# Increased Frequency of Adverse Events Observed after Ketamine Use for Psychiatric Emergency as Compared to Benzodiazepines and Antipsychotics

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# Introduction

Ketamine may be favorable to benzodiazepine or antipsychotic medications for prehospital treatment of patients experiencing a psychiatric emergency. Combative patients may require a sedative medication for safe treatment and transport. Benzodiazpines and antipsychotics are common choices for the emergency treatment of an agitated patient experiencing a psychiatric emergency. Ketamine is perceived as safe and effective for this indication by paramedics in the United States, but only 33% of US paramedics have ketamine in their treatment protocols. Ketamine provides rapid and effective sedation for agitated patients experiencing a psychiatric emergency. Data are limited on the safety profile of ketamine for this indication, however, smaller studies suggest ketamine is associated with a high rate of endotracheal intubation. This study evaluated adverse events after administration of ketamine compared to benzodiazepines or antipsychotics in the prehospital treatment of psychiatric patients.

# Methods

A retrospective analysis was performed using deidentified patient care records from the ESO Solutions (Austin, TX) research database from calendar year 2017.

Inclusion criteria: Patients over 13 years experiencing a psychiatric emergency and receiving a single dose of ketamine, benzodiazepine, or antipsychotic.

Psychiatric emergencies were defined as one of the following:

#### **Dispatch Types:**

EMD code "25"
Dispatch Complaint
Psychiatric Problem/Abnormal
Behavior/Suicide Attempt

# **Primary Impressions:**

Behavioral/psychiatric episode Confusion/Delirium Cocaine related disorders Hallucinogen related disorders Mental disorder Other stimulant related disorders

# Signs & Symptoms:

Combative or violent behavior

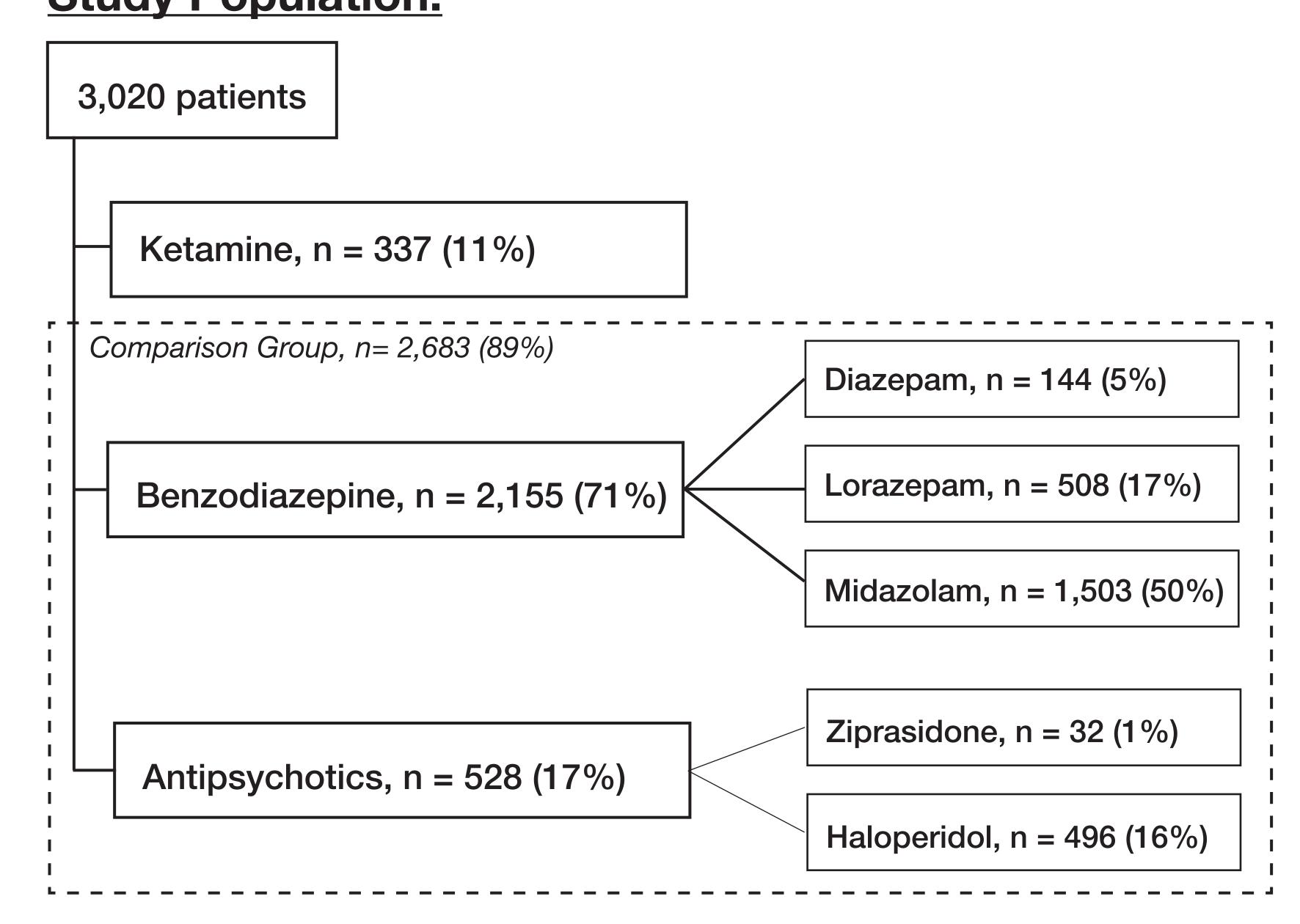
Emotional stress
Hallucinations
Irritability and anger
Overactivity
Restlessness and agitation
Strange and inexplicable behavior
Dementia with behavioral disturbance
Intoxication
Mental disorder, not otherwise specified

