
  - 2100 = 9 pm
High-Alert Medications

- **Safeguard strategies employed:**
  - Increase access to drug info
  - Limit access to drug
  - Use auxiliary labels
  - Automated alerts
  - Standard ordering, storage, preparation, administration
  - Double-checks
  - Be alert for look alike, sound alike medications

Look-Alike, Sound-Alike Drugs

- **Prevention Strategies:**
  - Be aware of potentially confusing products
  - Ensure orders are complete & clear
  - Determine purpose of Rx
  - Write & **read back** verbal orders
  - Change look-alike appearances (TALL man letters, bold face, highlighting)
  - Separate confusing products
  - Use “name alert” stickers
What is a Double Check?

• Ensure accuracy of the prepared medication to be administered to the correct patient
• High-Risk medications require 2 staff one must be RN double-check prior to administration at patient’s bedside need second signature
• The second nurse will validate that the drug selected and dose prepared matches the appropriate order for the specific patient.

The Validation Will Include:

• Patient name
  • Drug name/Vial
  • Dose, Quantity or volume
  • Strength/concentration
  • Administration form
  • Original vial or container
  • Initial pump settings, rate and container, new settings (at bedside)
  • Check appropriate lab values
Double Sign-Off

- Most high risk medications require a second signature prior to administration
- Serves as an independent double check to ensure that a proper medication and dose have been selected for the patient
- Know which medications require double sign-off *(please refer to “Medication Administration and Documentation in the Acute Care Setting” Policy for MHS-Pre, For GSH High Risk High Alert Policy)*
- *Documentation of the medication administration occurs upon administration and not at the time of the double check*

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**High-Risk Medications: Require a Double-Check**

**Tacoma campus only**

**New policy coming out soon**
High-Risk Medications: Require a Double-Check

Puyallup Campus

• Policy name “High-Risk, High Alert medication policy”
  • Anticoagulants
  • IV pressors
  • Insulins
  • Epidural medications
  • PCA medications
  • Chemotherapy

Smart Pump

Smart Pump (PLUM-A) drug library will provide another level of safety for you and your patient.

Use them!!!
Smart Pump (Plum-A) Libraries

- **Medication Libraries**
  - Libraries are specific to patient populations and units, called CCA’s or Clinical Care Areas
  - Hard stops, soft stops
  - Medication alerts

- **The Drug Library needs to be used on ALL infusions unless a Code 4/99 situation**

Smart Pumps

**Please note:**
- When entering rates for Heparin drips, remember to check your CCA for your area. Some CCA’s administer Heparin in **units/hr and some in ml/hr**.
From MHSnet, click [Departments] tab
Click [View All]

Under “Patient Care – MMC, Allenmore, Business Areas,” click [Pharmacy]
In the left side menu, click [Hospira Smart Pumps]

Anticoagulants

National Patient Safety Goals

• NPSG #3: Reduce the likelihood of patient harm associated with the use of anticoagulation therapy
• NPSG #9: Reduce the risk of patient harm from falls (keep in mind that consequences of a fall may be more serious in a fully anticoagulated patient, especially elderly patients)
Reasons Why Anticoagulants Are High Risk Medications

• **BLEEDING**

• Errors continue to happen
  - Most recent error occurred in Texas when 17 NICU patients were administered heparin overdoses due to a pharmacy error in mixing
  - A famous example is that of Dennis Quaid’s twins, who were given heparin in a concentration of 10,000 units/ml instead of 10 units/ml (1000-fold error!)

• The bottom line of why these drugs are considered high risk is **PATIENT SAFETY**

Outline

• Anticoagulants on MHS formulary
  - Brief pharmacology overview

• Why do we categorize anticoagulants as high risk medications?

