Physical Restraint Use in Adult Patients Presenting to a General Emergency Department

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Study objective: The prevalence of agitation among emergency department (ED) patients is increasing. Physical restraints are routinely used to prevent self-harm and to protect staff, but are associated with serious safety risks. To date, characterization of physical restraint use in the emergency setting has been limited. We thus aim to describe restraint patterns in the general ED to guide future investigation in the management of behavioral disorders.

Methods: We conducted a cross-sectional study of adult patients presenting to 5 adult EDs within a large regional health system for 2013 to 2015, and with a physical restraint order during their visit. We undertook descriptive analyses and cluster analysis to determine unique meaningful groups within our sample.

Results: In 956,153 total ED visits, 4,661 patients (0.5%) had associated restraint orders, representing 3,739 unique patients. The median age was 47 years (interquartile range 32 to 59 years), 66.7% of patients were men, 61.9% had a psychiatric history, and 91.1% arrived by ambulance. For chief complaints, 33.7% were alcohol or drug use, 45.4% medical, 12.3% psychiatric, and 8.5% trauma. Cluster analysis identified 2 distinct cohorts. A younger, predominantly male population presented with alcohol or drug use, whereas an older group arrived with medical complaints.

Conclusion: Our data found strong association of alcohol or drug use with physical restraints and identified a unique elderly population with behavioral disturbances in the ED. Further characterization of causal links and safer practices to manage agitation for these vulnerable populations are needed. [Ann Emerg Med. 2019;73:183-192.]

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INTRODUCTION

Background and Importance

Behavioral emergencies presenting to the emergency department (ED) are rapidly increasing in the United States, with national estimates of a 50% increase in number of ED visits for behavioral disorders between 2006 and 2011 compared with only 8.6% increase in overall visits.[1] Agitation often occurs during these patient encounters, with 1.7 million events occurring annually in emergency settings alone.[2] Staff must use multiple techniques, including de-escalation and agitation reduction techniques, as well as coercive measures consisting of physical restraints and administration of appropriate sedatives when necessary.[3]

Treatment of these agitation episodes, however, can lead to significant harm for patients. Although physical restraints are commonly used in the ED, serious adverse events have been cited in the restraint process, including blunt chest trauma, aspiration, respiratory depression, and asphyxiation leading to cardiac arrest.[4,5] In addition, a survey of ED patients found that 66% reported experiencing severe psychological distress and lasting consequences in regard to care-seeking behavior after physical restraint.[6] Because of increasing awareness of associated complications and threats to patient safety for a highly vulnerable population, The Joint Commission (TJC) and Centers for Medicare & Medicaid Services have adopted conditions that regulate the use of restraints in US hospitals.[7]

Efforts to reduce these serious complications have recently led to calls for use of validated agitation scales and algorithms to help clinicians determine when restraint is most appropriate.[6] Despite these recommendations, there remains a lack of standardization for specific thresholds to initiate restraint placement in the ED, causing substantial variability in practice among providers and institutions.[8,9] In part, this lack of consensus and standardization has been attributed to limited knowledge of the general characteristics, risk factors, and practices of restraint use specific to the emergency setting, in which the acuity of

Editor's Capsule Summary

What is already known on this topic

Agitated patients are a safety issue for themselves and emergency department staff.

What question this study addressed

The authors quantified the use of restraints in a large regional health system, identifying specific patient populations for whom they were most used.

What this study adds to our knowledge

Most but not all restraints were used for psychiatric patients. Younger patients had an alcohol or drug history, whereas older patients were more likely to have an underlying medical cause for agitation.

How this is relevant to clinical practice

This study provides a cross-sectional snapshot of patients who require physical restraint. Such knowledge may help guide proactive, less restrictive means of ensuring safety for agitated patients.

agitation may be higher and nature of patient presentations may be more varied.[10-12] Such information would serve to further delineate practice patterns and highlight areas requiring additional research and evaluation.

Goals of This Investigation

Our study aims to describe physical restraint use in a large hospital network containing multiple EDs with diverse populations and geographic locations. We undertook descriptive analyses of patient, visit, and restraint characteristics and cluster analysis of restraint use patterns to determine unique populations within our cohort. We believe that a detailed characterization of ED physical restraint use will aid in the investigation of better strategies to manage agitation while maintaining staff and patient safety in the emergency setting.

MATERIALS AND METHODS

Study Design and Setting

We conducted a cross-sectional study of consecutive patients presenting to any of 5 adult EDs within a large tertiary care health system based in New England between January 1, 2013, and December 31, 2015. The 5 EDs represented a spectrum of distinct municipalities, locations, and patient types, encompassing a geographic area of approximately 650 square miles. These included a tertiary care academic site, 3 community-based sites in different locations but serving similar demographic regions, and one large urban site. The entire system has a total of 2,130 inpatient hospital beds and an average total annual ED volume of approximately 300,000 patients.

