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Racial, Ethnic, and Age-Related Disparities in Sedation and Restraint Use for Older Adults in the Emergency Department

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ABSTRACT

Objectives: *Older adults may present to the emergency department (ED) with agitation, a symptom often resulting in chemical sedation and physical restraint use which carry significant risks and side effects for the geriatric population. To date, limited literature describes the patterns of differential restraint use in this population.* ***Design, setting, participants, and measurements:*** *This retrospective cross-sectional study used electronic health records data from ED visits by older adults (age ≥65 years) ranging 2015–2022 across nine hospital sites in a regional hospital network. Logistic regression models were estimated to determine the association between patient-level characteristics and the primary outcomes of chemical sedation and physical restraint.* ***Results:*** *Among 872,587 ED visits during the study period, 11,875 (1.4%) and 32,658 (3.7%) encounters involved the use of chemical sedation and physical restraints respectively. The populations aged 75-84, 85-94, 95+ years had increasingly higher odds of chemical sedation [adjusted odds ratios (AORs) 1.35 (95% CI 1.29–1.42); 1.82 (1.73–1.91); 2.35 (2.15–2.57)*

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respectively] as well as physical restraint compared to the 65-74 group [AOR 1.31 (1.27−1.34); 1.55 (1.50−1.60); 1.69 (1.59−1.79)]. Compared to the White Non-Hispanic group, the Black Non-Hispanic and Hispanic/Latinx groups had significantly higher odds of chemical sedation [AOR 1.26 (1.18−1.35); AOR 1.22 (1.15−1.29)] and physical restraint [AOR 1.12 (95% CI 1.07−1.16); 1.22 (1.18−1.26)]. ***Conclusion:*** *Approximately one in 20 ED visits among older adults resulted in chemical sedation or physical restraint use. Minoritized group status was associated with increasing use of chemical sedation and physical restraint, particularly among the oldest old. These results may indicate the need for further research in agitation management for historically marginalized populations in older adults.* (Am J Geriatr Psychiatry 2024; ■■:■■−■■)

Highlights

- **What is the primary question addressed by this study?**
  What are the patterns of chemical sedation and physical restraint use in the geriatric population in emergency department settings?
- **What is the main finding of this study?**
  This retrospective, cross-sectional study found that there is an increased odds of chemical sedation and physical restraint use with increasing older age as well as Black race and Hispanic/Latinx ethnicity.
- **What is the meaning of the finding?**
  Within the geriatric population, older adults and those from historically marginalized backgrounds may be more vulnerable to sedation and restraint use in the emergency settings, which may make these already high-risk populations even more susceptible to worse health outcomes.

INTRODUCTION

In the United States (US), adults aged 65 and older comprise 17% of the total population, with the proportion of older adults continuing to increase annually.[1] One quarter of older adults are members of racially and ethnically minoritized groups,[2] and by 2040, the non-Hispanic White population aged 65 and older is projected to increase by only 29% compared to 115% for racially and ethnically minoritized populations.[2] In an aging and increasingly racially diverse U. S, nearly 20% of all emergency department (ED) visits are made by older adults, with utilization highest among Black individuals, and higher among White individuals compared to Hispanic individuals.[3,4] Owing in part to medical comorbidities and behavioral disturbances related to neurodegenerative diseases, older adults may present to the ED with agitation, a symptom with the potential to result in chemical sedation and physical restraint use.[5,6] Older adults are at significantly higher risk of complications and side effects associated with their use, such as precipitation of delirium, aspiration, arrhythmia, hypotension, thrombosis, musculoskeletal injury, and psychological harm.[7-10] Despite these heightened risks among older adults, there are limited studies which explore differential restraint use in this population.

There is mounting evidence that both chemical sedation and physical restraints in the ED setting are applied inequitably in the U.S. In children and adults, for example, Black individuals, males, and individuals with lower socioeconomic status are at greatest risk to undergo both chemical sedation and physical restraint in the emergency setting.[11−15] Healthcare clinicians are found to be more inclined to chemically and physically restrain Black individuals at higher rates than their White counterparts in long-term care settings, but there are currently few studies investigating restraint inequities in older adults[16] in other healthcare contexts.[17,18] Although recent literature

evaluating the use of chemical sedation and physical restraint in the ED have included the older adult population, there has been limited data regarding potential disparities or differential application in their use within the geriatric cohort.[19–22]

These restraint inequities may be rooted in structural forms of ageism, racism, and discrimination against people living with mental illness that perpetuate adverse health outcomes for such minoritized groups.[23] This can be materialized at the systems level through differential access to resources for mental health as well as the interpersonal level between clinician and patient via mechanisms of prejudgement, bias, and stereotypes resulting in differential medical treatment.[24] Clinicians may consciously or unconsciously make a decision to restrain a patient based on the individual's age, race, or mental illness status. That said, even adjusting for many underlying factors contributing to these disparities at the individual level such as patient lifestyle risk factors[25] and clinical morbidities, there are still notable gaps in care for these minoritized groups. Addressing the structural health determinants will help contextualize the unequal distribution of adverse medical events.