Included medications were categorized as ketamine, benzodiazepine or antipsychotic. The frequency of adverse events was compared between ketamine versus benzodiazepines or antipsychotics. Analyses were performed in R version 3.5.1 (R Foundation, Vienna, Austria).

#### **Adverse Events:**

Non-Invasive Airway Management
Cricoid Pressure
Manual Airway
NPA
OPA
Suction
Non-Invasive Ventilation
CPAP
BVM
Invasive Airway Management
Supraglottic airway
Endotracheal Intubation
Cardiac Arrest

# **Study Population:**

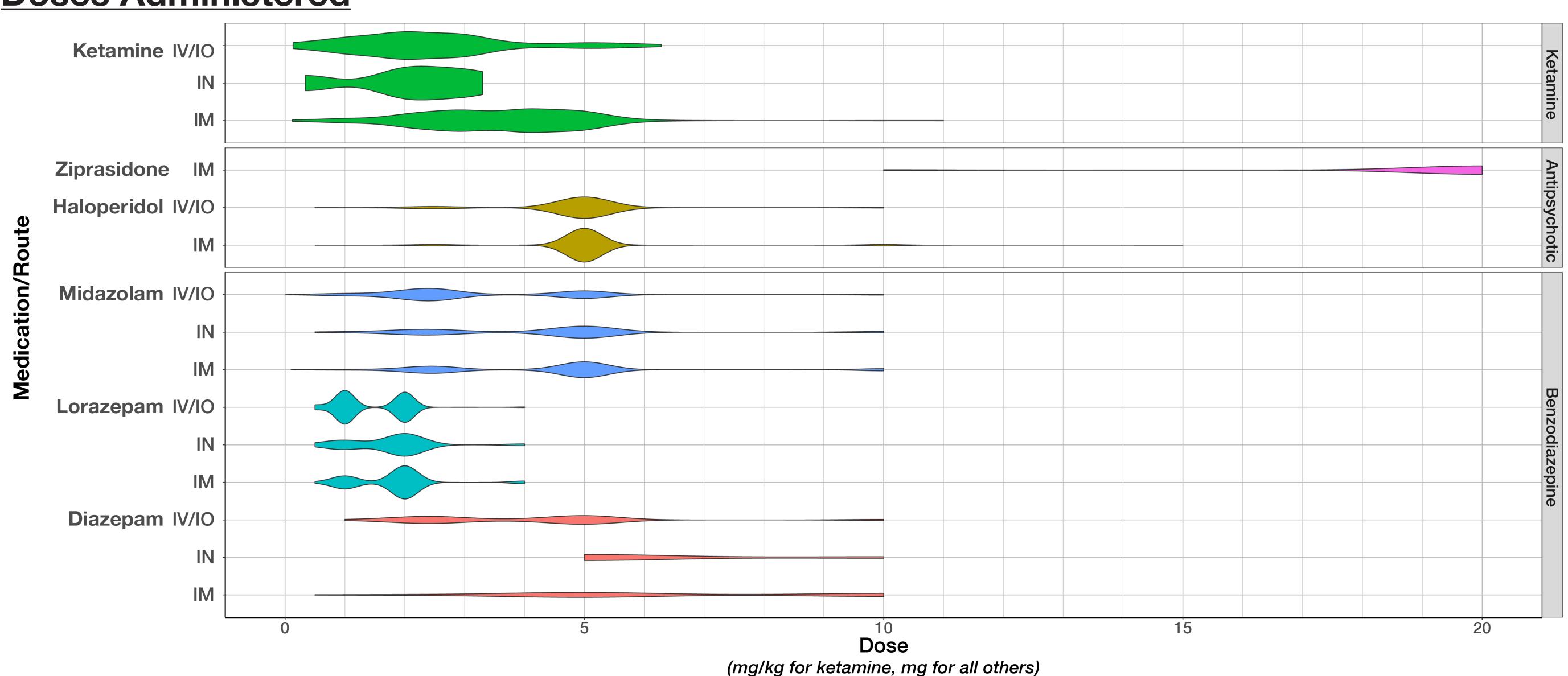


#### Results

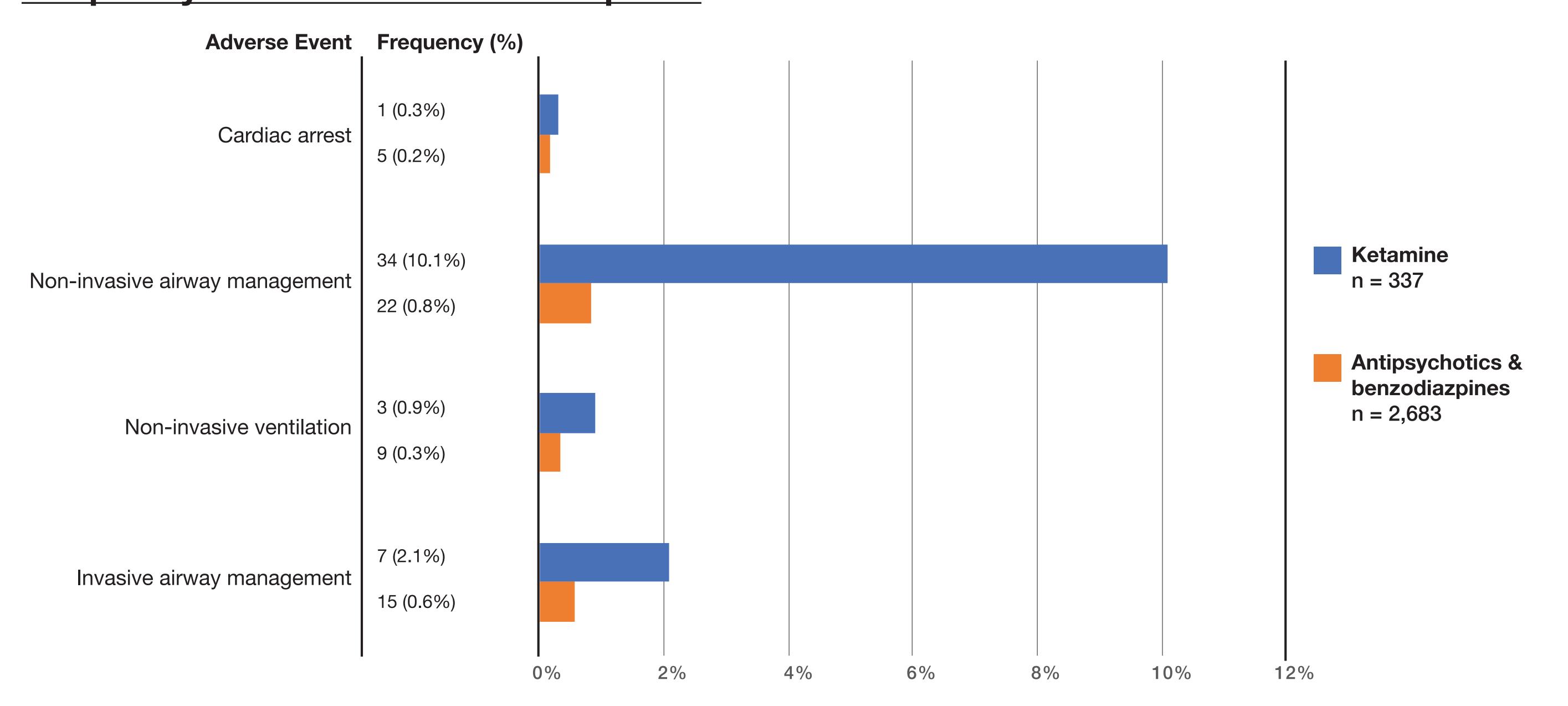
Medication group characteristics were described:

	Ketamine	Antipsychotics	Benzodiazpines
Age, median (IQR), y	32 (16)	39 (26)	37 (27)
Male, No. (%)	222 (65.88%)	249 (47.16%)	1028 (47.7%)
Weight, mean, kg.	82.97	77.84	77.74
Vitals Obtained Prior to Medication, No. (%)	156 (46.29%)	327 (61.93%)	1606 (74.52%)
Known Psychiatric History, No. (%)	80 (23.74%)	140 (26.52%)	545 (25.29%)
Known Substance Abuse History, No. (%)	16 (4.75%)	34 (6.44%)	148 (6.87%)
Known Neurological Condition, No. (%)	9 (2.67%)	14 (2.65%)	47 (2.18%)
Alcohol/Drug Paraphernalia at Scene, No. (%)	32 (9.5%)	12 (2.27%)	50 (2.32%)
Substance Use Reported, No. (%)	127 (37.69%)	172 (32.58%)	616 (28.58%)