• MHS policy highlights and provides ideas for improving patient safety with regard to anticoagulant medications
**Formulary Anticoagulants**

- Heparin (UFH)
- Low Molecular Weight Heparins (LMWH)
  - Fragmin® (dalteparin) and Lovenox® (enoxaparin)
- Refludan® (lepirudin)
- Argatroban®
- Coumadin® (warfarin)

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**Why keep so many different anticoagulants on formulary??**
Warfarin

- Inactivates vitamin K-dependent coagulations factors II, VII, IX, and X
- Available PO
- Used for long term anticoagulation to prevent development/recurrence of clots (atrial fibrillation; aortic and mitral valve replacements; DVT; PE and etc.)
- Available generically; inexpensive
- Requires 5-7 days to reach peak therapeutic effect
- Requires monitoring

INR

- Used for monitoring patients on Warfarin
- Purpose: safety measure to prevent over-anticoagulation
- Measures the time to clot formation (prothrombin time) following addition of clot-inducing substances to a sample of plasma, from which platelets have been removed (the result is converted to a ratio secondary to variability in reagents used by different labs)
  - Assesses extrinsic coagulation pathway
- Goal INR: usually 2-3 or 2.5-3.5 depending on a condition being treated
Heparin (UFH)

- Inactivates thrombin as well as other coagulation factors and plasmin; also prevents formation of fibrin
- Can be administered IV and sub-Q
- Used in in-patient settings to prevent and treat clots
  - Patients with active clots may concomitantly be initiated on Warfarin and maintained on Heparin until therapeutic on Warfarin for at least 2 days
- Short half-life (1-2 hours)
- Can cause Heparin induced thrombocytopenia (HIT)
- Requires monitoring

aPTT

- Used to monitor general anticoagulation status
- Assesses time to clot formation following addition of clot-inducing substances to a sample of plasma
  - Intrinsic coagulation pathway
  - In order to simulate intrinsic coagulation pathway, reagents used in this test are different from those used to determine prothrombin time (from which INR is derived)
- Unlike prothrombin time, which is converted to an INR, this test is not standardized
HepU (UFH) or Anti-Xa

- Monitor anticoagulation status with Heparin therapy, especially IV drips
- Measures Heparin levels
- Weight based

LMWHs: Fragmin® and Lovenox®

- Inactivate factor Xa (as well as thrombin, but to a much smaller degree than UFH)
- Sub-Q administration allows for outpatient use until patients with active clots become therapeutic on Warfarin
LMWHs: Fragmin® and Lovenox® cont.

- Unlike Heparin, these agents have longer duration of effect, less likely to induce thrombocytopenia, do not require monitoring, and are safe for outpatient use
- Monitoring may be initiated to assess response to therapy and to adjust dose (also for safety reasons in patients with compromised renal function since these drugs accumulate)

Anti-Xa Activity, CBC

- Used in patients on LMWHs
- Purpose: generally, monitoring is not required to ensure proper anticoagulation, except for patients with compromised renal function.
- Can be used to adjust doses (especially obese patients) and to monitor pregnant patients
- Measures activity of LMWHs against factor Xa in plasma using a chromogenic assay
- Goal: 0.5-1.0 units/ml
Direct Thrombin Inhibitors: Argatroban and Refludan® (lepirudin)

- Alternative agents for patients with Heparin-induced thrombocytopenia
  - Direct thrombin inhibitors
- Require aPTT monitoring
- Argatroban®
  - Dosing precautions apply to patients with hepatic dysfunction
  - Dosage adjustments are not necessary in patients with renal impairment
- Refludan® (lepirudin)
  - Eliminated by kidneys; use caution in patients with compromised renal function

Others...

- Recognize that medications listed below may make bleeding worse during some procedures/surgeries
  - ASA
  - NSAIDs, Ibuprofen, Naproxyn
  - Plavix, Aggrenox
**Vitamin K**

- Used to reverse Warfarin over-anticoagulation in patients at risk for bleeding or when bleeding is suspected
- Vitamin K is needed for proper synthesis of anticoagulation factors affected by Warfarin therapy
- Dose depends on INR and clinical presentation (See Warfarin Dosing – Adult Acute Care guideline MHS-pre only)

**Epidural placement in anticoagulated patients**

- **Absolute contraindication!!!**
  - High risk of developing spinal hematoma, which may paralyze the patient

- Know if your patients are anticoagulated and make others aware as well.
Anticoagulation and epidural placement continued...

To discontinue epidural catheter:

- Order needed for discontinuation of epidural line
- Before D/C of line check patients coagulation lab results
- Check policy or call pharmacy

Order sets

- Both MHS and Good Samaritan have a Heparin order set, refer to the order set each time the Heparin drip has to be adjusted.

