Peripheral Vasopressors

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The Problem

Standard medical dogma

- Cant use vasopressors in peripheral IV lines
- EVER!
The flip side…

1. Central line infection rates

1. Delay to definitive/appropriate treatment

1. Administrative pressure to timely admission
What are people using?
My Project

A review of central versus peripheral vasoactive drugs in the emergency department:

1. A literature review
2. Review of Incident information management systems (IIMS)
3. User survey
4. Develop a clinical guideline and recommendations for use in NSW Emergency Departments.
My Project

Primary Aim:
Examine the evidence for, and current practice of, peripheral administration of vasopressors in NSW EDs, and identify associated complications.

Secondary Aims:
Improve timeliness of vasopressor administration
Reduce the number of unnecessary central line insertions and resulting complications
Disseminate evidence about route of administration of vasopressors to emergency department clinicians
Reduce variability of practice and improve care in the use of vasopressors in NSW Emergency Departments
What does the literature say?

Systematic review conducted June 2015
  - Loubani et al 2015

Prospective Observational Study July 2015
  - Cardenas-Garcia et al 2015
86,000 articles
85 articles included

1 RCT (that did not specifically investigate complications of vasopressors)
The rest were case reports or series
29 had to be translated from other languages
Total of 270 patients
Total of 325 adverse events

Red Flag: no one writes case reports on the uneventful outcome for the peripheral administered vasopressor.
Systematic Review Snapshot

TAKE-HOME MESSAGE
Although the safety profile of peripheral administration of vasopressors remains uncertain, most reported adverse events are associated with a distal peripheral site or prolonged duration of administration.

Can Vasopressors Safely Be Administered Through Peripheral Intravenous Catheters Compared With Central Venous Catheters?

<table>
<thead>
<tr>
<th>Peripheral IVs</th>
<th>Central venous catheters</th>
</tr>
</thead>
<tbody>
<tr>
<td>318</td>
<td>7</td>
</tr>
<tr>
<td>Local tissue injury</td>
<td>204</td>
</tr>
<tr>
<td>Vasopressor extravasation</td>
<td>114</td>
</tr>
<tr>
<td>No tissue injury</td>
<td>86</td>
</tr>
<tr>
<td>Skin necrosis</td>
<td>179</td>
</tr>
<tr>
<td>Tissue necrosis</td>
<td>5</td>
</tr>
<tr>
<td>Gangrene</td>
<td>20</td>
</tr>
<tr>
<td>No tissue injury</td>
<td>3</td>
</tr>
<tr>
<td>Tissue injury</td>
<td>28</td>
</tr>
<tr>
<td>Skin necrosis</td>
<td>3</td>
</tr>
<tr>
<td>Gangrene</td>
<td>1</td>
</tr>
<tr>
<td>No tissue injury</td>
<td>3</td>
</tr>
<tr>
<td>Tissue injury</td>
<td>0</td>
</tr>
</tbody>
</table>

Figure. Summary of adverse events associated with administration of vasopressors through peripheral versus central venous catheters.
Most of the bad outcomes were Noradrenaline administered distally to the antecubital fossa for > 6 hours. Noradrenaline was responsible for 80% of tissue damage, and 65% of extravasation. In 85% of tissue injuries, and 75% of extravasation the cannula was distal. The injury occurred in <6 hours in 6.5%, average duration of 60 hours, median of 24 hours. Extravasation occurred in an average of 35 hours, median of 22 hours. Of 318 total incidents, major disability was reported in 12 (3.7%) pts, and in 5 (1.5%) it was felt to contribute to mortality.
Fig. 2. Duration of infusion of peripherally and centrally administered vasopressors, in hours, for events where local tissue injury occurred.
In emergency situations, short-term administration (<2 hours) of vasopressor infusions via proximal, well-placed peripheral IVs is unlikely to cause local tissue injury. This should only be performed as a temporizing measure until central venous access is obtained.

Further research is required to clarify the impact of peripheral IV administration of vasopressors on hemodynamic stability in critically ill patients and on their clinical outcomes.
Evaluate the safety of vasoactive medication administered through peripheral intravenous access.

- Norepinephrine, dopamine, and phenylephrine
- 734 patients
- Medical ICU, single centre, New York USA
- Prospective Observational Study
- **Convenience sample**
  - Consultant discretion
**TABLE 1. Summary of the Requirements for PIV Access Used for Infusion of VM**

- Vein diameter >4 mm measured with ultrasonography
- Position of PIV access documented to be in the vein with ultrasonography before starting infusion of VM
- Upper extremity only, contralateral to the blood pressure cuff
- Intravenous line size 20 gauge or 18 gauge
- No hand, wrist, or antecubital fossa PIV access position
- Blood return from the PIV access prior to VM administration
- Assessment of PIV access function every 2 hours as per nursing protocol
- Immediate alert by nursing staff to the medical team if line extravasation, with prompt initiation of local treatment
- 72 hours maximum duration of PIV access use

**NOTE:** Abbreviations: PIV, peripheral intravenous; VM, vasoactive medication.
Cardenas-Garcia et al 2015

**Results**

953 cases received VM
783/953 (82%) received VM via PIV access, 170/953 (18%) via CVC

Extravasation occurred in 19/783 (2%) of interventions.

All treated with phentolamine and application of nitroglycerine paste.

No tissue injury at the site of VM extravasation.
Author Summary

“The delivery of VM via PIV access is safe and feasible.”

“Clinicians should no longer consider administration of norepinephrine, dopamine, or phenylephrine to be an automatic indication for CVC access.”

“A broader study regarding assessment of safety and efficacy will require a multicenter design.”
IIMs review

3 year review of Incident Information Management System database
Vasopressors and inotropes
Emergency Department, ICU
492 incidents approx 1 in 15 relevant
IIMS review

“Noradrenaline given via peripheral IV for 2 hours Nil extravasation, redness, blanching, oedema to IV site.”

“Handed over from night staff that pt has Noradrenaline running through a PIVC as PICC line insertion was not successful.”

“When the patient arrived to ICU, found noradrenaline infusion running at 1 mL/hr through peripheral cannula. Noted right forearm and hand swollen”
Survey

https://www.research.net/r/LQFHQMC

3 Demographic Questions and 4 on Vasopressors

4. Which of these Vasopressors have you used in your emergency department within the previous 5 years? (tick all that apply)

<table>
<thead>
<tr>
<th>Vasopressors</th>
<th>Centrally</th>
<th>Peripherally</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noradrenaline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adrenaline</td>
<td></td>
<td></td>
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<tr>
<td>Metaraminol</td>
<td></td>
<td></td>
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<tr>
<td>Dobutamine</td>
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<td></td>
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<tr>
<td>Isoprenaline</td>
<td></td>
<td></td>
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<tr>
<td>Vasopressin</td>
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</tbody>
</table>

5. Have your patients experienced any of the following unexpected complications related to peripheral vasopressor use in the Emergency Department (Tick all that apply)

- Skin/tissue
- Necrosis
- Gangrene
- Blisters
- Ulcer
- Arrhythmia
- Other

7. As far as you know, is there a policy regarding the **peripheral** use of the following vasopressors in your emergency department?
Survey

Nearly 200 responses
2 weeks to go

7. As far as you know, is there a policy regarding the peripheral use of the following vasopressors in your emergency department?

7 staff specialists
• 4 believe there are No policies
• 1 metaraminol
• 1 metaraminol, dopamine, dobutamine, isoprenaline
• 1 dopamine, dobutamine, isoprenaline
Watch this space ……..

Review and Collate all the information
Development of a statewide guideline
Publication in a journal

Questions?