Any visit for a patient aged 18 years or older in which a physical restraint order was placed in the electronic health record during the patient's stay in any of the 5 EDs was included for the purposes of our study. Any restraint orders placed outside the ED setting were excluded. We obtained institutional review board approval from the Human Investigations Committee as a medical record review.

Data Collection and Processing and Methods of Measurement

To identify potential risk factors for restraint to include in our analyses, we first conducted a comprehensive literature review limited to English-language articles, using combinations and variations of the search terms "restraint," "agitation," "violence," "workplace violence," "behavioral," and "emergency department" on the Cumulative Index of Nursing and Allied Health, Ovid/MEDLINE, and PsycINFO databases. A total of 387 articles resulted between 1985 and 2016. Two independent reviewers (A.H.W. and a medical librarian) performed manual reviews of titles and abstracts. Of the 34 articles found to be relevant to restraint use, 4 explicitly examined specific variables for restraint use. Figure 1 summarizes these variables elicited by our literature search. The 4 studies were focused on the psychiatric[13-15] and elderly ED patient subsets,[16,17] and there were no articles that identified variables for a more general ED population. We extracted these factors from the systemwide electronic health record. All EDs were part of a single health care system and use a single electronic health record vendor, Epic (Verona, WI), with a centralized data warehouse (Clarity). We imported all data elements for each ED visit from this data warehouse directly into statistical software for analysis, and the study author responsible for the abstraction process (R.A.T.) was blinded to individual patient information throughout this process. Data were deidentified after initial database access, and only deidentified data were stored and used in the analysis process.

In accordance with similar strategies used in previous studies of physical restraint use,[13,17] we grouped comparable diagnoses together into 4 main classes: medical, alcohol or drug use, trauma, and psychiatric. Medications administered in the ED that were considered to be psychoactive consisted of antipsychotics, anxiolytics, and sedative-hypnotics, commonly used for chemical sedation and control of acute agitation in clinical practice and in the published literature.[18] Medications and comorbidities were grouped with the Anatomical Therapeutic Chemical classification system and

Patient demographics and history
- Demographics: sex, age, race/ethnicity[15,17,24,25]
- Language[15]
- Employment status[15]
- Type of health insurance[15,24,25]
- Psychiatric history[15]
- Homelessness[17,25]
- Drug use[15,25]
- Alcohol use[15,24]
- Total number of ED visits in the past year[15]

Visit characteristics
- Chief complaint[24]
- Psychoactive medications administered in ED[17,24]
- Mode of arrival[15,24]
- Initial vital signs[15]
- Time of day of presentation[24]

Restraint characteristics
- Type: locked, nonlocked, Posey (midabdomen strap), side rail, soma bed (canopy outfitting over stretcher)[17,25]
- Point: 2 vs 4
- Reason for restraint use: aggressive/violent/combative, danger to self/others, intubation or life-preserving equipment protection, unwilling/unable to follow commands[17]

Clinical outcomes
- Length of time in restraints[17]
- Length of ED stay[17]
- Disposition (admission, elopement, discharge, left against medical advice, psychiatric observation[26])[15,17,24]

Figure 1. Variables relevant to physical restraint use in the ED.

Clinical Classification Software categories.[19,20] We categorized race or ethnicity into 3 groups: black, white, and other or unknown. Health insurance status also consisted of 5 categories: uninsured or self-pay, Medicare, Medicaid, other payment source, and commercially insured. We categorized time of day of presentation to the EDs as day (7 AM to 3 PM), evening (3 PM to 11 PM), and night (11 PM to 7 AM). We categorized mode of arrival at the ED into ambulance or emergency transport, private vehicle, or walk-in. Homelessness status had a consistent unique identifier in the electronic health record when patients notified the registration clerk that they lacked a permanent address. Details in regard to the characteristics of the physical restraint were also extrapolated per electronic order, including the type, 2- versus 4-point restraint, reason for use, and length of time in restraints. For simplicity in data presentation, we displayed the results of the community sites as one combined cohort. All 3 community EDs were situated in similar suburban locations and served comparable demographics of patients and illnesses.

Primary Data Analysis

We summarized categorical data with frequencies and proportions, with 95% confidence intervals. Continuous data were summarized with means with SDs or medians with interquartile ranges (IQRs) where appropriate. For bivariable analyses, we used the χ^2 or Fisher's exact test for categorical data and the Mann-Whitney *U* test for continuous variables that were nonnormally distributed.

