Project Title

Push-Dose Pressors: A Multi-Prong Approach to Reduce Medication Error

Project Lead and Members

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Organisation(s) Involved

Ng Teng Fong General Hospital

Healthcare Family Group(s) Involved in this Project

Medical, Nursing, Allied Health

Applicable Specialty or Discipline

Emergency Medicine

Aims

1) Achieve ZERO medication error associated with use of Push-Dose pressors (PDP)

2) Improve ED nurses' confidence levels with PDP preparation

Background

See poster appended/ below

Methods

See poster appended/ below

Results

See poster appended/ below

Lessons Learnt

This QI project demonstrated the value of a multi-prong, multi-disciplinary approach with interventions targeted at root causes to reduce risk of medication error and maximize patient safety.

Conclusion

See poster appended/ below

Project Category

Care & Process Redesign

Quality Improvement

Keywords

Medication Error, Push-Dose Pressors, Emergency Medicine

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PUSH-DOSE PRESSORS: A MULTI-PRONG APPROACH TO REDUCE MEDICATION ERROR

✓ SAFETY ❑ PRODUCTIVITY
✓ QUALITY ❑ COST
❑ PATIENT EXPERIENCE

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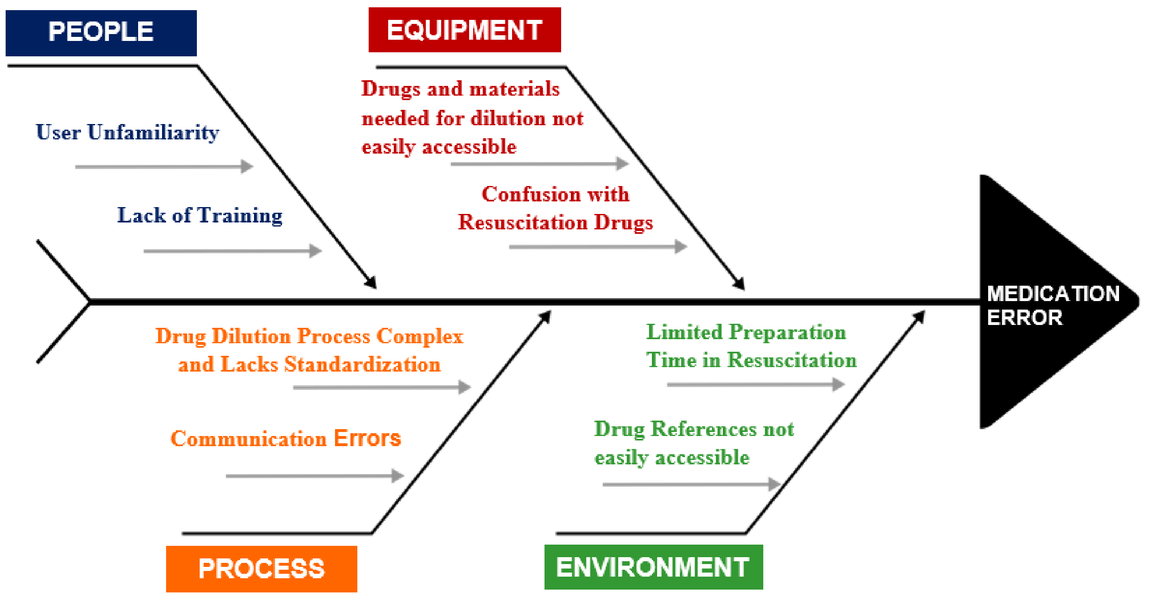
Background and Aim

- Push-dose pressors (PDP) refer to the use of intermittently administered doses of vasopressors to correct hypotension
- They are introduced to the Emergency Department (ED) for intubation-related hypotension that is commonly encountered in critically ill patients
- A medication error resulted when a bolus of phenylephrine 700mcg was given instead of the intended 100mcg but with no adverse outcomes
- As PDP often involve bedside dilution, medication errors and adverse events occur not infrequently with human errors accounting for nearly 20% of cases[1]

