

Providence

## Providence Digital Commons

---

2024 Swedish Learning and Celebration Day

Swedish Learning and Celebration Day

---

6-2024

### Safety of Ketamine Use for Rapid Control of Agitation in the Emergency Department

Rosa Hong Trieu  
*Swedish*

Follow this and additional works at: [https://digitalcommons.providence.org/swedish\\_learning\\_day\\_24](https://digitalcommons.providence.org/swedish_learning_day_24)



Part of the [Emergency Medicine Commons](#), [Medical Education Commons](#), and the [Pharmacy and Pharmaceutical Sciences Commons](#)

---

#### Recommended Citation

Trieu, Rosa Hong, "Safety of Ketamine Use for Rapid Control of Agitation in the Emergency Department" (2024). *2024 Swedish Learning and Celebration Day*. 2.

[https://digitalcommons.providence.org/swedish\\_learning\\_day\\_24/2](https://digitalcommons.providence.org/swedish_learning_day_24/2)

This Presentation is brought to you for free and open access by the Swedish Learning and Celebration Day at Providence Digital Commons. It has been accepted for inclusion in 2024 Swedish Learning and Celebration Day by an authorized administrator of Providence Digital Commons. For more information, please contact [digitalcommons@providence.org](mailto:digitalcommons@providence.org).

Swedish Learning & Celebration Day 2024

# Safety of Ketamine Use for Rapid Control of Agitation in the Emergency Department

Presented By: Rosa Hong Trieu, PharmD

Date: June 3rd, 2024

# Background and Problem Statement

## ACEP Clinical Policy: Severe Agitation (2024)<sup>1</sup>

- IV/IM Ketamine (*Level C recommendation*)

## Current Literature<sup>2,3</sup>

- 2 to 5 mg/kg IM ketamine for severe agitation
  - Trend towards lower dosing to decrease respiratory adverse effects

**Problem:** No consensus on IM ketamine dosing

1. American College of Emergency Physicians Clinical Policies Subcommittee et al. (2024)

2. Cunningham et al. Prehospital and disaster medicine. (2021)

3. Lin et al. The American journal of emergency medicine. (2020)

# Study Objectives

Evaluate the safety profile of IM ketamine dosed  $\leq 3$  mg/kg vs  $> 3$  mg/kg for severe agitation in the ED

Compare clinical success rates between IM ketamine dosed  $\leq 3$  mg/kg vs  $> 3$  mg/kg for severe agitation in the ED

# Methods

## Retrospective Chart Review

- **Setting:** Swedish Medical Center Emergency Departments
  - First Hill, Cherry Hill, Edmonds, Issaquah, Mill Creek
- **Timeline:** September 2019 to September 2023
- All data was obtained through the hospital system's electronic medical record system (Epic)

# Inclusion and Exclusion

Adult patient administered at least one dose of IM ketamine in the ED (n = 227)

Excluded Patients  
(n = 152)

Low Dose Cohort  
IM ketamine  $\leq$  3 mg/kg  
(n = 30)

High Dose Cohort  
IM ketamine  $>$  3 mg/kg  
(n = 45)

