High Alert Medications

Basic Medication Safety (BMS) Certification Course
King Saud bin Abdulaziz University for Health Sciences, Ministry of National Guard – Health Affairs
Learning Objectives

- Define and identify High Alert Medications
- Share our experiences / reporting
- Identify common risks
- Outline strategies to improve and minimize risks
- Reinforce policy & procedures
High Alert Medications

Medications that pose an increased risk of causing significant harm to patients if used in error
Top 10 Medications Reported as Causing Harm

MedMarx 2008 High Alert Meds with Harm Score E and Above

Accounted for 199 / 465 (43%) Harmful Incidents. (ISMP Canada; 2001-2005)
Reported Medication Errors / Near Misses for Top Four High Alert Medications

2015, 2016 and 2017 - Central Region (KAMC)

Total HAM:
- 2015 = 527
- 2016 = 814
- 2017 = 814
NCCMERP Categorizing Medication Errors for All High Alert Medication Events

2015, 2016 and 2017 - Central Region (KAMC)
Half of Preventable ADEs involve:

<table>
<thead>
<tr>
<th>DRUG</th>
<th>TOO MUCH LEADS TO:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opiates</td>
<td>Respiratory depression</td>
</tr>
<tr>
<td>Insulin</td>
<td>Hypoglycemia</td>
</tr>
<tr>
<td>Anticoagulants</td>
<td>Bleeding</td>
</tr>
</tbody>
</table>

U$3.5 billion is spent annually on extra medical costs of ADEs


Case:

- 44 year old male
- History of PE on Warfarin

- Admitted for bilateral hydronephrosis, with acute renal failure for bilateral nephrostomy tube placement
- Post-nephrostomy tube the anticoagulation was resumed with Enoxaparin 120 mg q 12 hr in the setting of severely compromised renal function

- Patient was transferred to ICU with clinical picture of shock, which turned to be hemorrhagic, complicated by multi-organ failure and death

- Ultrasound of abdomen showed evidence of intra-abdominal collection
Anticoagulants

Percentage of Reported High Alert Medication Events

- 22% during 2017 at KAMC-Riyadh
- 24% during 2016 at KAMC-Riyadh

Common Risks

- Lack of standardization in names and packs
- Complicated dosing regimens
- Low Molecular Weight Heparin (LMWH) syringe designed for adults only
Anticoagulants

Common Strategies

- Standardize labels, packaging
- Protected Standard Concentration
- Anticoagulation Services
- Counseling
- Use protocols / smart pumps
- Individualized monitoring and handoffs
- Medication Reconciliation
- Improved Information and Counselling for Patients
  - At start of therapy (prescription)
  - On hospital discharge
  - At the first anticoagulant clinic appointment
  - When necessary throughout course of therapy
Opiates

Percentage of Reported High Alert Medication Events

- 24% during 2017 at KAMC – Riyadh
- 23% during 2016 at KAMC – Riyadh

Common Risks

- LASA (Morphine and HYDROmorphone)
- Lack of leading zero
  - Ordered .8 mg, patient received 8 mg Morphine
- Bolus dose, failing to re-program maintenance dose
- Different rates and concentrations
- Improper disposable of Transdermal Patches
Opiates

Common Strategies

- Differentiate products
- Use TALL man lettering
- Use conversion tables
- Time Out prior to intrathecal injection and **ONLY** intrathecal meds will be in the procedure area
- Education for staff regarding PCA
- Develop a quick reference sheet on PCA
- Implement protocols for the use of PCA and other opioids
- Proper patient education
## Chemotherapy

### Percentage of Reported High Alert Medication Events
- 18% during 2017 at KAMC-Riyadh
- 15% during 2016 at KAMC-Riyadh

### Cases

<table>
<thead>
<tr>
<th>Drug</th>
<th>Error and Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methotrexate</td>
<td>Administering daily instead of weekly (approximately 25 fatalities reported)</td>
</tr>
<tr>
<td>VinCRISTine</td>
<td>Accidental Intrathecal administration - Fatal</td>
</tr>
<tr>
<td>Lomustine</td>
<td>Oral agent administered daily instead of every 6 weeks, hospitalization and death</td>
</tr>
<tr>
<td>CARBOplatin and CISplatin</td>
<td>CISplatin administered at dose intensity appropriate for CARBOplatin, fatal outcome</td>
</tr>
</tbody>
</table>
Chemotherapy