- Our project aims to:
  1) Achieve **ZERO** medication error associated with use of PDP
  2) Improve ED nurses' confidence levels with PDP preparation

Root-Cause Analysis



Interventions

- We adopted a systems-based approach to implement various interventions targeted at these causes according to recommendations based on current safe medication practice guidelines[2]

Step 1: Standardize Drug Preparation Process

We establish the standards for drug preparation, concentration/dilution, syringe size and drug labels

Step 2: Training/Education

Training of the nurses is conducted in 2 phases:
Phase 1 – Educational video via e-learn to impart drug knowledge and demonstrate step-by-step instructions to safely prepare and dilute PDP
Phase 2 – Hands-on session for return demonstration and communication skills. Three-way communication is emphasized as best practice especially in chaotic resuscitation situations
Training of the doctors involve engagement on clinical grounds and reminders during monthly clinical meeting

Step 3: Medication Charts

These serve as an additional resource to provide more information on indications, preparation and administration recommendations as well as to facilitate team communication. The charts are made available on resuscitation trolleys for easy access as well as on intranet

NTFGH ED IV Dilution Chart

Phenylephrine HCl (10mg/1ml)				
Direct I/V	Continuous I/V	Suitable Diluent	Indication	Contra-indication
Over 1-2min (given in doses of 100mcg)	0 – 10,000mcg/hr	NS, D5	▪ Peri-intubation hypotension ▪ Shock (septic, vasodilatory)	▪ Hypersensitivity to phenylephrine
Dilution 10mg (1 ampoule of 10mg/1ml) in final volume 100ml N/S (1ml = 100mcg) *Refer to epic order on next page				
Usual Infusion Rate: 0 – 10,000mcg/hr				

NTFGH ED IV Dilution Chart

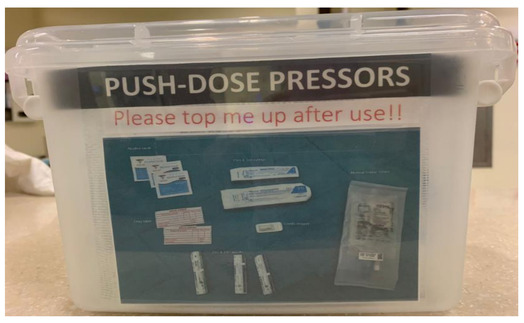
Adrenaline 1:1000 (1mg/1ml)				
Direct I/V	Continuous I/V	Suitable Diluent	Indication	Contra-indication
1mg in 10mls N/S (1:10 000) Cardiac arrest q3-5 min	▪ 0.01-1mcg/kg/min *Central line required for infusion **Caution in patients with tachycardias/ischaemic heart disease	NS, D5	▪ Cardiac arrest ▪ Anaphylactic shock ▪ Bronchospasm ▪ Shock ▪ Peri-intubation hypotension	▪ Cerebral arteriosclerosis, coronary insufficiency ▪ Narrow angle glaucoma ▪ Hypersensitivity to epinephrine or its components
1mg in 100mls N/S (1:100 000; 1ml = 10mcg) (given in doses of 5-20mcg for hypotension)	Dilution 8mg (8 ampoules of 1mg/1ml) in final volume 100ml of D5% (CENTRAL LINE)			
	Usual Infusion Rate: 0.01-1mcg/kg/min			

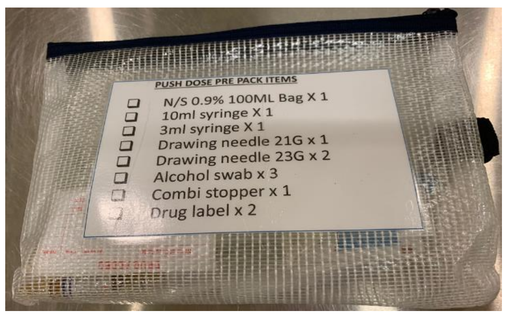
Medication charts are additional resources made easily accessible to provide more information and to facilitate communication

