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Inappropriate Pharmacologic Management Following Positive CAM-ICU Screening in Critically Ill Adults

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Abstract

Background: Delirium is a common problem in critically ill patients, contributing to worse outcomes and increased lengths of stay. Although guidelines recommend prioritizing prevention and nonpharmacologic management, medications are often required to maintain patient and staff safety. However, the validated screening tools available make it difficult for physicians and nurses to distinguish between delirium and other types of agitation, leading to varying practice patterns.

Objectives: The primary objective of this study was to describe the use of medications to manage delirium in the medical intensive care unit (MICU) among critically ill patients with delirium, as well as characterize patient and environmental factors that may contribute to inappropriate medication use.

Methods: This was a retrospective study using chart review of adult patients admitted to the MICU of an academic tertiary care center. Descriptive statistics were used to summarize patient characteristics and medication administration events.

Results: Of the 431 patients who met inclusion criteria, 29 received medication administrations within one hour following the index positive CAM-ICU score. Patient and environmental factors were similar between patients receiving appropriate versus inappropriate medications with respect to demographics, history of substance use disorder or dementia, and the time and day of the week of the index positive CAM-ICU score. Patients receiving inappropriate medications were younger on average than those receiving appropriate medications (mean age 61.1 versus 68.8 years). Potentially inappropriate medication administration was uncommon occurring in only 8 (1.9%) patients. The most common medications used in both the appropriate and inappropriate contexts were opioids.

Conclusion: Potentially inappropriate medication administration following positive CAM-ICU screening was uncommon in this cohort. Among patients who received pharmacologic treatment, opioids accounted for most medication administration events, highlighting the challenges of distinguishing pain-related from delirium-related agitation in critically ill patients.

Keywords: Delirium; critical care; opioids; critical care nursing

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1. Introduction

Delirium is a common problem in intensive care units (ICU), leading to worse patient outcomes, increased intensive care unit and hospital lengths of stay (LOS), and higher financial costs¹. Current clinical guidelines emphasize minimizing the use of medications that may worsen or prolong delirium. Although prevention and nonpharmacologic interventions remain the cornerstone of management, pharmacologic therapies are frequently used in clinical practice to address agitation and maintain patient and staff safety. While routine use of atypical antipsychotics (such as haloperidol) is not broadly recommended, these medications may be beneficial to patient and staff safety in some clinical scenarios¹. Benzodiazepines and opiates, in particular, have been associated with increased risk of delirium, but are frequently utilized in the ICU for other clinical indications.

Agitation is a frequently encountered challenge in ICU settings, especially from the perspective of appropriate management. Even with validated screening tools, such as the Richmond Agitation Sedation Score (RASS)², Critical Care Pain Observation Tool (CPOT)³, or Confusion Assessment Method (CAM-ICU)⁴, determining whether a patient's agitation is from delirium or another cause is often challenging. For some patients, especially those that are intubated or cannot otherwise communicate their needs, the signs observed in these screening tools may not be specific enough to differentiate causes of agitation. In addition, even these screening tools that are intended to be quick, they can place increased workload on nursing staff¹. While providers place orders for medications to manage agitation, these are sometimes prescribed on an as needed basis. This leaves nurses to determine if and when to administer them, placing additional demands on their clinical judgment and workload.

The primary objective of this study was to describe the use of medications to manage delirium in the medical intensive care unit (MICU) among critically ill patients with delirium. In addition, we explored whether patient characteristics and environmental factors, including time of day and day of week, were associated with differences in prescribing patterns. Understanding the frequency and clinical circumstances surrounding potentially inappropriate medication use may provide insight into the challenges of delirium management in critically ill patients.

2. Methods

In this retrospective study, adult patients admitted to the medical intensive care unit (MICU) at an academic tertiary care center between October 1, 2015 and December 31, 2023 were screened. Patients were

included if they had a positive CAM-ICU score consistent with delirium. The CAM-ICU is a validated delirium screening tool commonly used in critically ill patients⁴. Any pharmacologic treatment given within one hour after a positive CAM-ICU score was evaluated. Patients were excluded if delirium was attributed to alcohol withdrawal, defined by the presence of a documented Clinical Institute Withdrawal Assessment (CIWA) score, or if they had benzodiazepines, opiates, or antipsychotics listed on their pre-admission medication list, to minimize misclassification of chronic medication use as delirium-directed pharmacologic treatment.