Given the intersectional vulnerability of older adults from racially and ethnically minoritized groups, there is a need to elucidate demographic characteristics associated with disparate ED restraint use within this population. Age is often overlooked in intersectionality research.[26] Treating such characteristics as separate identities fails to capture the interplay of age and race and ethnicity and the potential for increased discrimination for these minoritized groups. It is important to adopt an intersectional approach of age and race and ethnicity to provide insight into unequal aging and health inequalities across the life course.

The objective of this study was to explore the characteristics of older adults presenting to the ED that are associated with chemical sedation and physical restraint use. We hypothesized that minoritized groups and those with mental health-related comorbidities would be at higher risk for receiving restraint measures during their ED visit.

METHODS

Study Design

This retrospective cross-sectional study used data from the electronic health record, with our inclusion criteria capturing all ED visits ranging from January 1, 2015 to December 31, 2022 across nine hospital sites for patients aged 65 and older in a regional New England hospital network. The network included two nonacademic urban, two academic urban, and five nonacademic suburban sites. We attempted to reduce bias by including EDs in multiple hospital types (i.e., academic, community, urban, rural) and by including all adult ED visits with complete data. The study followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.[27] The Yale University Institutional Review Board approved this study and waived the need for informed consent.

Main Outcomes and Covariates

The two primary outcomes of interest included the presence of chemical sedation and the presence of physical restraint. We defined chemical sedation as the presence of an intramuscular sedative order in a patient's electronic health record during an ED visit inclusive of the following commonly used medications for sedation in emergency settings as defined in previous literature: antipsychotics (haloperidol, droperidol, olanzapine), benzodiazepines (lorazepam, midazolam), ketamine, and diphenhydramine.[28,29] Similar to prior research on use of medications during management of agitation,[29] our study considered any treatment with intramuscular medication as chemical sedation given that oral and intravenous routes would be challenging and potentially dangerous during symptoms of acute agitation. Physical restraint was defined as the presence of an order for violent physical restraints, indicated for management of behavior that jeopardized the immediate physical safety of the patient, staff, or others as defined by Joint Commission standards.[30]

Covariates incorporated within the logistic regression models included ED length of stay, sex, race and ethnicity, chief complaint, visit diagnoses, and documented history of psychiatric and/or substance use diagnoses. We retrieved demographic and visit data directly from health records of the encounter. The primary exposure of interest was age, which was categorized using 10-year increments that are consistent with existing literature: 65–74, 75–84, 85–95, 95+.[31] Race and ethnicity were categorized as Black, Hispanic or Latino, White, Asian, Alaskan/Pacific

Islander (including American Indian or Alaska Native, Native Hawaiian or Other Pacific Islander), Other (including multiracial and other race or ethnicity), and unknown as per prior published work.[29] Classifications may represent self-identification or assignment by hospital registration. The ED length of stay was a binary variable categorized as greater than 8 hours or less than or equal to 8 hours as a marker for elevated risk of boarding and predictor of requiring inpatient admission.[32] We grouped ED chief complaints and categorized them as medical, psychiatric, substance use-related, neurological/cognitive, or agitation-related based on previous methodologies.[33] We grouped relevant past psychiatric, substance use, and/or behavioral diagnoses according to the Agency for Healthcare Research and Quality Clinical Classification Software.[34]

Statistical Analysis

Descriptive statistics were used to summarize patient demographics, frequencies of each measure from the electronic health record data, and frequencies of sedation and restraint use. All analyses were conducted using R studio (Version 4.2.2).

We used separate generalized linear multivariable mixed models with a binary logistic link to evaluate associations between visit-level characteristics and the primary outcomes of chemical sedation and physical restraint use respectively. We chose to analyze the primary outcomes in separate models given that the decision-making processes for use of chemical sedation and physical restraint were clinically distinct.[35–37] We attempted to address bias by nesting our models by patient, adjusting our multivariable regressions for possible confounding variables. We assessed for collinearity within the fully adjusted models and ensured that the variance inflation factors were less than 1.5. All statistical tests were two-tailed and P-values < 0.05 were considered significant. All analyses which nested the data were completed using the Geepack package.