# Analysis of Data

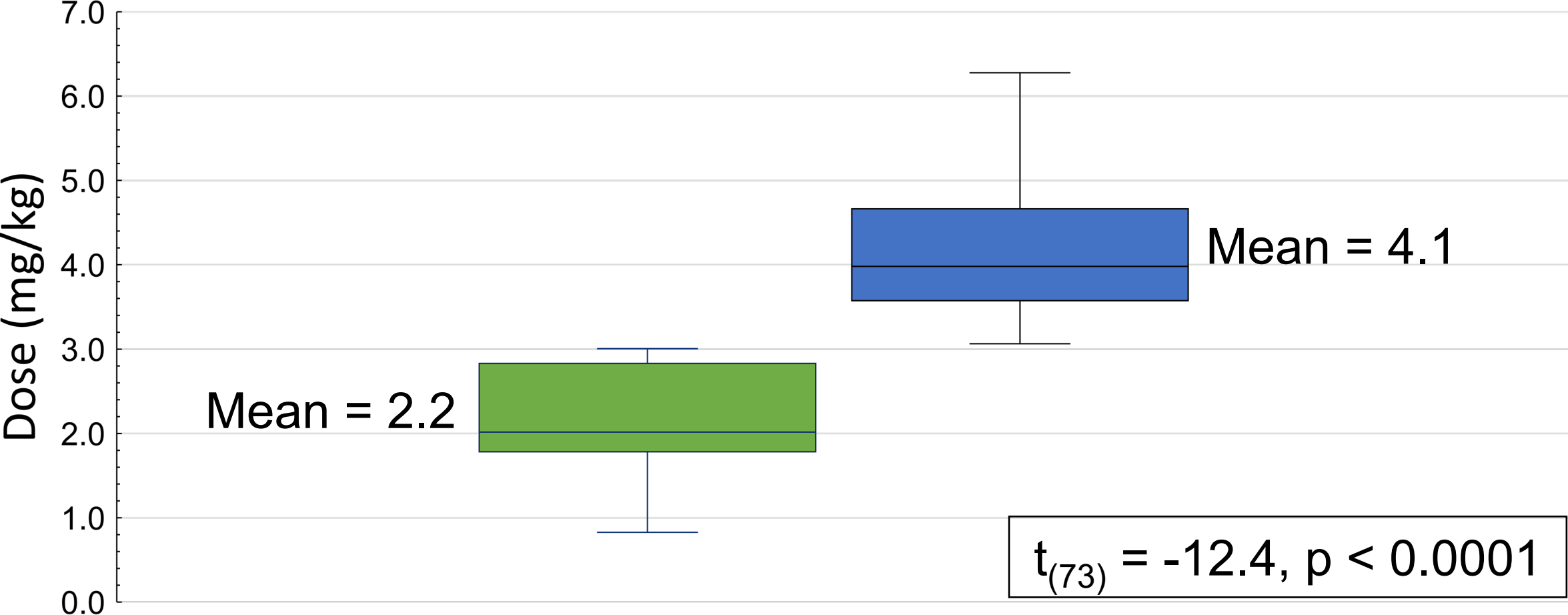
**Primary Endpoint:** Respiratory support or medical intervention for cardiovascular event within 2 hours of IM ketamine  $\leq 3$  mg/kg or  $> 3$  mg/kg TBW administered for rapid control of agitation in the ED

## Secondary Endpoints

- Clinical success within 15 minutes
- Time to removal of restraints or seclusion
- ED length of stay