Common Risks

- Miscommunication
- Total course (or cycle) dose given every day
- Substantial distance between Pharmacy and patient treatment area (lack of communication)
- Lack of health care information (labs, BSA)
- Excessive interruptions
- LASA / packaging
- Lack of protocols and education
- Route of administration: Intravenous vs. Intrathecal
Chemotherapy

Common Strategies

- Drugs are **ONLY** stored in Pharmacy
- Standard chemotherapy order sets
- Orders must be signed by an authorized Consultant
- Double check against actual order / protocol
- No abbreviations / error-prone abbreviations
- Avoid excessive precision (round off 919.57)
- Non-Oncology indications: Order sets have dosing, route safeguards programmed in them
Chemotherapy

Common Strategies: Cont.

- Use of personal protective equipment to reduce employee exposure to hazards
- Dispense VinCRISTine (and other vinca alkaloids) in a minibag of a compatible solution and not in a syringe
- Weekly dosage regimen default for oral Methotrexate in electronic systems when medication orders are entered.
- Body Surface Area dosing (mg / m2), when applicable mg / kg
- Use updated lab information
- Patient / caregiver education
- Communication
Insulin

Percentage of Reported High Alert Medication Events
- 8% during 2017 at KAMC Riyadh
- 13% during 2016 at KAMC Riyadh

Common Risks
- Look-Alike Vials
- Use of “U” or “IU”
- Incorrect dose / rate
- Lack of dose checking

Only Insulin IV is High Alert Medication
Common Strategies

- Spell out “Units” and “Numbers”
- Smart pump / double-check
- Protected standard concentration of Adults
- Order sets for
  - Perioperative Management of a Diabetic Patient’
  - Regular
  - Insulin IV Infusion Scale in Intensive Care Department
- Insulin Infusion Protocol in Cardiac Sciences
- Basal-Bolus-Corrective Subcutaneous Insulin Protocol in Internal Medicine
- Store separately / labels
Concentrated Electrolytes

Common Risks

Injury / Death
Concentrated Electrolytes

Common Strategies

- Stored in Red Bins with Lids
- Patient care areas: Stored in ADC locked Lidded
- Crash Cart / Black Box (as applicable)
  - Auxiliary label “High Alert / Conc. Electrolyte: Must Be Diluted”
- Standardized medication labels

APP 1433-18: Concentrated Electrolytes
Concentrated Electrolytes

Common Strategies: Cont.

- Storage of Concentrated Electrolytes Outside of Pharmacy is Limited to (as applicable)

<table>
<thead>
<tr>
<th>Concentrated Electrolyte</th>
<th>Clinical Justification for Concentrated Electrolyte</th>
<th>Location by Clinical Care Area</th>
<th>Quantity</th>
</tr>
</thead>
</table>
| Magnesium sulfate 4 mEq/mL or higher concentration | • Cardioplegia  
 • Eclampsia  
 • Torsades de pointes | • Crash Carts  
 • Cardiac / Liver OR  
 • Emergency Medical Services (EMS)  
 • Main OR  
 • Surgical Tower OR | Determined by Region |
| Potassium chloride 2 mEq / mL or higher concentration | • Cardioplegia | • Cardiac / Liver OR  
 • Main OR | Determined by Region |
General Strategies For High Alert Medications
General Strategies for High Alert Medications

- TALLman lettering
- ‘LASA’ on label, when applicable
- “High Alert” on storage label
- High Alert Medications must be stored in Red Bins using Standardized Medication Labels
- Medication which must be stored in Red Bins with Lids
  - Concentrated Electrolytes
  - Parenteral Skeletal Muscle Relaxants (Paralyzing agents)
- Patient care areas: Stored in ADC locked Lidded
- CPOE with clinical decision support, providing immediate warnings if unsafe orders are entered
General Strategies for High Alert Medications