Exposure and Outcome definitions

The index time point for each patient was defined as the first documented positive CAM-ICU score during the MICU admission. Medications administered within an hour after the index CAM-ICU were recorded. Pharmacologic management was categorized as clinically appropriate or clinically inappropriate based on current delirium management guidelines and prior literature¹.

Clinically appropriate pharmacologic management included: antipsychotics, or opiates or benzodiazepines with another documented indication. Clinically inappropriate pharmacologic management was defined as: benzodiazepines or opiate without a documented indication.

Covariates extracted from the electronic medical record included patient age, sex, race, history of dementia, and history of substance use disorder. We also queried factors present at the time of the index CAM-ICU, including time of day (day defined at 7a to 5p and evening/night defined as 5p to 7a), day of week (weekday versus weekend), and mechanical ventilation status at the time of CAM-ICU positivity.

Statistical Analysis

Descriptive statistics were used to summarize patient characteristics and medication administration events. Given the low frequency of inappropriate medication administration events, analyses were considered exploratory and no inferential statistical comparisons were performed.

3. Results

Of the 431 patients who met inclusion criteria, 29 received medication administrations within one hour following the index positive CAM-ICU score, while the majority of patients (402/431, 93.3%) did not receive pharmacologic treatment within the predefined evaluation window. Patient and index CAM-ICU event characteristics are shown in Table 1.

Table 1. Characteristics of patients and timing of index CAM-ICU score

Characteristic	Appropriate (n=21)	Inappropriate (n=8)
Day of Week		
Weekdays	17 (81.0%)	7 (87.5%)
Weekends	4 (19.0%)	1 (12.5%)
Time of Day		
Day (7a–5p)	13 (61.9%)	3 (37.5%)
Evening/Night (5p–7a)	8 (38.1%)	5 (62.5%)
Sex		
Female	8 (38.1%)	4 (50.0%)
Male	13 (61.9%)	4 (50.0%)
Race		
Asian	1 (4.8%)	0 (0.0%)
Black	7 (33.3%)	3 (37.5%)
White	12 (57.1%)	4 (50.0%)
N/A	1 (4.8%)	1 (12.5%)
Mean Age (years)	68.8	61.1
Substance Use Disorder		
Yes	1 (4.8%)	1 (12.5%)
No	20 (95.2%)	7 (87.5%)
Dementia		
Yes	0 (0.0%)	0 (0.0%)
No	21 (100%)	8 (100%)

Baseline characteristics appeared similar between patients receiving appropriate versus inappropriate medications with respect to sex, race, history of substance use disorder, history of dementia, timing of the index positive CAM-ICU score, and day of week of the index positive CAM-ICU score. Patients receiving inappropriate medications were younger on average than those receiving appropriate medications (mean age 61.1 versus 68.8 years).

Classification of medication administration events is shown in Table 2. Potentially inappropriate medication administration following positive CAM-ICU scores was uncommon, occurring in 8 of 431 patients (1.9%). Of the 8 medication administrations categorized as inappropriate, 5 involved opiates administered without a documented pain score, 1 involved an opiate with a charted pain score that did not meet order criteria, 1 involved an opiate administered as needed (PRN) for agitation, and 1 involved a benzodiazepine without an alternate documented indication. Among the 21 medication administrations categorized as appropriate, the most common indications were administration for documented pain (n=8) and prior to noxious stimuli (n=6). Additional appropriate uses included scheduled opiates (n=2), end-of-life care (n=3), treatment of increased respiratory rate per PRN instructions (n=1), and antipsychotic administration for agitation (n=1).

4. Discussion

In this retrospective study of critically ill patients with positive CAM-ICU scores, potentially inappropriate medication administration was uncommon. Notably, most patients with positive CAM-ICU scores did not receive pharmacologic treatment within the predefined evaluation window, suggesting that positive delirium screening alone did not routinely trigger medication administration in this cohort. Among patients who did receive medications, opiates accounted for the majority of both appropriate and inappropriate administration events.