Step 4: Pre-Packed Push-Dose Pressors Kits

Components (including drugs) needed for preparation are pre-packed in a kit with 2 separate pouches for adrenaline and phenylephrine. This kit is placed on automated dispensing cabinet (ADC) for easy access in emergency situations. This step serves 3 objectives:

1) The labelled kit clearly states the indication for use as PDP. This helps differentiate from resuscitation drug – adrenaline (used in cardiac arrests) with a different concentration and preparation process
2) Clear instructions on preparation and dose concentration is provided for quick reference and easy access
3) Less time is needed to gather individual components, thus allowing the nurses to focus and reduce risk of errors.

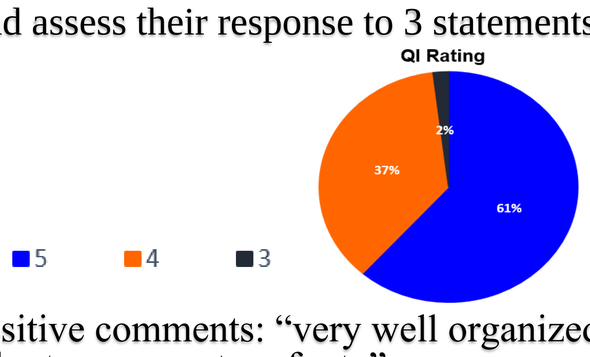




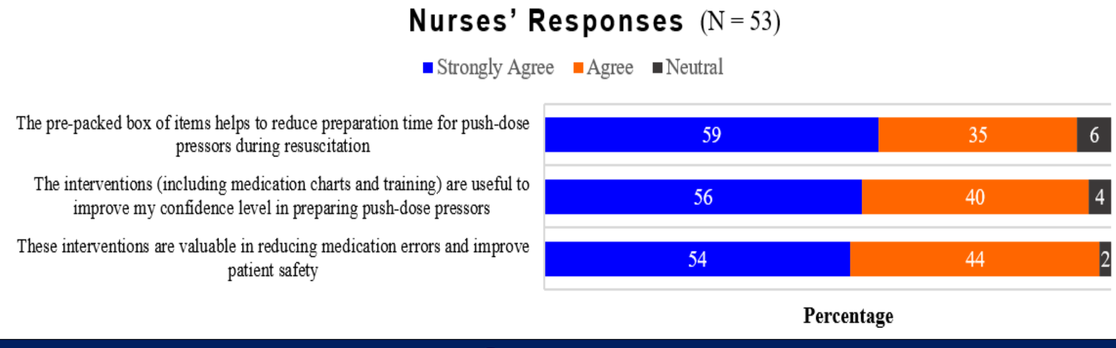
Components needed for the preparation are pre-packed in a clearly labelled kit placed on ADC for easy access in emergency situations

The pouches have different-coloured labels for 2 drugs with clear instructions on preparation and dose concentration for quick reference

Results

- We have achieved **ZERO** medication error since implementation
- An anonymous online survey was administered to the ED nurses to rate this initiative and assess their response to 3 statements on a 5-point Likert scale
- 

98% give a rating of 4 and 5 (out of 5)
- Positive comments: "very well organized", "I like it, it helps reduce prep time", "charts are easy to refer to"
- >90% agree and strongly agree that the initiative decreases preparation time, improve their confidence levels, and is valuable to reduce medication errors and improve patient safety



Conclusion

This QI project demonstrated the value of a multi-prong, multi-disciplinary approach with interventions targeted at root causes to reduce risk of medication error and maximize patient safety.

Ng Teng Fong General Hospital

Jurong Community Hospital

Reference

1) Cole JB, et al. Human Errors and Adverse Hemodynamic Events Related to "Push Dose Pressors" in the Emergency Department. J Med Toxicol 2019 Oct;15(4):276-286
2) Holden D, et al. Safety Considerations and Guideline-Based Safe Use Recommendations for "Bolus-Dose" Vasopressors in the Emergency Department. Ann Emerg Med 2018 Jan;71(1):83-92