RESULTS

There were 872,587 ED visits during the study period. This included 11,875 (1.4%) encounters using intramuscular chemical sedation (Table 1) and 32,658 (3.7%) encounters using physical restraints (Table 2). Of the encounters using chemical sedation, 53.5% were female, 29.8% were 85−94, 5.6% were age 95+, 13.1 % were Black and 9.1% Hispanic/Latinx, 27.9% were in the ED for over 8 hours, and 66.2% had previous psychiatric and/or substance use history. Of the encounters containing physical restraints, 52.2 % were male, 27.9% were 85−94, 4.4% were age 95+, 13.3% were Black and 8.1% Hispanic/Latinx, 49.4% had previous psychiatric and/or substance use history.

Regression Model for Chemical Sedation

Within a fully adjusted model for chemical sedation (Table 3), we found a significant association between sedation and age (p <0.001). Visits including 75−84, 85−94, 95+ age groups had increasingly higher odds of chemical sedation compared to the 65-74 group (AOR 1.35 [95% CI {1.29−1.42}; 1.82 {1.73 −1.91}; 2.35 {2.15−2.57}]). Those with an ED length of stay of greater than 8 hours had a significantly higher odds (AOR of 1.60 [1.53-1.67]) compared to those who were in the ED for less than 8 hours. Males had significantly higher odds of experiencing sedation than females (AOR 1.26 [1.21-1.31]). Black Non-Hispanic and Hispanic/Latinx groups had significantly higher odds of sedation compared to the White Non-Hispanic group (AOR 1.26 [1.18-1.35]; 1.22 [1.15-1.29]). The Other Non-Hispanic group had a significant AOR of sedation compared to the White Non-Hispanic group as well (1.29 [1.08-1.55]). Visits with agitation, substance use, cognitive or neurologic, and psychiatric complaints had significantly higher adjusted odds of sedation compared to visits without those complaints (AOR 11.48 [10.49-12.57], 3.90 [3.64-4.18], 2.00 [1.91-2.09], and 3.90 [3.64-4.18] respectively). Visits with medical complaints had a significantly decreased odds of sedation compared to those without (AOR of 0.45 [0.43-0.47]). Visits with histories of psychiatric and/or substance use diagnoses had higher odds of chemical sedation (AOR 2.78, [2.50-3.09]) compared with those without the diagnoses.

Regression Model for Physical Restraint

The fully adjusted model for physical restraint (Table 4) showed significant association between physical restraint and age as well (p <0.001). The

TABLE 1. Demographic and Clinical Characteristics of Emergency Department Visits by Presence of Chemical Sedation in the Geriatric Population, 2015–2022

Demographic and Visit Characteristics n = 872,587 visits	Chemical Sedation Counts (%)[a]	
	No 860,712 (98.6)	Yes 11,875 (1.4)
Emergency Department Length of Stay		
≤ 8 hours	692,728 (80.5)	8,562 (72.1)
> 8 hours	167,984 (19.5)	3,313 (27.9)
Sex		
Female	491,053 (57.1)	6,351 (53.5)
Male	369,659 (42.9)	5,524 (46.5)
Race/Ethnicity		
API[b] Non-Hispanic	2,037 (0.2)	13 (0.1)
Asian Non-Hispanic	9,461 (1.1)	80 (0.7)
Black Non-Hispanic	104,047 (12.1)	1,555 (13.1)
Hispanic/Latinx	73,868 (8.6)	1,085 (9.1)
Other[c] Non-Hispanic	8,980 (1.0)	128 (1.1)
Unknown/Refused	6,588 (0.8)	61 (0.5)
White Non-Hispanic	655,731 (76.2)	8,953 (75.4)
Age		
65-74	362,995 (42.2)	3,890 (32.8)
75-84	282,486 (32.8)	3,780 (31.8)
85-94	188,107 (21.9)	3,544 (29.8)
95+	27,124 (3.2)	661 (5.6)
Medical Chief Complaint[d]		
No	183,914 (21.4)	6,400 (53.9)
Yes	676,798 (78.6)	5,475 (46.1)
Agitation Chief Complaint		
No	858,188 (99.7)	10,917 (91.9)
Yes	2,524 (0.3)	958 (8.1)
Cognitive/Neurologic Chief Complaint[d]		
No	754,605 (87.7)	8,262 (69.6)
Yes	106,107 (12.3)	3,613 (30.4)
Psychiatric Chief Complaint		
No	846,376 (98.3)	10,553 (88.9)
Yes	14,336 (1.7)	1,322 (11.1)
Substance Use Chief Complaint		
No	853,737 (99.2)	11,420 (96.2)
Yes	6,975 (0.8)	455 (3.8)
Previous Substance Use/Psychiatric History[e]		
No	520,527 (60.5)	4,012 (33.8)
Yes	340,185 (39.5)	7,863 (66.2)

[a] Percentages may not add to 100% due to rounding.
[b] The "API" group includes "American Indian or Alaska Native", "Native Hawaiian", "Native Hawaiian or Other Pacific Islander", and "Other Pacific Islander."
[c] The "other" group includes "Other/Not Listed" and "Other."
[d] Primary chief complaints were grouped into five categories in accordance with prior work regarding agitation in the ED.[3]
[e] We mapped diagnoses to the AHRQ Clinical Classification System and manually grouped psychiatric and substance use diagnoses.