- Use of smart infusion pumps with dose checking software enabled
- Order sets
- Independent Double-Check (IDC)
  Procedure in which two healthcare professionals separately check (alone and apart from each other, then compare results) each component of prescribing, transcribing, dispensing and verifying the medication before administering to the patient
  - Dispensing
  - Verifying at time of administration

Done without distractions
# General Strategies for High Alert Medications

APP 1429-02: Look-Alike/Sound-Alike And High Alert Medications, January- Appendix D

## Risk Reduction Strategies For High Alert Medications

<table>
<thead>
<tr>
<th>Drug or Class</th>
<th>High-Area Feature</th>
<th>Storage</th>
<th>Risk Reduction Strategies for High Alert Medications</th>
<th>Dispensing</th>
<th>Administration</th>
<th>Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adrenergic Agents (IV) (e.g., Dopamine)</td>
<td>Narrow therapeutic index</td>
<td>TALL, stratified, or label, if applicable</td>
<td>Standardized concentration and labeling of fixed strengths</td>
<td>Premixed bags are used when possible</td>
<td>At/CHS Parenteral Therapy Manual and guidelines for medication administration</td>
<td>App 1435-03 Extravasation Management, Management of clinical pharmacist</td>
</tr>
<tr>
<td>High alert medications within ICU/Critical Care Units (PCU) and other high-risk areas are stored in red boxes with standardized medication labels</td>
<td>Naloxone/oximmodern</td>
<td>- Naloxone/oximmodern order is used</td>
<td>Low-alert, “High Alert Medication” (Orabase #111597)</td>
<td>Labial infection, “High Alert Medication” (Orabase #111597)</td>
<td>Labial infection, “High Alert Medication” (Orabase #111597)</td>
<td>Labial infection, “High Alert Medication” (Orabase #111597)</td>
</tr>
<tr>
<td>For medications that cannot physically fit into the red box and are removed</td>
<td>Naloxone/oximmodern</td>
<td>- Naloxone/oximmodern order is used</td>
<td>Low-alert, “High Alert Medication” (Orabase #111597)</td>
<td>Labial infection, “High Alert Medication” (Orabase #111597)</td>
<td>Labial infection, “High Alert Medication” (Orabase #111597)</td>
<td>Labial infection, “High Alert Medication” (Orabase #111597)</td>
</tr>
<tr>
<td>- “High Alert” on storage labels</td>
<td>None</td>
<td>- Naloxone/oximmodern order is used</td>
<td>Low-alert, “High Alert Medication” (Orabase #111597)</td>
<td>Labial infection, “High Alert Medication” (Orabase #111597)</td>
<td>Labial infection, “High Alert Medication” (Orabase #111597)</td>
<td>Labial infection, “High Alert Medication” (Orabase #111597)</td>
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APP 1429-02 Look-Alike, Sound-Alike and High Alert Medications, January 2017 - Appendix D
## General Strategies for High Alert Medications

APP 1429-02: Look-Alike/Sound-Alike And High Alert Medications, April 2017 - Appendix C