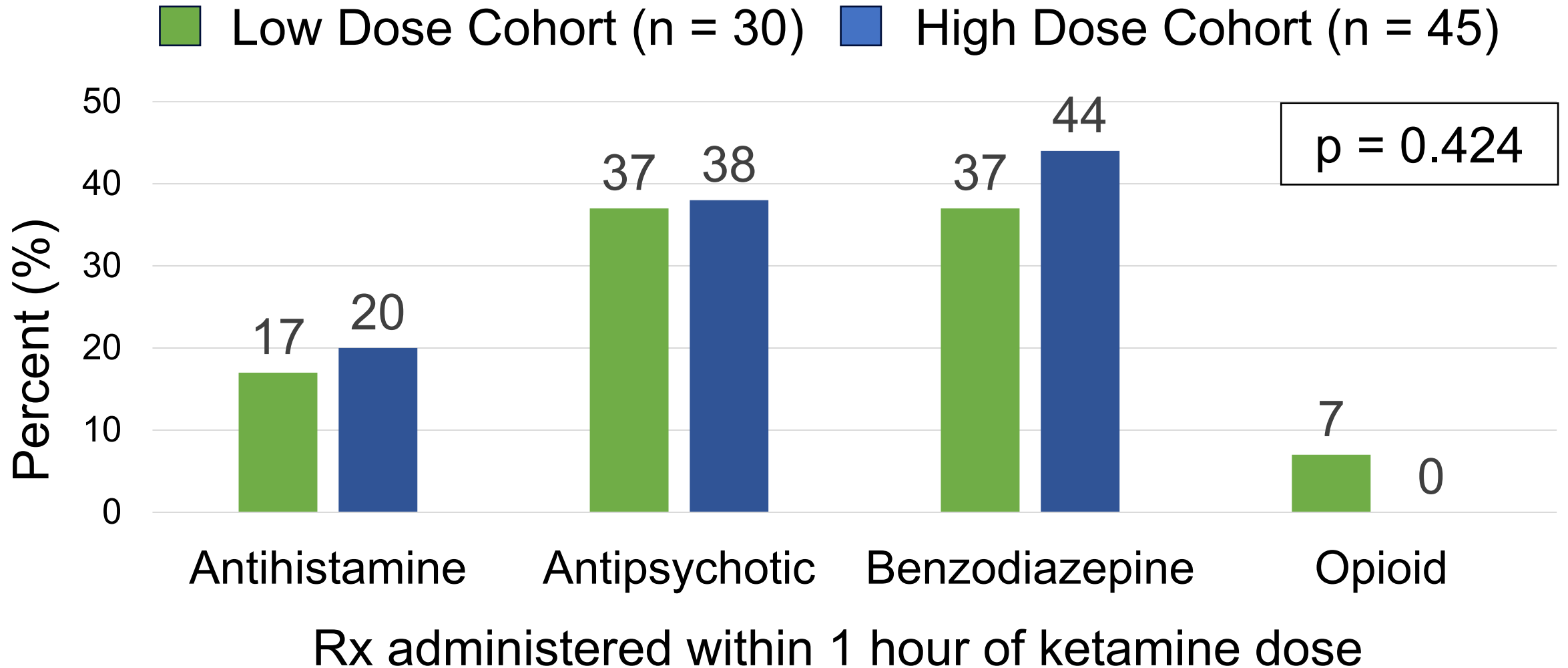
# IM Ketamine Dose Administered

■ Low Dose Cohort (n = 30)   ■ High Dose Cohort (n = 45)





# Concomitant Medications



# Primary Outcomes

	Low Dose Cohort (N = 30)	High Dose Cohort (N = 45)	p
Cardiovascular adverse event, requiring intervention <sup>a</sup>	0 (0%)	0 (0%)	NA
Respiratory adverse event, requiring intervention <sup>b</sup>	1 (3%)	9 (20%)	0.038 <sup>c</sup>
Bag-mask ventilation	0 (0%)	1 (2%)	
Nasal canula	1 (3%)	8 (18%)	
Simple face mask, HFNC, CPAP, Mechanical Ventilation	0 (0%)	0 (0%)	

HFNC, high flow nasal canula; CPAP, continuous positive airway pressure.

<sup>a</sup> Cardiovascular adverse events include elevated blood pressure (> 180/120 mm Hg), new dysrhythmia, and cardiac decompensation. Interventions defined as pharmacological or medical management (eg. fast-acting antihypertensive medication administered) within 2 hours of ketamine administration.

<sup>b</sup> Respiratory intervention defined as respiratory support needed within 2 hours of ketamine administration.

<sup>c</sup>  $\chi^2_{(1,75)} = 4.33$

# Secondary Outcomes

	Low Dose Cohort (n = 30)	High Dose Cohort (n = 45)	p
Clinical success within 15 min of IM ketamine administration <sup>1</sup>	28 (93%)	43 (96%)	1 <sup>a</sup>
Time to removal of restraints or seclusion after ketamine administration (min)	185 ± 133	227 ± 160	0.484 <sup>b</sup>
ED length of stay (hr)	28 ± 24	30 ± 22	0.713 <sup>c</sup>

<sup>1</sup> Clinical success within 15 min of weight-based IM ketamine dose with clinical success, defined by: RASS score -1 to +1; AASS score (agitation) < 2; BARS ≤ 4; removal of restraints/seclusion; no additional sedative doses required; progress note documenting success

<sup>a</sup> Fisher's exact test

<sup>b</sup> Kruskal-Wallis rank sum test, H(1) = 0.490.

<sup>c</sup> Kruskal-Wallis rank sum test, H(1) = 0.135.