75–84, 85–94, 95+ age groups had increasingly higher odds of physical restraint compared to the 65-74 group (AOR 1.31 [95% CI 1.27–1.34]; 1.55 [1.50–1.60]; 1.69 [1.59–1.79]). Visits with ED length of stay of greater than 8 hours had a significantly higher odds of restraint compared to those less than 8 hours of stay (AOR 1.35 [1.32–1.39]). Males had significantly higher odds of experiencing physical restraint than females (AOR 1.58 [1.55–1.62]). Hispanic/Latinx, Black Non-Hispanic, Asian Non-Hispanic, and Other Non-Hispanic patients had significantly higher odds of physical restraint compared to the White Non-Hispanic group (AOR 1.12 [95% CI 1.07–1.16]; 1.22 [1.18–1.26]; 1.19 [1.07–1.33]; 1.17 [1.05-1.30]). The API Non-Hispanic group had significantly lower odds of physical restraint compared to the White Non-Hispanic group (AOR 0.62 [0.45-0.85]). Visits with agitation and cognitive/neurological chief complaints had significantly higher odds of physical restraints compared to those without (AOR 3.57

TABLE 2. Demographic and Clinical Characteristics of Emergency Department Visits by Presence of Physical Restraint in the Geriatric Population, 2015-2022

Demographic and Visit Characteristics	Physical Restraint Counts (%)[a]	
n = 872,587 visits	**No** ***839,929 (96.3)***	**Yes** **32,658 (3.7)**
Emergency Department Length of Stay		
≤ 8 hours	676,550 (80.5)	24,740 (75.8)
> 8 hours	163,379 (19.5)	7,918 (24.2)
Sex		
Female	481,793 (57.4)	15,611 (47.8)
Male	358,136 (42.6)	17,047 (52.2)
Race/Ethnicity		
API[b] Non-Hispanic	2,011 (0.2)	39 (0.1)
Asian Non-Hispanic	9,187 (1.1)	354 (1.1)
Black Non-Hispanic	101,246 (12.1)	4,356 (13.3)
Hispanic/Latinx	72,297 (8.6)	2,656 (8.1)
Other[c] Non-Hispanic	8,750 (1.0)	358 (1.1)
Unknown/Refused	6,445 (0.8)	204 (0.6)
White Non-Hispanic	639,993 (76.2)	24,691 (75.6)
Age		
65-74	355,985 (42.4)	10,900 (33.4)
75-84	275,053 (32.7)	11,213 (34.3)
85-94	182,534 (21.7)	9,117 (27.9)
95+	26,357 (3.1)	1,428 (4.4)
Medical Chief Complaint[d]		
No	176,548 (21.0)	13,766 (42.2)
Yes	663,381 (79.0)	18,892 (57.8)
Agitation Chief Complaint		
No	837,106 (99.7)	31,999 (98.0)
Yes	2,823 (0.3)	659 (2.0)
Cognitive/Neurologic Chief Complaint		
No	740,705 (88.2)	22,162 (67.9)
Yes	99,224 (11.8)	10,496 (32.1)
Psychiatric Chief Complaint		
No	825,090 (98.2)	31,839 (97.5)
Yes	14,839 (1.8)	819 (2.5)
Substance Use Chief Complaint		
No	832,895 (99.2)	32,262 (98.8)
Yes	7,034 (0.8)	396 (1.2)
Previous Substance Use/Psychiatric History[e]		
No	508,023 (60.5)	16,516 (50.6)
Yes	331,906 (39.5)	16,142 (49.4)

[a] Percentages may not add to 100% due to rounding.
[b] The "API" group includes "American Indian or Alaska Native", "Native Hawaiian", "Native Hawaiian or Other Pacific Islander", and "Other Pacific Islander."
[c] The "other" group includes "Other/Not Listed" and "Other."
[d] Primary chief complaints were grouped into five categories in accordance with prior work regarding agitation in the ED.[3]
[e] We mapped diagnoses to the AHRQ Clinical Classification System and manually grouped psychiatric and substance use diagnoses.

