High-Dose Nitroglycerin IV Push versus Continuous Infusion for Hypertensive Acute Heart Failure

Pardeep Kaur, Pharm.D.; Lisa Phan, Pharm.D., BCPS, BCCCP; Jayme Patel, Pharm.D., BCPS, BCCCP

UMC UNIVERSITY MEDICAL CENTER

INTRODUCTION

- Acute heart failure (AHF) is a common underlying cause for dyspnea in patients presenting to emergency departments (ED)[1]
- Hypertensive AHF with pulmonary edema
  - Can deteriorate rapidly
  - Timely intervention vital to improve patient outcomes
- Nitroglycerin at lower doses primarily causes veno-dilation resulting in decreased preload while higher doses also lead to arteriole dilation and reduction in afterload[2]

OBJECTIVE

To evaluate the efficacy and safety of nitroglycerin IV push doses ≥ 200 mcg ± continuous infusion versus nitroglycerin continuous infusion alone in hypertensive AHF with pulmonary edema

METHODS

- A single-center, retrospective chart review from December 1, 2017 - June 1, 2021
- Patients who received IV nitroglycerin in the ED with ICD-9/10 codes for AHF or acute pulmonary edema
- Study groups
  - Nitroglycerin continuous IV infusion (CIV)
  - Nitroglycerin IV push ≥ 200 mcg ± nitroglycerin continuous IV infusion (IVP ± CIV)
- **Primary outcome**
  - Rate of mechanical intubation within 6 hours after initiation of nitroglycerin therapy
- **Secondary outcomes**
  - Hospital LOS
  - Rate of ICU admission
  - Hypotension
    - SBP ≤ 90 mmHg during nitroglycerin administration or within 60 mins after discontinuation

INCLUSION & EXCLUSION CRITERIA

Inclusion criteria

- ≥ 18 years
- IV nitroglycerin administration in the ED
- ED physician diagnosis of AHF or acute pulmonary edema
- SBP ≥ 160 mmHg or MAP ≥ 110 mmHg
- Need for supplemental oxygen

Exclusion criteria

- Intubated before or within 5 minutes after IV nitroglycerin administration

RESULTS

Table 1: Baseline Characteristics

Characteristic	CIV (n = 59)	IVP ± CIV (n = 5)	P-value
Age, year (mean ± SD)	57.6 ± 12.5	64.6 ± 4.8	0.22
Male, n (%)	35 (59.3)	4 (80)	0.64

Other baseline characteristics include atrial fibrillation, chronic obstructive pulmonary disease, end stage renal disease, hypertension, heart failure, prior sublingual nitroglycerin use, non-invasive ventilation, and IV loop diuretic administration

- Similar between the groups

Figure 1: Intubation rate within 6 hours

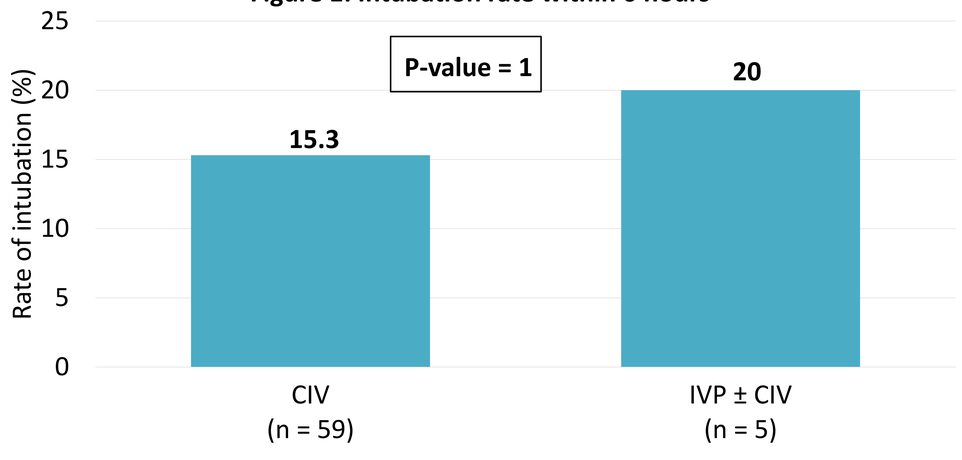

Table 2: Secondary outcomes

Outcome	CIV (n = 59)	IVP ± CIV (n = 5)	P-value
Hypotension, n (%)	3 (5)	0 (0)	1
ICU admission, n (%)	48 (81.4)	5 (100)	0.58
Hospital LOS, mean ± SD	6 ± 5.0	13 ± 12.9	0.03

RESULTS & DISCUSSION

Table 3: Nitroglycerin Doses

	CIV (mcg/min) (n = 59)	IVP ± CIV (n = 5)	
		CIV (mcg/min)	Cumulative push doses (mcg)
Initial rate (mean ± SD)	25.1 ± 40.5	121 ± 81.9	-
Minimum	22.1 ± 37.8	105 ± 93.9	450
Maximum	69.5 ± 71.1	150 ± 70.7	8500

Limitations

- Single center retrospective study
- Small sample size
- Unclear documentation of nitroglycerin doses
- Nitroglycerin IV push doses all from one prescriber

Conclusion

- Unable to detect a difference between the rates of mechanical intubation within 6 hours
- Hospital length of stay longer in IVP ± CIV group
- No difference in hypotension and ICU admission rates
- Prospective, randomized trials warranted to further establish efficacy of nitroglycerin IV push doses

REFERENCES

1. Viau DM, et al. The pathophysiology of hypertensive acute heart failure. *Heart.* 2015;101(23):1861-1867.
2. Wang K, et al. Role of high-dose intravenous nitrates in hypertensive acute heart failure. *Am J Emerg Med.* 2020;38(1):132-137.

DISCLOSURE & CONTACT

All authors have nothing to disclose

Pardeep.kaur@umcsn.com
Lisa.phan@umcsn.com
Jayme.patel@umcsn.com

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PATHWAY DESIGNATED AMERICAN NURSES CREDENTIALING CENTER