Opiates are commonly utilized in intensive care units for treatment of pain and prevention of pain associated with noxious stimuli. Protocolized pain management strategies utilizing opiates may reduce sedation requirements, duration of mechanical ventilation, and ICU length of stay¹. However, distinguishing pain-related agitation from delirium-related agitation remains challenging in clinical practice. Commonly used assessment tools such as CPOT for pain and CAM-ICU for delirium may not adequately differentiate these processes in some patients, particularly those who are intubated or otherwise unable to communicate their symptoms. This creates challenges for both prescribers and nursing staff when determining whether opiate administration is likely to improve or worsen agitation in a patient with delirium. These challenges may be further compounded by variability in PRN medication order structure and administration practices in ICU

Table 2. Medications administered after index CAM-ICU score

Classification	Medication Context	n
Inappropriate (n=8)	Opiate without a documented pain score	5
	Opiate with pain score not meeting order criteria	1
	Opiate ordered PRN for agitation	1
	Benzodiazepine without alternate indication	1
Appropriate (n=21)	Opiate prior to noxious stimulus	6
	Opiate for pain with charted pain score	8
	Scheduled opiate	2
	Opiate in end-of-life care	3
	Opiate for increased respiratory rate per PRN instructions	1
	Antipsychotic for agitation	1

settings. These challenges may be further compounded by variability in PRN medication order structure and administration practices in ICU settings.

Order structure can impact medication administration practices in the ICU. In one 1994 study, 90% of drug orders for sedation, analgesia, and neuromuscular blockade were written as PRN, but 42% lacked clearly specified indications⁵. Although standardized protocols and electronic medical records have likely improved this issue, ambiguities in PRN medication administration still occur in modern ICU practice.

Prior studies have suggested that environmental and workflow-related factors may influence medication administration practices in ICU settings. In addition, patient-related factors such as underlying cognitive impairment or substance use history may influence treatment approaches^{6,7}. However, we did not observe clear differences in medication administration patterns based on timing of the CAM-ICU event, patient sex, race, history of dementia, or history of substance use disorder.

Interestingly, patients receiving inappropriate medications were younger on average than those receiving appropriate medications (61.1 versus 68.8 years). One possible explanation is that delirium may have been less readily suspected in younger patients despite positive CAM-ICU scores, potentially resulting in less consideration of delirium-related risks during medication administration.

This study has several limitations. First, this was a retrospective single-center study with a relatively small number of medication administration events, limiting statistical power and generalizability. Second, medication appropriateness was determined through chart review and depended on documentation within the electronic medical record, which may not fully reflect the clinical reasoning surrounding medication administration. In addition, the predefined one-hour evaluation window following the index positive CAM-ICU score may not have captured all pharmacologic

interventions related to delirium management. Finally, the observational nature of the study limits the ability to determine causality between patient or environmental factors and medication administration practices.

More research is needed to improve differentiation between delirium and other causes of agitation in critically ill patients, including pain-related agitation. Although scoring systems such as CAM-ICU, CPOT, and RASS have standardized approaches to assessment and treatment, limitations remain that may complicate clinical decision-making regarding appropriate pharmacologic management.

5. References

1. Devlin JW, Skrobik Y, Gélinas C, et al. Clinical Practice Guidelines for the Prevention and Management of Pain, Agitation/Sedation, Delirium, Immobility, and Sleep Disruption in Adult Patients in the ICU. *Crit Care Med*. 2018;46(9):e825-e873.
2. Sessler CN, Gosnell MS, Grap MJ, et al. The Richmond Agitation-Sedation Scale: validity and reliability in adult intensive care unit patients. *Am J Respir Crit Care Med*. 2002;166(10):1338-1344.
3. Gélinas C, Arbour C, Michaud C, Vaillant F, Desjardins S. Implementation of the critical-care pain observation tool on pain assessment/management nursing practices in an intensive care unit with nonverbal critically ill adults: a before and after study. *Int J Nurs Stud*. 2011;48(12):1495-1504.
4. Khan BA, Perkins AJ, Gao S, et al. The Confusion Assessment Method for the ICU-7 Delirium Severity Scale: A Novel Delirium Severity Instrument for Use in the ICU. *Crit Care Med*. 2017;45(5):851-857.
5. Dasta JF, Fuhrman TM, McCandles C. Patterns of prescribing and administering drugs for agitation and pain in patients in a surgical intensive care unit. *Crit Care Med*. 1994;22(6):974-980.

6. Steel TL, Bhatraju EP, Hills-Dunlap K. Critical care for patients with substance use disorders. *Curr Opin Crit Care*. 2023;29(5):484-492.
7. Marcantonio ER. Delirium in Hospitalized Older Adults. *N Engl J Med*. 2017;377(15):1456-1466.