[3.25-3.91]; 2.50 [2.44-2.57]). Visits with medical complaints had significantly lower odds of restraint compared to those without medical complaints (AOR 0.58 [0.57-0.60]). Substance use and psychiatric visit complaints were not significantly associated with physical restraint. Visits containing patient histories of psychiatric and/or substance use diagnoses had significantly higher odds of violent restraint (AOR 1.41 [1.38-1.44]) compared with those with no such diagnoses.

DISCUSSION

To our knowledge, this is the first study to investigate both chemical sedation and physical restraint

TABLE 3. Multivariable Logistic Regression Analyses for Associations between Demographic and Visit Characteristics and Chemical Sedation Use for Older Adults in the Emergency Department

Demographic and Visit Characteristics	Nested Unadjusted Odds Ratios		Nested Adjusted Odds Ratios[a]	
n = 872,587 visits	Odds Ratio (95% CI)	p-value	Odds Ratio (95% CI)	p-value
Emergency Department Length of Stay				
≤8 hours	Ref.	Ref.	Ref.	Ref.
>8 hours	1.60 (1.53, 1.66)	***	1.60 (1.53, 1.67)	***
Sex				
Female	Ref.	Ref.	Ref.	Ref.
Male	1.16 (1.11, 1.20)	***	1.26 (1.21, 1.31)	***
Race/Ethnicity				
API[b] Non-Hispanic	0.47 (0.27, 0.81)	***	0.62 (0.36, 1.08)	0.09
Asian Non-Hispanic	0.62 (0.50, 0.77)	***	0.90 (0.72, 1.13)	0.37
Black Non-Hispanic	1.09 (1.04, 1.16)	***	1.22 (1.15, 1.29)	***
Hispanic/Latinx	1.08 (1.01, 1.15)	***	1.26 (1.18, 1.35)	***
Other[c] Non-Hispanic	1.04 (0.88, 1.24)	0.62	1.29 (1.08, 1.55)	***
Unknown/Refused	0.68 (0.53, 0.87)	***	0.85 (0.66, 1.10)	0.21
White Non-Hispanic	Ref.	Ref.	Ref.	Ref.
Age				
65-74	Ref.	Ref.	Ref.	Ref.
75-84	1.25 (1.19, 1.31)	***	1.35 (1.29, 1.42)	***
85-94	1.76 (1.68, 1.84)	***	1.82 (1.73, 1.91)	***
95+	2.27 (2.09, 2.47)	***	2.35 (2.15, 2.57)	***
Medical Chief Complaint[d]				
No	Ref.	Ref.	Ref.	Ref.
Yes	0.23 (0.22, 0.24)	***	0.45 (0.43, 0.47)	***
Agitation Chief Complaint				
No	Ref.	Ref.	Ref.	Ref.
Yes	29.84 (27.63, 32.22)	***	11.48 (10.49, 12.57)	***
Cognitive/Neurologic Chief Complaint				
No	Ref.	Ref.	Ref.	Ref.
Yes	3.11 (2.99, 3.24)	***	2.00 (1.91, 2.09)	***
Psychiatric Chief Complaint				
No	Ref.	Ref.	Ref.	Ref.
Yes	7.40 (6.97, 7.85)	***	3.90 (3.64, 4.18)	***
Substance Use Chief Complaint				
No	Ref.	Ref.	Ref.	Ref.
Yes	4.88 (4.43, 5.37)	***	2.78 (2.50, 3.09)	***
Previous Substance Use/Psychiatric History[e]				
No	Ref.	Ref.	Ref.	Ref.
Yes	3.00 (2.89, 3.12)	***	2.34 (2.25, 2.43)	***

[a] *** refers to P value of <0.05 which was considered statistically significant.

[b] The "API" group includes "American Indian or Alaska Native", "Native Hawaiian", "Native Hawaiian or Other Pacific Islander", and "Other Pacific Islander."

[c] The "other" group includes "Other/Not Listed" and "Other."

[d] Primary chief complaints were grouped into five categories in accordance with prior work regarding agitation in the ED.[3]

[e] We mapped diagnoses to the AHRQ Clinical Classification System and manually grouped psychiatric and substance use diagnoses.

use in older ED patients. In our analysis, approximately one in 20 ED visits among older adults resulted in use of chemical sedation or physical restraint. We found that greater age, Black race, and Hispanic/Latinx ethnicity were associated with chemical sedation and/or physical restraint use. Other predictors of sedation and/or restraint use included ED length of stay over 8 hours, male sex, previous psychiatric history, and visits related to agitation or cognitive/neurologic complaint.

