

# Peripheral Vasopressor Administration in Critically Ill Children with Shock

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## BACKGROUND

- To reduce the risk of tissue injury from drug extravasation, vasopressors (VP) are typically infused via a central venous catheter (CVC).
- Placement of a CVC can delay administration of life-sustaining medication and can result in complications.
- Recent adult data suggests that peripheral administration may be safe. Evidence in children is less robust.

## OBJECTIVES

- To characterize our experience and complication rates with peripheral VP administration.

## METHODS

- Retrospective study
- Patients were categorized into two groups:
  - (1) peripheral VP (PVP) if they received > 1 hour VP support through a peripheral IV or
  - (2) central VP (CVP) if they received VP only via a CVC.
- Groups were compared using Wilcoxon rank sum tests for continuous variables and Fisher's exact test or Pearson's chi-square tests for categorical data.

## RESULTS

Table 1: Cohort Characteristics

	Entire cohort n=757	PVP Cohort n=232	CVP Cohort n=525	p-value
Age (year), median [IQR]	9.4 [2.6-14.1]	10.3 [4.8-14.6]	8.5 [2.1,13.9]	0.003
Female, n %	345 (45.6)	110 (47.4)	235 (44.8)	0.53
Weight (kg), median [IQR]	27.0 [13.0,50.0]	30.4 [17.3,52.1]	25.3 [12.0,49.0]	0.0012
Primary diagnosis, n (%)				<0.0001
Sepsis/Shock	199 (26.3)	95 (40.9)	104 (19.8)	
Respiratory Infections	89 (11.8)	31 (13.3)	58 (11.0)	
Trauma/Burn	88 (11.6)	15 (6.5)	73 (13.9)	
Seizures	44 (5.8)	15 (6.5)	29 (5.5)	
Other	337 (44.5)	76 (32.8)	261 (49.7)	
PRISM III score, median [IQR]	9 [5,15]	7.0 [3.0,13.0]	10 [5,16]	0.0004
7pm-7am pressor initiation, n (%)	414 (54.7)	149 (64.2)	265 (50.5)	0.0005
PICU LOS (days), median [IQR]	4.48 [2.0,10.9]	2.81 [1.6,8.0]	5.77 [2.4,13.3]	<.0001
Mechanically ventilated during PICU admission, n (%)	552 (72.9)	118 (50.9)	434 (82.7)	<0.0001
Duration of mechanical ventilation (days), median [IQR]	4.19 [1.7,9.4]	2.78 [1.1,6.1]	4.68 [1.8,10.5]	0.0003
Received cardiopulmonary resuscitation, n (%)	49 (6.5)	7 (3.0)	42 (8.0)	0.0098
Received extracorporeal support, n (%)	29 (4.1)	4 (2.1)	25 (4.8)	0.13
Died during PICU admission, n (%)	144 (19.0)	24 (10.3)	120 (22.9)	<0.0001

Table 2: PVP administration has a low complication rate

Extravasation Event Characteristics	Total extravasation events (n=4)
Nighttime extravasation event (7p-7a)	3 (66.7)
Duration of vasopressor infusion prior to extravasation, minutes: median [IQR]	880 [475, 1610]
Other medications infusing	0 (0.0)
Interventions, n (%)	
No intervention required	1 (25)
Antidote Administered	2 (50)
Phentolamine	2 (50)
Nitroglycerine (2% topical)	1 (25)
Terbutaline	1 (25)
Long-term disabilities	0 (0.0)

IQR: interquartile range; PRISM: Pediatric risk of mortality; PICU: Pediatric Intensive Care Unit; LOS: length of stay. PIV: Peripheral IV. G: Gauge