#### **Doses Administered**

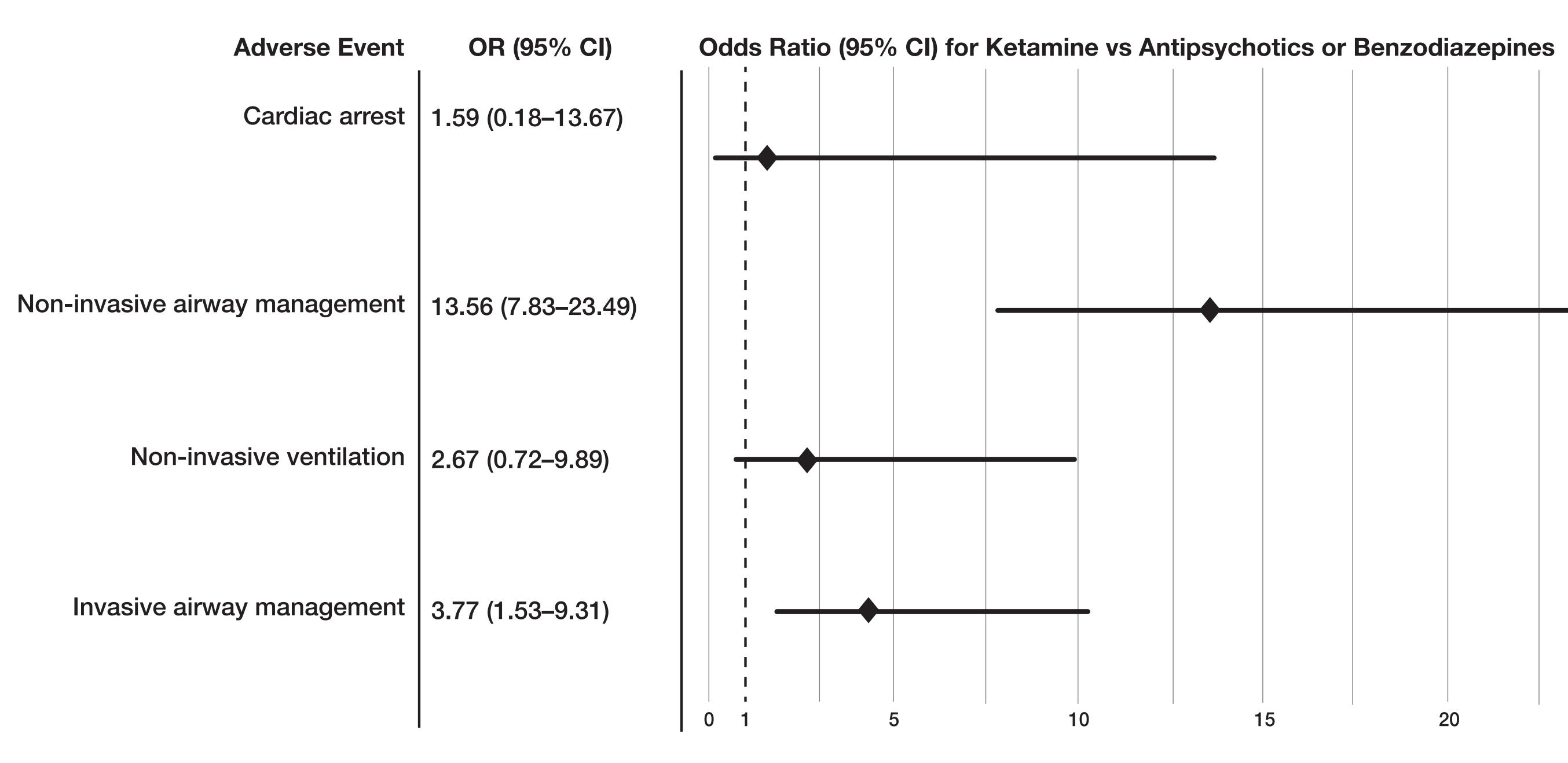


### Frequency of Adverse Events Compared



#### Results

#### Odds Ratio of Adverse Events



#### Limitations

This study was a retrospective review using paramedic-created patient care documentation, which could lead to inaccuracies. Additionally, patient agitation level or effectiveness of medications in controlling agitation could not be determined. The patients in this study were from multiple regions in the United States, with unknown differences in treatment protocols. Paramedic experience level could not be qualified. This study did not assess why airway or ventilation treatments were performed. Hospital outcomes, including whether or not patients received invasive airway management at the hospital, are unknown.

#### Conclusion

The adverse event rate for all psychiatric patients administered sedation was ≤11%. For psychiatric patients requiring treatment, those who received ketamine received significantly more airway management than patients who received a benzodiazepine or antipsychotic. Further study investigating the effectiveness of ketamine compared to benzodiazepines or antipsychotics and evaluating patient outcomes with each type of sedative agent is needed.