Our findings indicate a positive association between increasing older age and chemical sedation use. This is in contrast to a previous analysis of older adult ED encounters using National Hospital Ambulatory Medical Care Survey data from 2014 to 2017 which found that administration of sedatives was negatively associated with older age but that administration of antipsychotics was not.[19] However, the previous analysis focused on geriatric-related conditions and explicitly excluded visits related to substance use

TABLE 4. Multivariable Logistic Regression Analyses for Associations between Demographic and Visit Characteristics and Physical Restraint Use for Older Adults in the Emergency Department

Demographic and Visit Characteristics n = 872,587 visits	Nested Unadjusted Odds Ratios		Nested Adjusted Odds Ratios[a]	
	Odds Ratio (95% CI)	p-value	Odds Ratio (95% CI)	p-value
Emergency Department Length of Stay				
≤ 8 hours	Ref.	Ref.	Ref.	Ref.
> 8 hours	1.33 (1.29, 1.36)	***	1.35 (1.32, 1.39)	***
Sex				
Female	Ref.	Ref.	Ref.	Ref.
Male	1.47 (1.44, 1.50)	***	1.58 (1.55, 1.62)	***
Race/ethnicity				
API[b] Non-Hispanic	0.50 (0.37, 0.69)	***	0.62 (0.45, 0.85)	***
Asian Non-Hispanic	1.00 (0.90, 1.11)	0.98	1.19 (1.07, 1.33)	***
Black Non-Hispanic	1.12 (1.08, 1.15)	***	1.22 (1.18, 1.26)	***
Hispanic/Latinx	0.95 (0.91, 0.99)	***	1.12 (1.07, 1.16)	***
Other[c] Non-Hispanic	1.06 (0.95, 1.18)	0.28	1.17 (1.05, 1.30)	***
Unknown/Refused	0.82 (0.71, 0.94)	***	0.95 (0.83, 1.10)	0.53
White Non-Hispanic	Ref.	Ref.	Ref.	Ref.
Age				
65-74	Ref.	Ref.	Ref.	Ref.
75-84	1.33 (1.30, 1.37)	***	1.31 (1.27, 1.34)	***
85-94	1.63 (1.59, 1.68)	***	1.55 (1.50, 1.60)	***
95+	1.77 (1.67, 1.87)	***	1.69 (1.59, 1.79)	***
Medical Chief Complaint[d]				
No	Ref.	Ref.	Ref.	Ref.
Yes	0.37 (0.36, 0.37)	***	0.58 (0.57, 0.60)	***
Agitation Chief Complaint				
No	Ref.	Ref.	Ref.	Ref.
Yes	6.11 (5.61, 6.65)	***	3.57 (3.25, 3.91)	***
Cognitive/Neurologic Chief Complaint				
No	Ref.	Ref.	Ref.	Ref.
Yes	3.54 (3.45, 3.62)	***	2.50 (2.44, 2.57)	***
Psychiatric Chief Complaint				
No	Ref.	Ref.	Ref.	Ref.
Yes	1.43 (1.33, 1.54)	***	1.06 (0.98, 1.14)	0.16
Substance Use Chief Complaint				
No	Ref.	Ref.	Ref.	Ref.
Yes	1.45 (1.31, 1.61)	***	1.05 (0.94, 1.16)	0.4
Previous Substance Use/Psychiatric History[e]				
No	Ref.	Ref.	Ref.	Ref.
Yes	1.50 (1.46, 1.53)	***	1.41 (1.38, 1.44)	***

[a] *** refers to P value of <0.05 which was considered statistically significant.
[b] The "API" group includes "American Indian or Alaska Native", "Native Hawaiian", "Native Hawaiian or Other Pacific Islander", and "Other Pacific Islander."
[c] The "other" group includes "Other/Not Listed" and "Other."
[d] Primary chief complaints were grouped into five categories in accordance with prior work regarding agitation in the ED.[3]
[e] We mapped diagnoses to the AHRQ Clinical Classification System and manually grouped psychiatric and substance use diagnoses.

or withdrawal or psychiatric complaints,[19] which are demonstrated risk factors for chemical sedation in the pediatric and general adult populations.[12,38] The frequency with which medications were administered for agitation may be concerning given that side effect profiles of chemical sedatives (e.g., anticholinergic properties, arrhythmia, apnea, hypotension) are heightened as a patient's age increases due to increasing frailty and risks of polypharmacy.[39,40] In addition, previous work identified high rates of treatment failure among agitated older adults receiving chemical sedation for agitation in the ED, further raising the risk for adverse effects or need for repeat dosing or compound effects from administration of multiple sedatives.[20]

We also identified a positive association between increasing older age and physical restraint use. To date, most studies assessing physical restraint risk factors in older adults have occurred in long-term care facilities and inpatient settings.[41,42] While a recent cross-sectional study found that older age was associated with heightened physical restraint in the