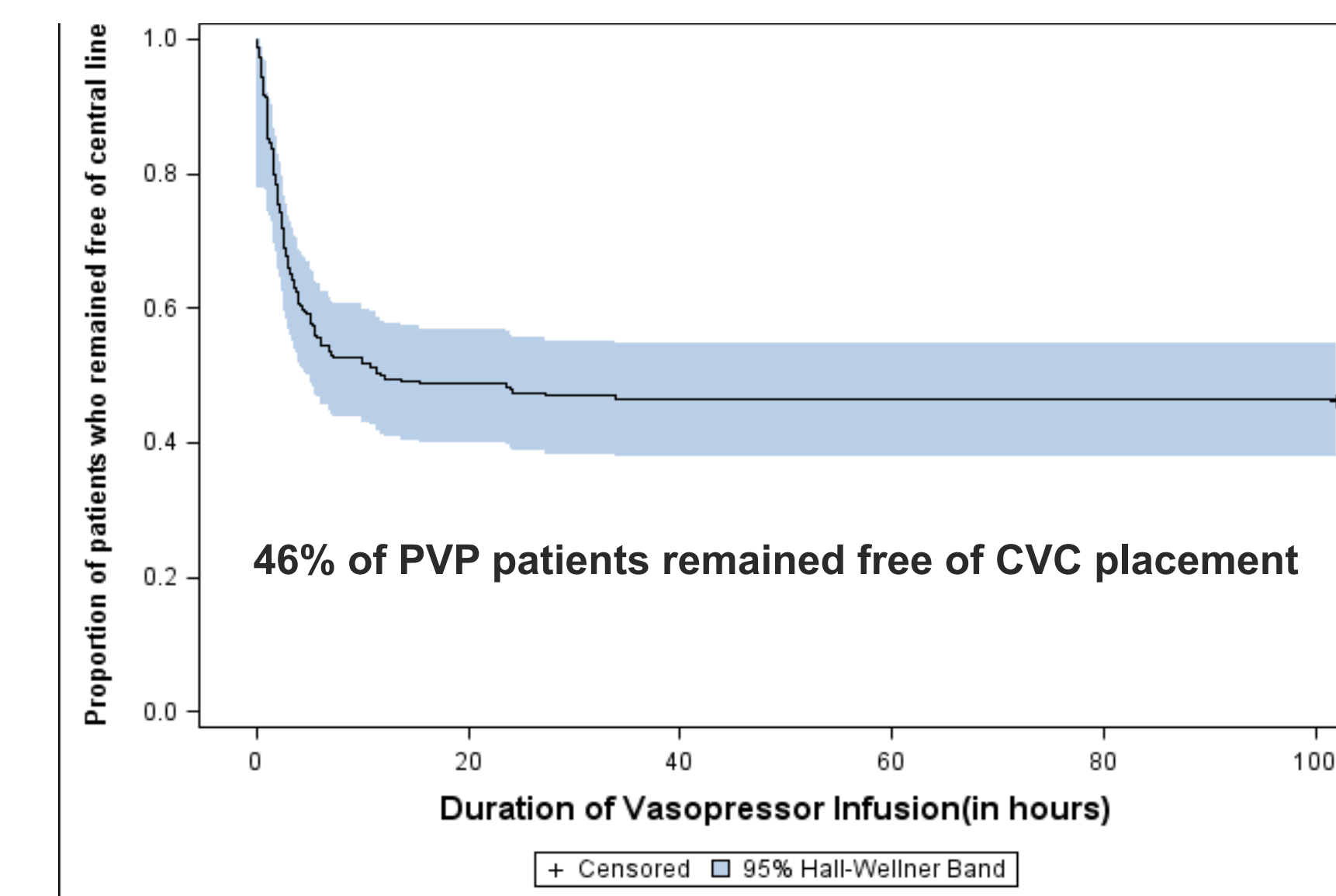
Table 3: PVP Infusion Characteristics

	Epinephrine	Norepinephrine	Dopamine
Maximum infusion dose, (mcg/kg/min), median [IQR]	0.10 [0.05, 0.15]	0.05 [0.05, 0.10]	10 [7, 12]
Most frequently used PIV site, n (%)	Antecubital, 14 (47%)	Antecubital, 19 (44%)	Antecubital, 94 (49%)
Most frequently used PIV size, n (%)	22G, 11 (38%)	22G, 13 (32%)	22G, 75 (42%)

Table 4: In PVP patients, CVCs were placed more frequently in more severely ill patients

	PVP patients had CVC placed n=125	PVP patients who DID NOT have a CVC placed n=107	p-value
Weight (kg), median [IQR]	26.5 [15.8-49.8]	37.2 [18.5-57.5]	0.03
PRISM III score, median [IQR]	10.0 [5.0-16.0]	6.0 [3.0-9.0]	<0.0001
Mechanically ventilated, n (%)	80 (64.0%)	38 (35.5%)	<0.0001
ICU LOS (days), median [IQR]	3.81 [2.0-7.3]	1.85 [1.13-3.14]	<0.0001
Died during PICU admission, n died (%)	19 (15%)	5 (4.8%)	0.0099

Figure 1: Median [IQR] time to CVC placement (hours): 2.3 [1.0-4.5]



## SUMMARY

- Children in the PVP group were older, had lower illness severity, and had VP therapy initiated at night more often than those in the CVP group.
- PVP patients who went on to receive a central line had higher severity of illness, lower weight, were more frequently mechanically ventilated, had longer PICU stays, and higher mortality.
- Extravasations occurred in 4 patients and were all associated with PIVs inserted in the hand.
  - Three of 4 had a pharmacologic antidote administered.
  - None resulted in long-term disabilities.

## CONCLUSIONS

- Short-term administration of VP therapy via a peripheral line is associated with a low incidence of complications.
- Peripheral VP therapy can offer providers an option for drug delivery while evaluating the need for a CVC.

## LIMITATIONS

- Retrospective design may limit identification of all complications.
- Unable to compare outcomes between PVP and CVP group due to differences in baseline factors and retrospective design.
- Single center

## FUTURE DIRECTIONS

- Evaluation of the safety of peripheral vasopressors and outcomes in critically ill children in a prospective manner