

Medication Safety & Electrolyte Administration

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Objectives

- Define and identify 'high alert medications'
- Identify potential weaknesses / areas of concern
- Outline safe medication use recommendations
- Promote utilization of policy & procedures
- Encourage reporting of errors & near misses

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High Alert Medications

- The Institute of Safe Medication Practices (ISMP) defines high alert medications as:
 - Drugs that bear a heightened risk of causing significant patient harm when used in error
 - Mistakes may or may not be more common, but the consequences are clearly more devastating to patients
 - Often impossible to reverse the effects of inappropriate electrolyte administration and could be deadly

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ISMP High Alert Medications

- Adrenergic agonists
- Adrenergic antagonists
- Anesthetic agents
- Antiarrhythmics
- Anticoagulants
- Antithrombotics
- Cardioplegic solutions
- Chemotherapy agents
- Electrolytes & fluids
- Epidural & intrathecal meds
- Insulins & oral hypoglycemics
- Liposomal forms of drugs
- Narcotics/Opiates
- Neuromuscular blockers
- Parental nutrition preparations
- Radiocontrast agents
- Sedatives




Common Examples

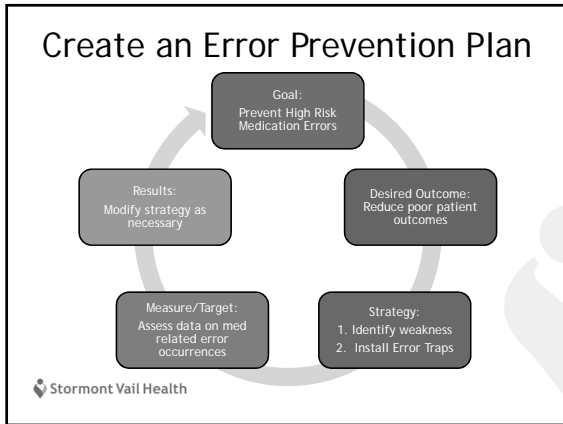
- Electrolyte solutions:
 - Potassium chloride
 - Potassium phosphates
 - Calcium chloride
 - Calcium gluconate
 - Magnesium sulfate
 - Sodium bicarbonate
 - Sodium phosphate
- Non-isotonic fluids:
 - Sodium chloride 3%
 - Dextrose 50%
 - Sterile water



Create an Error Prevention Plan

- Create awareness
 - Provide education and information to all healthcare personnel
- Identify problems
 - Can be actual or potential problems
 - Review adverse drug reaction reports
 - Review literature
 - Confer with a multidisciplinary group within your organization
- Make improvements





CREATE AWARENESS

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Raising Awareness

- High Risk Medications Lists:
 - **ISMP - Institute for Safe Medication Practices**
 - JCAHO - Joint Commission
 - CMS - Centers for Medicare and Medicaid Services
- Joint Commission requires healthcare organizations to:
 - Maintain a policy of high risk medications for the institution
 - Design safeguards to prevent medication errors

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Differences in Perception

2014 ISMP survey of health care professionals that appropriately identified select high alert medications

Medication	Nurses	Pharmacists	Practitioner
Concentrated Electrolytes	88.2%	91.2%	81.9%
Chemotherapy	85.4%	86.8%	74.6%
Insulin	86.7%	89.0%	65.5%
Neuromuscular blockers	79.1%	84.6%	80.2%
Anticoagulants	80.2%	75.7%	74.6%
Opiates	71.0%	70.6%	62.7%
Sedatives	57.8%	38.2%	53.7%
Magnesium sulfate	49.9%	24.3%	27.1%

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Types of Errors

2014 ISMP survey of healthcare professionals - the types of errors respondents reported involving high alert medications

Error Type	Count
Administration	29
Dispensing	21
Preparing	20
Ordering	18
Storage	6
Procurement	4
Monitoring	1

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Types of Errors

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IDENTIFY PROBLEMS

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Reasons errors may occur

- Dosing errors
- Calculation errors
- Concentration errors
- IV admixture errors
- Duplicate therapy
- Look-alike/sound-alike drugs
- Adverse drug reactions (ADRs)
- Contamination
- Incompatibilities

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Areas of Potential Weakness

- Departments where workflow is fast-paced
 - Emergency department
 - Critical care
 - Surgery
 - Trauma
- Special concern for:
 - Look-alike medications
 - Sound-alike medications
 - Concentrated medications