ED, the authors dichotomized age as 50 years and older and did not assess differential risk within the older age group.[43] Our findings suggest, however, that even amongst older adults, increasing age is a unique risk factor for physical restraint use. Possible explanations for increased restraint use in older adults include increased rates of delirium or neuropsychiatric manifestations of dementia in older individuals leading to ED evaluation.[5] Behavioral or psychiatric symptoms of dementia, such as agitation, aggression, hallucinations, and wandering behaviors occur in approximately 90% of persons living with dementia.[44,45] As prevalence and severity of dementia increase with age with the highest rates in older and oldest old ED patients, agitation and aggressive behaviors associated with dementia also rise,[46] likely contributing to our finding that older age is associated with higher rates of restraint use. Furthermore, older age and dementia are also associated with delirium.[47,48] Approximately 10% of delirium in the ED is hyperactive delirium,[49] leading to use of physical restraints and posing a further risk for worsening delirium.[50]

Increased length of stay has been associated with incident delirium in the ED for older adults,[51] consistent with the finding from our analysis that increased length of stay was associated with restraint use. Previous work has found that older ED patients with behavioral health complaints had prolonged lengths of stay, with involuntary status and chemical or physical restraint and significant predictors.[52] Those patients with longer lengths of stay were at increased risk of adverse events. This finding is particularly pertinent given the growing boarding crisis[53,54] which may lead to higher lengths of stay and elevated risk for older adults awaiting definitive care in the ED.[55] Unfortunately, the ED is associated with an uncomfortable, unfamiliar, and disorienting environment, heightening risks of delirium and worsening agitation through noise pollution, increased disruptions, and limited interactions with family members or caregivers.[56]

Another notable outcome of our analysis is that Black race and Hispanic/Latinx ethnicity were associated with both chemical sedation and physical restraint use in the older adult population. A growing body of literature has found that among pediatric and adult patients in the ED setting, health care personnel are more likely to both chemically sedate or physically restrain Black individuals,[11–13,38] likely owing to structural factors, such as decreased access to outpatient care and criminalization of race and mental illness.[57–59] Although similar patterns have been found in older adults, these have been restricted to long-term care settings.[17,18] Individuals who have decreased access to outpatient care are more likely to experience worsening symptoms and resort to emergency care services in the ED.[60] At this stage of mental health crisis, patients are more likely to be agitated and later restrained.[61] The inequitable treatment of patients based on age, race, and mental illness are fundamentally rooted in structural ageism, racism, and discrimination against people living with mental illness, all of which should be investigated and scientifically explored. The recent observational study using National Hospital Ambulatory Medical Care Survey data did not find differences in chemical sedation or antipsychotic use in older patients by race.[19] However, these data excluded individuals with a history of psychiatric complaints or substance use.[19]

There have also been documented differences in restraint use among Hispanic/Latinx individuals. A meta-analysis of six studies found that Hispanic/Latinx adults were at less risk of physical restraint use compared to White non-Hispanics[14] and a similar pattern was found in adults patients undergoing chemical sedation in an ED setting.[15] However, Hispanic/Latinx individuals have commonly been racially misclassified and statistical handling of ethnicity in studies has been heterogenous.[14] Indeed, individuals with Other racial categorization in our analysis and others had greater risk for physical and chemical restraint.[15,38] This "Other Non-Hispanic" group includes individuals who are classified as multiracial. Behavioral invalidation and identity invalidation, which serve as dimensions of racial discrimination, may influence this group's mental health outcomes.[62] They face unique stressors that may contribute to poorer health outcomes which may lead to agitation at the ED.

Moreover, in medical inpatients with delirium, those with a non-English preferred language may be more likely to be physically or chemically restrained compared to patients who preferred English.[63,64] This inequity is particularly concerning given that among older Hispanic/Latinx adults less than 50% are self-identified proficient English speakers.[64] Verbal de-escalation and re-direction are considered first line for

management of nonsevere agitation associated with delirium, dementia and other neuropsychiatric conditions.[65] When there is language discordance between the patient and clinicians, verbal de-escalation may not be attempted or may not be successful, potentially resulting in higher use of restraints. Limited English proficiency, a social determinant of health, is the basis of medical care communication between patient and clinician. Lack of communication may contribute to higher restraints if patients are unable to communicate their needs and clinicians are unable to meet them, leading to worsening of patient agitation.[66] Additionally, limited English proficiency may pose a challenge in accessing mental health care services and understanding health information.[67] Literacy is another social determinant of health that may adversely affect health due to difficulty of individuals understanding and following medical directions.[68] Other social determinants of mental health include economic stability and healthcare access and quality.[69] In the United States, Hispanic individuals have the highest uninsured rates compared to all other racial groups.[70] Compared to Non-Hispanic Whites, Hispanics are 24% less likely to have private health insurance. Not being able to afford private types of insurance may potentially result in differential treatment by healthcare personnel and systems.[71]

