

High Risk Medication Errors - Part 2

Session Overview

The Emergency Department is a fast-paced environment in which important treatment decisions are sometimes made with limited time. Medication mistakes, particularly those with high-risk drugs, can increase morbidity and mortality. The goal of this two-part talk is to introduce several high-risk medications and provide practical pearls to help avoid common, potentially serious mistakes.

Objectives

- 1) Identify three factors associated with medication errors in the ED
- 2) List three potential adverse effects of IV hydralazine
- 3) Explain one strategy for reducing medication errors related to epinephrine
- 4) Identify the two most critical pieces of information needed on syringes labeled in the ED

Background

[Peth 2003](#)

Variables associated with medication errors in the emergency department

Undifferentiated and unfamiliar patients 24-hour nature of services
Dispensing and administering medications without pharmacist double checks
Outpatient medication dispensing without pharmacist double checks
Critical and emergent nature of care provided
Overcrowding
Reliance on verbal orders
Understaffing of personnel
Absence of standardized handoff communication
Lack of independent double checks of nurse-prepared medications

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IV Hydralazine

- Potent vasodilator. Onset of action: ~20 minutes, peak effects last 60 minutes, duration of action is unpredictable and can persist for up to 8 hours. ([Powers 1998](#))
- Dangerous adverse effects
 - Stimulation of sympathetic nervous system, leading to exacerbation of oxygen consumption in a myocardium as well as an increase in heart rate.
 - Associated with increasing ICP. ([Rhoney 2006](#); [Skinhoj 1983](#))

- Latent period of 5-15 minutes followed by progressive and often precipitous BP drop. (Schroeder HA. J Clin Invest 1951;30:672-3.) ([Shepherd 1980](#))
- Severe hypotension and complications associated with birth. ([Obstet Gynecol 2011](#); [Magee 2003](#))
- Profound hypotension in critically ill. ([Kane-Gill 2014](#))
- Inappropriate use ([Campbell 2011](#))
 - Only 2% of all patients had documented evidence of hypertensive crisis.
 - Over 80% of all doses were associated with a reduction in systolic BP < 25%.
 - Of the 16 patients who experienced an adverse effect, most were related to hypotension, with six experiencing a decrease in systolic BP > 65 mmHg.
- Bottom line: start low, go slow (or consider alternative agents)
- Further reading from [EM PharmD blog](#)

23.4% Sodium Chloride

1. ISMP recommends that vials containing 23.4% sodium chloride are not stocked outside the pharmacy or dispensed to patient care units
2. Any IV push doses are prepared and dispensed from pharmacy, labeled with appropriate warnings, and hand delivered to the healthcare professional who will administer the drug

Epinephrine

Epinephrine is one of the most problematic medications in the ED with regard to errors

- The ratio concentration labeling only increases the confusion. And, there are so many sizes/concentrations that may be available in EDs and code carts.
 - Cardiac arrest concentration: **1:10,000** = 1 gm/10,000 mL = 1,000 mg/10,000 mL = **0.1 mg/mL**
 - Pretty-much-everything-else concentration: **1:1,000** = 1 gm/1,000 mL = 1,000 mg/1,000 mL = **1 mg/mL**
 - **Fortunately, the epinephrine ratio labeling are going away starting in May 2016 (at least in the U.S.)!** ([EMPharmD: No More Epinephrine Ratios](#); [ISMP Canada: Changes in Expression of Strengths](#))
- Here are a few ways to reduce errors:
 - Limit the number of epinephrine sizes/concentrations in your ED
 - Consider stocking epinephrine auto injectors for anaphylaxis/asthma ([EMPharmD: Epinephrine IM for Anaphylaxis](#); [EMPharmD: Epinephrine Auto-Injectors for In Hospital Use](#))

Alteplase (tPA)

- tPA, although actually easy to mix ([tPA Mixing Tutorial](#)), is prepared in high-pressure situations and can lead to dosing errors
 - Make sure to have [dosing sheets](#) available on paper and in EMRs

Boarder Patients

- Delays in home medications ([Liu 2011](#))
- Errors in psychiatric boarder patients ([Bakhsh 2014](#))
- Increased adverse effects and delays in antibiotics/home medications ([Sri-On 2014](#))
- Hospital mortality and hospital LOS are associated with length of ED boarding ([Singer 2011](#), [Mathews 2018](#))
- ACEP statement on [Boarding of Admitted and Intensive Care Patients in the ED](#) (2017)

Medication Error-Prevention Strategies ([Weant 2014](#))

- Medication-error analysis
- Computerized provider-order entry systems
- Automated dispensing cabinets
- Bar-coding systems
- Medication reconciliation
- Standardizing medication-use processes
- Education
- Emergency-medicine clinical pharmacists ([ACMT 2018](#); [ACEP 2015](#))