For the cohort as a whole, we examined whether there were subgroups, or clusters, of patients with similar attributes by cluster analysis.[21] We restricted the number of variables used in cluster analysis to demographic, visit, vital signs, and arrival information. The number of clusters was determined with a combination of algorithms (eg, Frey, McClain, cindex, silhouette, and Dunn methods) included in the NbClust R package (The R Core Team, Vienna, Austria).[22] The distance, or dissimilarity between patients, was calculated as the Gower distance, which allows interval, ordinal, and nominal (categorical) variables.[23] Partitioning around medoids was chosen as the clustering technique, is more robust to noise and outliers compared with k means, and has the added benefit of having an observation serve as the exemplar for each cluster.[24] We used t-distributed stochastic neighbor embedding for 2-dimensional visualization of the clusters.[25] All analyses were conducted in R statistical software (version 3.4.3; R Foundation for Statistical Computing, Vienna, Austria).

RESULTS

A total of 956,153 ED visits occurred within the study period, with 4,661 visits (0.5%) having associated physical restraint orders for 3,739 unique patients. Within the cohort of visits with restraint use, median patient age was 47 years (IQR 32 to 59 years), 66.7% were men, 26.8% were black, and 54.2% were white (Table 1); 47.5% of patients were unemployed and 45.0% had Medicaid insurance. In regard to patient history, 27.7% reported history of drug use, 40.9% reported history of alcohol use, 5.9% reported homelessness, and 61.9% reported history of psychiatric illness (Figure 2). For chief complaints, 33.7% were related to alcohol or drug use, 45.4% were medical, 12.3% were psychiatric, and 8.5% were trauma (Figure 3). Of all visits, 48.0% resulted in admission and 48.3% resulted in discharge (Figure 4). Most patients arrived by ambulance (91.1%). Patients presented in

Table 1. Sample patient demographics by individual physical restraint order.

Characteristics	Total Sample, n=4,661 (%)	Urban Site, n=502 (%)	Community Sites, n=537 (%)	Academic Site, n=3,622 (%)
Patient demographics	4,661 (100)	502 (100)	537 (100)	3,622 (100)
Age, median (IQR), y	47 (32–59)	49 (33–67)	51 (37–62)	46 (32–58)
Sex				
Male	3,107 (66.7)	317 (63.1)	317 (59.0)	2,473 (68.3)
Female	2,554 (33.3)	185 (36.9)	220 (41.0)	1,149 (31.7)
Race/ethnicity				
Black	1,248 (26.8)	125 (24.9)	167 (31.1)	956 (26.4)
White	2,527 (54.2)	256 (51.0)	287 (53.4)	1,984 (54.8)
Other/unknown	886 (19.1)	121 (24.1)	83 (15.5)	682 (18.7)
Language=non-English	359 (7.7)	38 (7.6)	36 (6.7)	285 (7.9)
Employment status				
Disabled	727 (15.6)	63 (12.5)	111 (20.7)	553 (15.3)
Not employed	2,213 (47.5)	216 (43.0)	227 (42.3)	1,770 (48.9)
Retired	862 (18.5)	139 (27.7)	104 (19.4)	619 (17.1)
Employed (including part time, self)	684 (14.8)	69 (13.8)	74 (13.8)	541 (14.9)
Student	128 (2.8)	7 (1.4)	17 (3.2)	104 (2.9)
Unknown	46 (1.0)	8 (1.6)	4 (0.7)	34 (0.9)
Insurance status				
Commercial	841 (18.0)	123 (24.5)	99 (18.4)	619 (17.1)
Medicaid	2,099 (45.0)	209 (41.6)	239 (44.5)	1,651 (45.6)
Medicare	1,077 (23.1)	108 (21.5)	156 (29.1)	813 (22.4)
Other	560 (12.0)	48 (9.6)	35 (6.5)	477 (13.2)
Self-pay	84 (1.8)	14 (2.8)	8 (1.5)	62 (1.7)
Previous visits, median (IQR)	1 (0–5)	0 (0–2)	3 (0–8)	1 (0–5)