- Both MHS and Good Samaritan have a Lepirudin and Argatroban order sets to guide you in administration and monitoring of these medications
Warfarin and Bridge Therapy

What is bridge therapy?

• Regimen designed to protect patients at risk for clots when Warfarin therapy needs to be held for a procedure

• Usually patient discontinues Warfarin 4 to 5 days prior to a procedure to allow INR to fall below a therapeutic range, and a LMWH is initiated

• LMWH is stopped 12-24 hours before a procedure and then again resumed 12 hours post-procedure, along with Warfarin

• LMWH is continued until patient’s INR becomes therapeutic

Sedation

• Specialized knowledge base needed for procedural sedation

• Specialized policy, competency, training
5 Million Lives Campaign
Sedation/Opiates

- Sedation/Opiates are one of four classes of drugs listed as high alert medications
- Overall goal to reduce patient harm
- Opiates have led to serious adverse events
  - Allergic reactions
  - Over-sedation
  - Respiratory depression
  - Seizures
  - Death

Dosing Errors

- Misprogramming infusion pumps
  - Bolus dosing
- High initial dosing for opiate-naïve patients
- Oral to IV conversions
Concentration Errors

- Oral liquid morphine
- Dosing by volume vs. concentration
- Selecting the wrong concentration
  - (Morphine drip 1/1 concentration vs. 1/5 concentration)

Others

- Dangerous abbreviations (MSO4)
- Line confusion (IV vs. Epidural)
- ADR’s (Adverse drug reactions)
- Mislabeled and unlabeled syringes
- Not assessing patients status after medication admin.
- Unintended use
Fentanyl Patch

- NOT for opiate naïve patients
- Takes 48-72 hours to work
- Replace every 72 hours
  - Take off old patch!
  - Label new patch with date and time
- Proper disposal
- Do not cut

Naloxone (Narcan)

Used for opioid reversal

**Adults dose:** titrate 0.1-0.4 mg IVP, repeat Q 2-3 min PRN

Dose to respiratory response

Reverses Morphine, Fentanyl, Meperidine, Hydromorphone
Patient Teaching

- Constipation
  - prevention and tx
- Sedation
- Fall risk
- Confusion
- Effectiveness
- Pain Scales
- Side effects

Chemotherapy Agents

- Need a specialized knowledge base for chemotherapy administration and handling of toxic substances (see policies)
- Specialized policy, competency, training
- Successful completion of chemotherapy class
- Name of chemo agent should be written out no abbreviating the title of the medication
INSULIN – HIGH ALERT!

• Is your patient on Insulin?
  High chance of hypoglycemia!
• The brain needs glucose!
• BG should never be
  < 60 mg/dL
• Optimal BG > 80
• Does the dose fit the patient’s plan of care?
  weight?

Hypoglycemia

Signs/symptoms of hypoglycemia:
• Sweating, shaking, anxiety, irritability,
  headache, palpitations, disorientation,
  seizures, coma and death same for adults or
  kids
So Why Give Insulin?

• Important to keep blood sugar in a moderate range
  • Critical care: 80-120 mg/dL
  • Non-critical care range:
    • 80-130 mg/dL before meals
    • < 180 mg/dL after meals

• High blood sugars will do the following:
  • Impair healing
  • Increases the chance of developing a wound infection

Rapid and Short Actors

Aspart = Rapid
• NovoLog
• Onset → 10-20 min
• Peak → 1-3 hr
• Duration → 3-5 hr
• Usually given 5-10 min before meals (check if carb counting)
• Clear

Regular = Short
• (Humulin R or Novolin R)
• Onset → 30-60 min
• Peak → 1-5 hr
• Duration → 6-10 hr
• Usually given 30 min before meals
• Also clear
Long Actors

Glargine (Lantus)
- Used more often than Detemir
- Onset → 70 min
- Peak → Flat
- Duration → 24 hours (but sometimes dose BID)
- Clear

Detemir (Levemir)
- Onset → 45 min – 2 hrs
- Peak → Flat
- Duration → Dose-dependent (0.2 units/kg q12h or 0.4 units/kg q24h)
- Also clear

NPH Insulin – Intermediate Actor

- Novolin N or Humulin N
  - Onset → 1-2 hours
  - Peak → 6-14 hours
  - Duration → 16-24+ hours
  - Administration individualized
  - Cloudy
Pharmacy Dispensing

- Vials – Regular and Aspart
  - MedSelect/Pyxis

- Syringes (MHS-Pre) – Lantus

- Drips – Regular

Order Set Examples

- Order sets for adults and pediatrics for Insulins at MHS-Pre are in EPIC

- At Good Samaritan on paper forms
  - See example
Common Mistakes YOU Can Avoid!

