A Review of the Clinical and Cost Effectiveness of Intravenous and Intramuscular Pharmacological Treatment on Acute Agitation in Patients Admitted to the Emergency Department

Ryan Ferris, PharmD, PGY-1 Pharmacy Resident; Carol Keller, RPh, PhD

BACKGROUND

Introduction
- Agitation is common in the emergency department (ED) and can escalate to aggression or violence towards caregivers or other patients if not properly addressed[1]
- With diverse clinical reasons for acute agitation, etiology can vary including, intoxication, neurodegenerative, and psychiatric causes[1,2]

Treatment
- When verbal de-escalation and non-pharmacologic methods fail, pharmacological agents are needed to quickly calm patients[2-4]
- Oral agents are preferred whenever possible, but many patients are too violent or intoxicated and parenteral administration is required[1,2]
- Typically, antipsychotics and benzodiazepines are used first-line and come in various formulations[3,4]

Cost
- Ineffective management can delay care, result in injury to patient and staff, increase admission time, and drive up the cost of care[5]
- Cost effectiveness has not been widely reviewed
- The cost of care may be reduced by up to 20% if high-cost medications such as atypical antipsychotics or droperidol are equally effective compared to low-cost medications such as benzodiazepines or haloperidol

PURPOSE

- To evaluate the clinical and cost effectiveness of pharmacological treatment on adult behavioral health patients experiencing acute agitation and requiring ED admission
- To identify opportunities for cost savings in this high-risk patient population

METHODS

Study Design and Patient Setting
- Retrospective cohort study of adult (age ≥18) patients admitted to a small community hospital between October 1, 2019 and October 1, 2021

Data Collection
- Data was extracted from electronic health records data

Inclusion Criteria
- Patients admitted to the ED and treated for agitation using intramuscular or intravenous medications

Exclusion Criteria
- Pediatrics
- Pregnancy
- Alcohol Withdrawal

Study Drugs:
- Lorazepam, midazolam, droperidol, haloperidol, olanzapine, ziprasidone

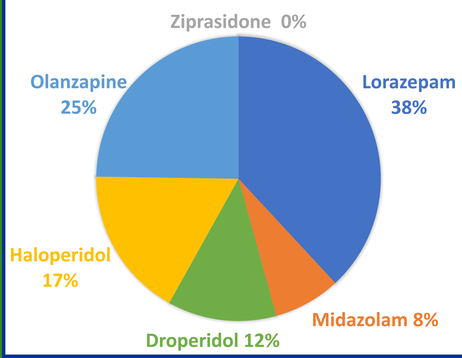
RESULTS

Baseline Characteristics

Table 1. Patient Characteristics (n = 65)

Characteristics	n	(%)
Mean Age (y); (SD)	38.3	(14.5)
Female Sex	33	(50.7)
Race		
Hispanic or Latino	11	(16.9)
Non Hispanic or Latino	49	(75.4)
Refused to Answer or Unknown	5	(7.7)
≥ 2 medications	37	(56.9)
Code Grays	20	(30.8)
Physical Restraints	23	(35.4)

Figure 1. Distribution of Study Medications



Financial Impact

Table 2. Cost of Study Medications

Study Drugs	n	Cost Per Unit ($)	Total Cost Per Drug ($)
Lorazepam	40	0.45	18.00
Midazolam	8	0.31	2.48
Droperidol	13	6.59	85.67
Haloperidol	18	0.56	10.08
Olanzapine	26	45.09	1172.34
Ziprasidone	0	42.36	N/A