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MAKE IMPROVEMENTS

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Ways to Make Improvements

- Implement fail-safes
- Add constraints
- Externalize error-prone processes
- Improve access to information
- Standardize
- Simplification
- Differentiation
- Reminders
- Redundancies
- Patient monitoring
- Failure mode and effects analysis

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Procurement

- Standardize:
 - Order only standardized premixed bags of electrolytes
- Differentiate:
 - Ensure there are no similarly packaged/labeled fluids
- Add reminders:
 - Label all high alert meds with HIGH RISK warning labels

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Storage

- Add Constraints:
 - Remove concentrated electrolytes from patient care areas
 - Store premixed bags only in the pharmacy or in locked automated dispensing cabinets
- Differentiate:
 - Segregate the storage of electrolytes from other fluids

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Ordering

- Standardize:
 - Implement hospital-wide electrolyte protocols for administration of ALL electrolytes
- Simplify:
 - Utilize order sets or pre-printed orders for use with administration of IV electrolytes
- Add Constraints:
 - Set dose limits for IV electrolyte administration

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Preparing

- Externalize error-prone processes:
 - Eliminate the potential for preparation errors
 - Use only standardized, manufactured, premixed bags of electrolytes and fluids

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Dispensing

- Implement fail-safes:
 - Utilize electronic medical records and automated dispensing cabinets, if possible
 - Limit access to only pharmacy personnel for electrolyte dispensing, if possible
 - If not possible, designate only certain individuals to have access to these medications (ex. Charge Nurse)

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Administration

- Implement fail-safes:
 - Implement barcode scanning whenever possible
 - Administer all IV electrolytes through rate-controlled programmable pumps
 - Use smart pumps when available, do not bypass inputting all the information
- Redundancies:
 - Utilize double checks (manual or automated)

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REPORTING

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Report Errors

- Encourage reporting of near misses and errors
 - You can't fix what you don't know is a problem!
- Create a culture of appreciation for error reporting
 - Do not penalize individuals for speaking up
 - Permit anonymous reporting
- Have open discussions with the healthcare team
 - Discuss errors or near misses that have occurred
 - Implement changes to prevent reoccurrence


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ELECTROLYTE PROTOCOLS

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General Recommendations


- Create a standardized protocol
 - Utilize order sets or preprinted order forms
 - Use standard concentrations of manufactured premixes
- Have an electrolyte level within previous 24 hours
- Never administer concentrated electrolytes
 - Always dilute them and administer via IVPB on a pump
- Recheck electrolyte level after administration

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Potassium IV Protocols

- Have a previous level from within 4 hours
- May recheck a level 4 hours after administration


- Central line administration
 - Maximum rate: 20 mEq IV over 1 hour
 - Maximum concentration: 20 mEq / 50 mL
- Peripheral line administration
 - Maximum rate: 10 mEq IV over 1 hour
 - Maximum concentration: 10 mEq / 50 mL

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Magnesium IV Protocols

- Have a previous level from within 24 hours
- May recheck a level 2 hours after administration


- Central or peripheral line administration
 - Maximum rate: 2 grams IV over 1 hour
 - Maximum concentration: 2 grams / 50 mL

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Phosphorus IV Protocols

- Have a previous level from within 24 hours
- May recheck a level 2 hours after administration


- Should be ordered in mmol of phosphorus
 - Approximately 1 mmol phosphate = 1.5 mEq potassium (in KPO₄)
 - Use sodium phosphate for patients with:
 - Serum potassium >4.5 mEq/L & serum sodium <145 mEq/L
- Central line administration
 - Maximum rate: 15 mmol / 100 mL IV over 2 hours
- Peripheral line administration
 - Maximum rate: 15 mmol / 250 mL IV over 4 hours

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Calcium IV Protocols


- Have a previous level from within 24 hours
- May recheck a level 2 hours after administration
- Administer through central line (highly preferred)

- Central or peripheral line administration
 - Maximum rate: 2 grams IV over 1 hour
 - Maximum concentration: 2 grams / 100 mL


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Conclusion


- Electrolytes are considered high alert medications
- We need to order, prepare, dispense, and administer electrolyte solutions with caution
- Stocking and carrying manufactured electrolyte solutions can help reduce errors
- Creation of protocols and use of standardized order sets are good ways to avoid errors
- Learn from near misses and errors to create safer practice in the future

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Questions?



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