### APPENDIX C

<table>
<thead>
<tr>
<th>CATEGORY/CLASS OF MEDICATION</th>
<th>MG-NHA Drug Formulary (April 2017)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Anticoagulants/Antithrombotics</td>
<td></td>
</tr>
<tr>
<td>- Norepinephrine</td>
<td></td>
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<tr>
<td>2. Antiplatelet Agents/Thrombolytics</td>
<td></td>
</tr>
<tr>
<td>- Ticlopidine (IV)</td>
<td></td>
</tr>
<tr>
<td>- Dabigatran (Oral)</td>
<td></td>
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<tr>
<td>- Enoxaparin (IV only)</td>
<td></td>
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<tr>
<td>- Fondaparinux (IV only)</td>
<td></td>
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<tr>
<td>- Heparin, Unfractionated (IV only)</td>
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<tr>
<td>- Streptokinase (IV)</td>
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<tr>
<td>- Tiopronin (IV)</td>
<td></td>
</tr>
<tr>
<td>3. Concentrated (Undiluted) Electrolytes (IV)</td>
<td></td>
</tr>
<tr>
<td>- Magnesium Sulfate 4 meq/mL or higher concentration</td>
<td></td>
</tr>
<tr>
<td>- Potassium Acetate 2 mEq/mL or higher concentration</td>
<td></td>
</tr>
<tr>
<td>- Potassium Chloride 2 mEq/mL or higher concentration</td>
<td></td>
</tr>
<tr>
<td>- Potassium Phosphate 3 mmol/mL or higher concentration</td>
<td></td>
</tr>
<tr>
<td>- Sodium Acetate 2 mEq/mL or higher concentration</td>
<td></td>
</tr>
<tr>
<td>- Sodium Chloride greater than 0.9% concentration</td>
<td></td>
</tr>
<tr>
<td>- Sodium Phosphate 3 mmol/mL or higher Concentration</td>
<td></td>
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<tr>
<td>4. General Groups</td>
<td></td>
</tr>
<tr>
<td>- All Chemotherapeutic agents (IV &amp; Oral)</td>
<td></td>
</tr>
<tr>
<td>- All Epidermal and intraepithelial agents</td>
<td></td>
</tr>
<tr>
<td>- All Investigational (research/study) drugs</td>
<td></td>
</tr>
<tr>
<td>- All Opiates and Narcotics (All routes)</td>
<td></td>
</tr>
<tr>
<td>- Anesthetic agents (IV) (e.g., Propofol)</td>
<td></td>
</tr>
<tr>
<td>5. Miscellaneous Drugs</td>
<td></td>
</tr>
<tr>
<td>- Insulin (IV only)</td>
<td></td>
</tr>
<tr>
<td>- Parenteral Nutrition (IPN)</td>
<td></td>
</tr>
<tr>
<td>6. Neuromuscular Blockers (IV)</td>
<td></td>
</tr>
<tr>
<td>- Cisatracurium</td>
<td></td>
</tr>
<tr>
<td>- Pancuronium</td>
<td></td>
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<tr>
<td>- Rocuronium</td>
<td></td>
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<tr>
<td>- Succinylcholine</td>
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</tr>
</tbody>
</table>

- *Storage requirements for medications labeled ‘High Alert – IV Only’: Store in red bins at a higher level of safety measures for when they may be used intravenously.
- List may change based upon changes made to the MG-NHA Drug Formulary by the Corporate Pharmacy and Therapeutics Committee.

Independent Double-Check (IDC) is required for all High Alert Medications. (BAHI Standard MM:36.7)
32771
Warfarin 2.5 mg tablet
HAZARDOUS / HIGH ALERT

Information available at One Stop Resource

NGHA > NGHA > Saudi Medication Safety Center > APPs

One Stop Resource

ADR & Med Error / Near Miss Summary Reports

Corporate Pharmacy & Therapeutics Committee, MNG-HA

Links

Medication Safety Information Alert Warnings
NGHA Specific Information
Patient Education Material
Educational Brochures
Reference Material
ISMP Medication Leaflets
USP Pictograms
Medication Information for Patients
Standardized Medication Labels

32771
Warfarin 2.5 mg tablet
HAZARDOUS / HIGH ALERT

High Alert Meds Std Med Lbls 09Dec2015
LASA Meds Std Med Lbls 07Sept2015
Med Lbls Std Med Lbls 07Dec2015
Narcotic Controled Subst Std Med Lbls 07Sept2015

1429-02 Look-Alike, Sound-Alike & High Alert Medications

1429-03 Prescribing & Dispensing Medication Guidelines
1429-10 Conflict of Interest
1429-31 Disposal, Sale and Donation of Items at MNG-HA
1429-33 Vaccine Storage, Transport & Handling
1430-05 Fall Risk Prevention & Management
1430-06 Palliative & End-Of-Life Care
Alerts Advisories at HIS-CPR

- Max
- Interactions
- Allergies
STANDARDIZE

STANDARDIZE

STANDARDIZE
Safe Patient Care Is Our Goal