Figure 2. Total Cost of Study Medications

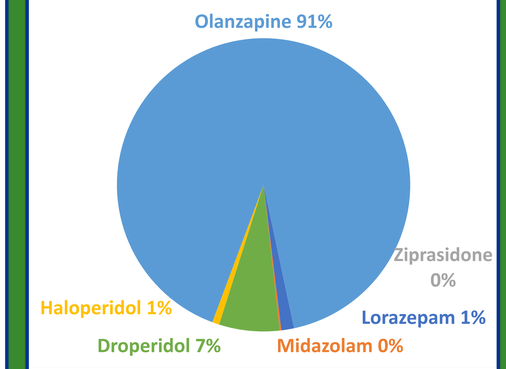
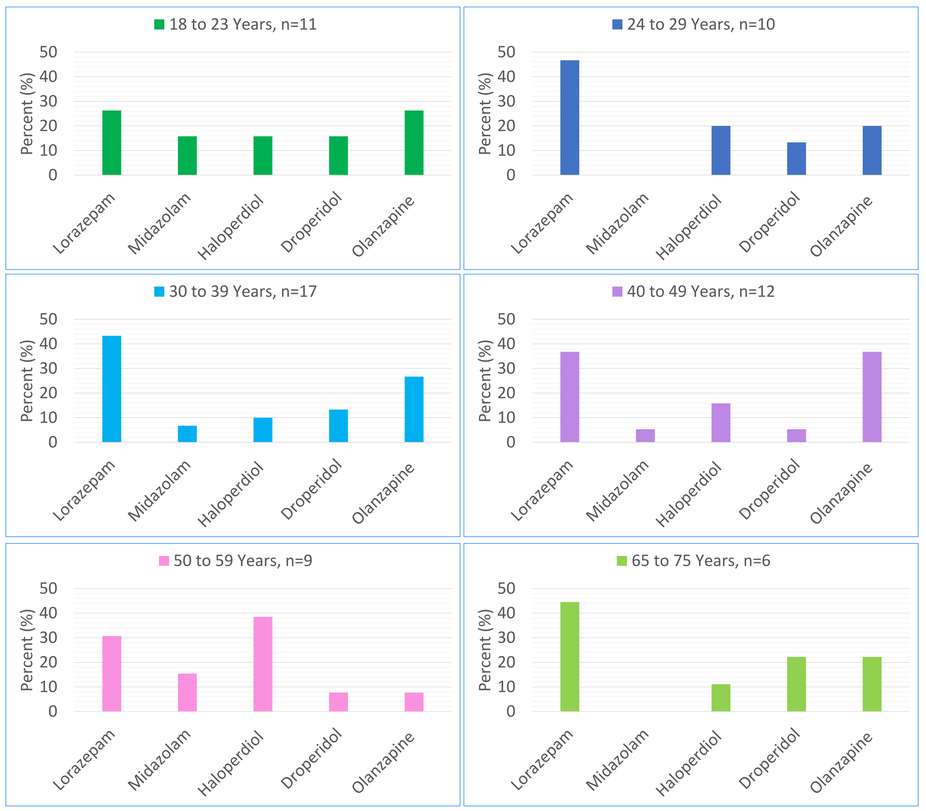


Figure 3. Frequency of Study Medication Administration by Age Groups



RESULTS (CONTINUED)

Baseline
- Of the 201 charts reviewed, 65 patients met inclusion criteria
- Patient age ranged from 19 to 74 years with a majority between the ages of 30-39 years old (Figure 3)
- Over one-half (56.9%) of patients required administration of at least 2 study medications (Table 1)
- Approximately one-third required physical restraints (35.4%) and/or a Code Gray (30.8%) due to their increased agitation during hospital stay (Table 1)
- Ziprasidone was not administered during the study period (Figure 1)

Cost
- Olanzapine was the most expensive study medication (Figure 2)
- Total financial impact during the study period was $1288.57 (Table 2)

DISCUSSION

- Olanzapine represents nearly 91% of total medication cost
- Lorazepam is 89% less expensive than olanzapine
- If olanzapine use was reduced by 50% and substituted for lorazepam, this would reduce the total cost by 45%
- Cost savings would be exponentially greater at larger hospitals where utilization of atypical antipsychotics is more frequent

LIMITATIONS

- Retrospective, non-randomized, single-center study
- Small sample size
- Inconsistencies in electronic medical record documentation of code gray and physical restraints
- Several medications given together as treatment 'cocktails'
- No standardized agitation assessment completed to assess medication effectiveness

GOING FORWARD

- Complete statistical analysis for study medication effectiveness and patient outcomes
- Develop a standardized algorithm for drug selection in the treatment of agitation for ED staff

REFERENCES

1. Klein LR, Driver BE, Miner JR, et al. Intramuscular Midazolam, Olanzapine, Ziprasidone, or Haloperidol for Treating Acute Agitation in the Emergency Department. *Ann Emerg Med*. 2018;72(4):374-385. doi:10.1016/j.annemergmed.2018.04.027.
2. Martel ML, Driver BE, Miner JR, Biros MH, Cole JB. Randomized Double-blind Trial of Intramuscular Droperidol, Ziprasidone, and Lorazepam for Acute Undifferentiated Agitation in the Emergency Department. *Acad Emerg Med*. 2021;28(4):421-434. doi:10.1111/acem.14124.
3. Wilson MP, Pepper D, Currier GW, Holloman GH Jr, Feifel D. The psychopharmacology of agitation: consensus statement of the american association for emergency psychiatry project Beta psychopharmacology workgroup. *West J Emerg Med*. 2012;13(1):26-34. doi:10.5811/westjem.2011.9.6866.
4. Schneider A, Mullinax S, Hall N, Acheson A, Oliveto AH, Wilson MP. Intramuscular medication for treatment of agitation in the emergency department: A systematic review of controlled trials. *Am J Emerg Med*. 2021;46:193-199. doi:10.1016/j.ajem.2020.07.013.
5. Baker SN. Management of acute agitation in the emergency department. *Adv Emerg Nurs J*. 2012;34(4):306-320. doi:10.1097/TME.0b013e31826f12d6.