# Discussion and Research Implications

Doses greater than 3 mg/kg TBW was associated with more adverse events compared to lower dosing

No additional benefit was observed with higher IM ketamine doses

IM ketamine dosed at 3 mg/kg or less may be considered over higher dosing for rapid control of agitation in the ED

# References

1. American College of Emergency Physicians Clinical Policies Subcommittee (Writing Committee) on Severe Agitation, Thiessen MEW, Godwin SA, et al. Clinical Policy: Critical Issues in the Evaluation and Management of Adult Out-of-Hospital or Emergency Department Patients Presenting With Severe Agitation: Approved by the ACEP Board of Directors, October 6, 2023. *Ann Emerg Med.* 2024;83(1):e1-e30. doi:10.1016/j.annemergmed.2023.09.010
2. Barbic, D., Andolfatto, G., Grunau, B., Scheuermeyer, F. X., Macewan, B., Qian, H., Wong, H., Barbic, S. P., & Honer, W. G. (2021). Rapid Agitation Control With Ketamine in the Emergency Department: A Blinded, Randomized Controlled Trial. *Annals of emergency medicine*, 78(6), 788–795. <https://doi.org/10.1016/j.annemergmed.2021.05.023>
3. Coffey, S. K., Vakkalanka, J. P., Egan, H., Wallace, K., Harland, K. K., Mohr, N. M., & Ahmed, A. (2021). Outcomes Associated with Lower Doses of Ketamine by Emergency Medical Services for Profound Agitation. *The western journal of emergency medicine*, 22(5), 1183–1189. <https://doi.org/10.5811/westjem.2021.5.50845>
4. Cunningham, C., Gross, K., Broach, J. P., & O'Connor, L. (2021). Patient Outcomes Following Ketamine Administration for Acute Agitation with a Decreased Dosing Protocol in the Prehospital Setting. *Prehospital and disaster medicine*, 36(3), 276–282. <https://doi.org/10.1017/S1049023X21000236>
5. Kim HK, Leonard JB, Corwell BN, Connors NJ. Safety and efficacy of pharmacologic agents used for rapid tranquilization of emergency department patients with acute agitation or excited delirium. *Expert Opin Drug Saf.* 2021;20(2):123-138. doi:10.1080/14740338.2021.1865911
6. Lin, J., Figuerado, Y., Montgomery, A., Lee, J., Cannis, M., Norton, V. C., Calvo, R., & Sikand, H. (2021). Efficacy of ketamine for initial control of acute agitation in the emergency department: A randomized study. *The American journal of emergency medicine*, 44, 306–311. <https://doi.org/10.1016/j.ajem.2020.04.013>
7. Lipscombe, C., Akhlaghi, H., Groombridge, C., Bernard, S., Smith, K., & Olaussen, A. (2022). Intubation Rates following Prehospital Administration of Ketamine for Acute Agitation: A Systematic Review and Meta-Analysis. *Prehospital emergency care*, 1–15. Advance online publication. <https://doi.org/10.1080/10903127.2022.2108178>
8. Mankowitz SL, Regenber P, Kaldan J, Cole JB. Ketamine for Rapid Sedation of Agitated Patients in the Prehospital and Emergency Department Settings: A Systematic Review and Proportional Meta-Analysis. *J Emerg Med.* 2018;55(5):670-681. doi:10.1016/j.jemermed.2018.07.017
9. Mo, H., Campbell, M. J., Fertel, B. S., Lam, S. W., Wells, E. J., Casserly, E., & Meldon, S. W. (2020). Ketamine Safety and Use in the Emergency Department for Pain and Agitation/Delirium: A Health System Experience. *The western journal of emergency medicine*, 21(2), 272–281. <https://doi.org/10.5811/westjem.2019.10.43067>
10. Zaki, H. A., Shaban, E., Bashir, K., Iftikhar, H., Zahran, A., Salem, E. E. M., & Elmoheen, A. (2022). A Comparative Analysis Between Ketamine Versus Combination of Midazolam and Haloperidol for Rapid Safe Control of Agitated Patients in Emergency Department: A Systematic Review. *Cureus*, 14(6), e26162. <https://doi.org/10.7759/cureus.26162>