In our analysis, male sex, psychiatric/substance use history, and visits for agitation and cognitive/neurologic complaints were positively associated with chemical sedation and physical restraint use. Although Kennedy et al. identified an association between female sex and chemical sedation in a population of older adults evaluated in the ED, this was not the case for antipsychotic use.[19] Moreover, both chemical sedation and physical restraint use have generally been associated with male sex in adult populations.[15,38] The association of psychiatric illness and visits for agitation and cognitive/neurologic complaints with restraint use highlights the intersectional vulnerability of older adults with medical and psychiatric morbidity.

Collectively, our results highlight the need to further investigate the unique risk factors for restraint use in older adults with a particular focus on mechanisms by which racial and structural inequities may be perpetuated. Future studies should prioritize investigating predictive models, as well as safe prevention and treatment strategies for older adults with agitation in the ED.[72] It is also critical for these findings to help inform future clinical care practice improvement. Emergency care is complex, and clinicians are expected to care for critically ill patients with immediate action.[73] Structured curricula and training can help clinicians gauge the need for restraint use with more conscious attention to potential structural biases[74] in the context of emergency psychiatric care, especially for the geriatric population.

Our study has several limitations. First, the study was based on electronic health record data, which may be susceptible to inaccurate or incomplete information.[75] Race and ethnicity may be prone to misclassification in electronic health record data sets but represented the best means of data capture. Specifically, data limitations include classifying all Black people as "Black Non-Hispanic" which may not an accurate representation of ethnicity within Black people. As electronic health record data do not currently capture this, future studies should aim to implement valid ethnic distinctions of Black people residing in the US. Given the cross-sectional nature of the study, it is not possible to determine the reason or appropriateness of restraint order and to make casual claims. For patients with severe agitation, sedation and restraints may be necessary to ensure safety of patient and/or others. Use of intramuscular medications to identify chemical sedation may result in under-identification of antipsychotic and sedative use in this population. This was done to maintain standardization within the existing literature. Given lack of reliable indicators for dementia status in our dataset, we were unable to include presence of dementia as a predictor for use of sedation or restraints. Another limitation is that hospital type was not included as a confounder in our statistical model. It is possible that urban sites experience a more diverse patient population which can contribute to increased restraints. The generalizability of the analysis may be further limited given the regional focus of the study. In light of increasing evidence regarding social determinants and health disparities, we believe that our findings are of broad relevance to other health care institutions and systems.

In conclusion, our cross-sectional analysis of older adults receiving treatment in the ED found that those with Black Race, Hispanic/Latinx ethnicity, and with oldest age had increased risk of chemical sedation

and physical restraint use in the ED. These results suggest that those representing historically marginalized populations and at highest risk for complications and adverse effects may be exposed the most to chemical sedation or physical restraint use when seeking emergency care. Given the growing and increasingly diverse older adult population in the US, further research in ED agitation detection and management should prioritize studying the intersections of characteristics within vulnerable geriatric populations and promote patient-centered approaches for de-escalation and safety.

AUTHOR CONTRIBUTION

Conception or design of the work: PJ, CJG, AHW; Data acquisition: PJ, LR, DS, AHW; Data analysis, or interpretation: PJ, CJG, LR, MB, DS, AK, IVF, EC, AHW. All authors were involved in drafting the work or revising it for important intellectual content, approved the final version to be published and agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

DISCLAIMER

The contents are solely the responsibility of the authors and do not necessarily represent the official views of Yale School of Medicine, Duke University School of Medicine, New York University, Harvard Medical School, the Indian Health Service, or National Institutes of Health.

ROLE OF THE SPONSOR

National Institute of Mental Health, the National Institute on Minority Health and Health Disparities, and the National Institutes of Health-National Institute on Aging had no substantive involvement in any aspect of the study including the design and conduct of the study; collection, management, analysis, and interpretation of the data; and preparation of the manuscript. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

PRESENTATION

Results from this study were presented at the 2023 Society for Academic Emergency Medicine Annual Meeting May 16 - 19, 2023 in Austin, TX.

The contents are solely the responsibility of the authors and do not necessarily represent the official views of Yale School of Medicine, Duke University School of Medicine, Harvard Medical School, New York University, the Indian Health Service, Veteran's Health Administration, or National Institutes of Health. Funders/Sponsors did not participate in the work.

DATA STATEMENT

See the section above on "presentation" - we presented at the SAEM annual meeting.

DISCLOSURES

No conflicts of interest were reported by the authors of this paper.

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