Simulation-based training to improve knowledge of dosing and formulation of push dose vasopressors in the emergency department

Josh Burton PGY-3, DO; Jamin Brown PGY-3, DO; Faculty Advisors: Kelly Murray, PharmD, BCACP; Tyson Bryant, DO

BACKGROUND

• Vasopressors phenylephrine and epinephrine are formulated into push dose pressors (PDPs), which are used to treat transient hypoperfusion through intermittent administration in small doses.
• PDP use is common in anesthesia medicine, but relatively new to emergency medicine.
• PDPs are particularly useful for managing hypotension in the peri-intubation and peri-arrest phases or as a bridge to continuous vasopressor infusions in critically ill patients.
• However, PDPs must be formulated at bedside, which may result in errors and adverse events.
• Hesitation to emergency department use arises from concerns for dosing and formulation errors.

OBJECTIVES

• Primary: Measure knowledge of PDP dosing, formulation, and adverse events prior to and following a simulation-based educational intervention among emergency medicine resident physicians.
• Secondary: Assess the efficacy of simulation-based training to improve safety and quality of healthcare in the emergency department setting.

METHODS

• Emergency medicine residents participated in a one-day simulation-based didactic session.
• Baseline knowledge was assessed with a quiz prior to any educational intervention.
• Participants were given two formal lectures encompassing the indications for use, formulation, and dosing of push-dose epinephrine and phenylephrine as well as hands-on demonstrations of formulation preparation.
• Residents next participated in four team-based simulation scenarios of critically ill patients in which PDP formulation and administration was required with debriefing after case conclusion.
• Immediately following the lectures and team-based simulation scenarios, the quiz was readministered and knowledge reassessed. A 3-month follow-up quiz will also be administered to assess knowledge retention.

RESULTS

Bedside Formulation Sheet

Bolus dose pressors

**Epinephrine:**
- Adrenaline (epinephrine) 1 mg/mL, SR, SD
- Formulation Instructions:
  - Dissolve 1 mg of epinephrine into 10 mL of normal saline
  - Final concentration: 10 µg/mL
  - Give in 0.5 mL increments

**Phenylephrine:**
- Phenylephrine 5% (20 mg/mL), SR, SD
- Formulation Instructions:
  - Dissolve 20 mg of phenylephrine into 10 mL of normal saline
  - Final concentration: 2% (20 mg/mL)
  - Give in 0.5 mL increments

Comparison and Participants Pre and Post Lecture Quiz Results

CONCLUSIONS

• PDPs can be a useful tool for managing hypotension in the critically ill patient.
• However, adequate knowledge of dosing, formulation, and side effects for these medications is essential in limiting human error and adverse events.
• A lecture and simulation-based educational intervention can be an effective means to improve physician knowledge regarding proper dosing, formulation and side effects of PDPs.

FUTURE DIRECTIONS

• Obtain long term knowledge assessment with 3-month post lecture quiz
• Use of simulation lab to improve safety of healthcare in emergency department setting
• Platform to pursue further research studies in use of push dose vasopressors in the emergency department.

REFERENCES