• **Right dose prescribed and entered, but wrong dose given!**
  - Be careful drawing up dose
  - Check patients blood sugar, type of insulin with order, dose and route with order, concentration
  - Check dose in syringe coming from pharmacy
  - Independent double check must be performed with another nurse – **IF THE DOUBLE CHECK NURSE FINDS AN ERROR RE-DO, DRAW UP THE MEDICATION AGAIN. REMEMBER THEY ARE YOUR SECOND EYES**
    - Checking all of the above
Common Mistakes YOU Can Avoid!

- Mis-hearing, mis-reading
  - Look at your orders carefully
  - Don’t rely on another RN’s say-so
  - VERBAL ORDER READ BACK!
  - Know your Insulins! Is it short, medium or long acting?

Common Mistakes YOU Can Avoid!

- Misinterpreting an order
  - Avoid unsafe abbreviations
    - .5 vs. 5
    - 8.0 vs. 80
    - u vs. units
  - Do not write “repeat dose” or “repeat yesterday’s dose”
Insulin was given but patient has had no source of carbohydrates

- Make sure patient eats meal after short-acting Insulin given!
- If the Insulin drip is continued and the D5W IV Bag is stopped you should think of the following
- Potential for major hypoglycemic episode
- Assess why – new source of carbohydrate (CHO)?

Common Mistakes YOU Can Avoid!

- Long-acting Insulin ordered as daily?
  - Be sure med was not accidentally given q12h
  - Especially if patient is transferred to new floor
  - Or vice versa: ordered BID? Make sure given BID to control high blood sugars

- Does the dose make sense?
  - Did MD communicate intentions clearly?
  - Was patient on this dose at home?
  - Did pharmacy enter/interpret order correctly?
Summary

• Before you administer any medication ask yourself:
  • Is this medication appropriate to the patient plan of care?
  • Patients weight?
  • Patients condition?
  • 5 rights?

At the End of the Day Have You...

Done No Harm?

Right patient?
Right dose?

Right product?
Right route?

Right frequency/time?
References

• Therapeutic Use of Warfarin. © 2008 UpToDate, Inc.
• New Anticoagulants. © 2008 UpToDate, Inc.
• Clinical Use of Coagulation Tests. © 2008 UpToDate, Inc.
• Warfarin Dosing – Adult Acute Care. MHS Medication Guidelines
• Medication Administration and Documentation in the Acute Care Setting. MHS Policies and Procedures
Medication Safety Quiz

Name_________________________________ Date __/__/__

Department/Hospital__________________________

After reviewing the PowerPoint presentation please answer these questions, and then correct them using the enclosed answer key

1. QD is an acceptable abbreviation for every day?

2. Who is responsible for following the 5 rights?
   a. The ordering physician
   b. The pharmacist
   c. The charge nurse
   d. The nurse administering the medication

3. All medications that arrive in a syringe from pharmacy should be given IV.
   True False

4. You must go through a special class and pass a specific competency to administer in procedural sedation?
   True False

5. For any narcotic patches you must remove the old before applying the new.
   True False

6. Anticoagulants and Insulin’s require a double check by another licensed health care provider before administering.
   True False

7. Patients have died at MHS because a nurse did not follow the 5 rights.
   True False

8. What is a “double check?”
   e. The witness must check the original order, medication name, concentration, route, dose, reason for administration, any calculations, any corresponding lab work, original bottle/vial/IV bag
   f. You are rushing, you find a nurse to double check, they glance at the medication and say “it is fine”
   g. There is not a nurse around so you decide you are going to give the medication anyways, and ask one of your co-workers after the fact to co-sign.

Thank you for taking this quiz, please self correct using enclosed key
Medication Safety Quiz Answer Key

1. QD is an acceptable abbreviation for every day?  
   True  xFalse

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   d. The nurse administering the medication

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