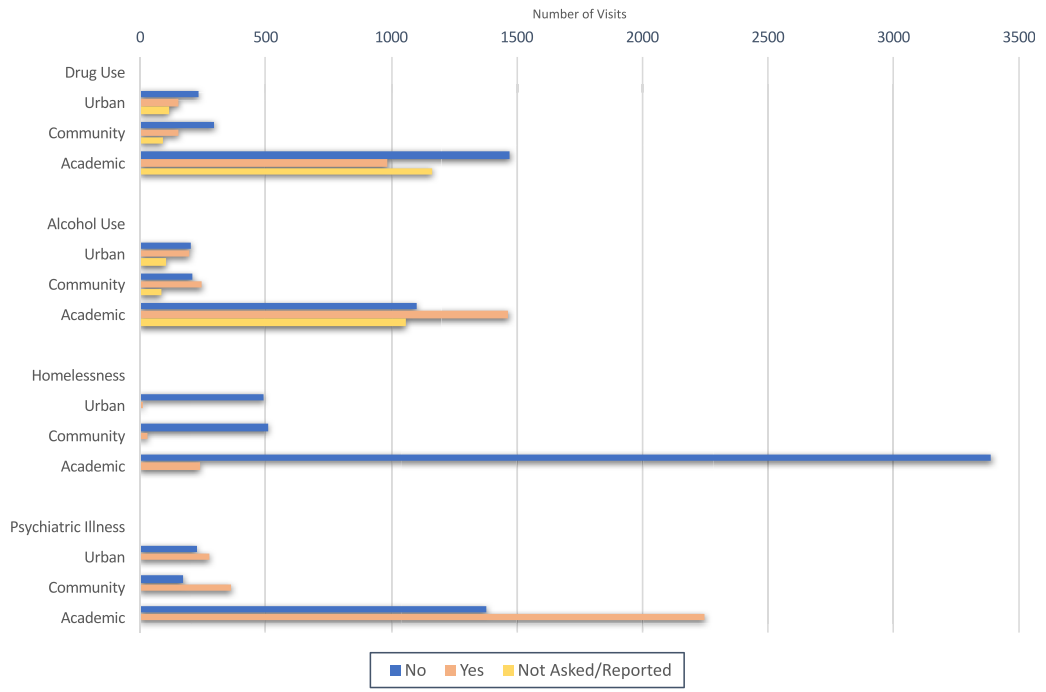

Figure 2. Patient history.

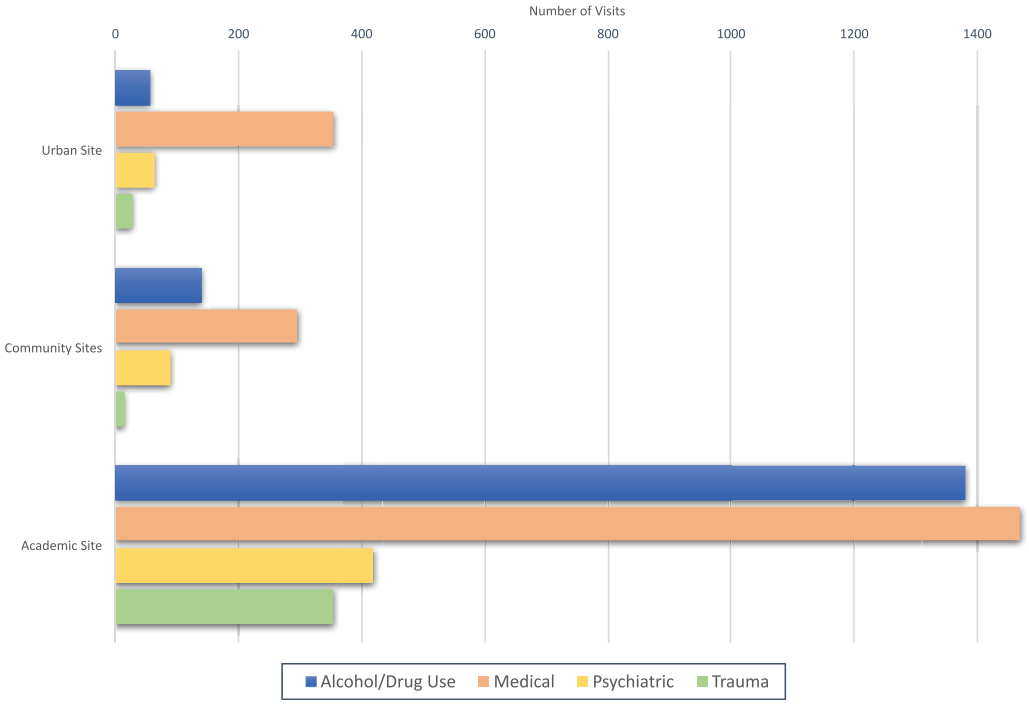

Figure 3. Chief complaint.

52.7% of visits during the evening shift, 29.1% during the day, and 18.2% at night. Patients on average had normal initial vital signs, with median pulse of 90 beats/min (IQR 73 to 105 beats/min) and median blood pressure of 116/71 mm Hg (systolic IQR 106 to 128 mm Hg; diastolic IQR 62 to 81 mm Hg). For patients with restraint orders, 44.6% had associated anxiolytics ordered in the same visit, 39.6% had antipsychotics ordered, and 11.4% had

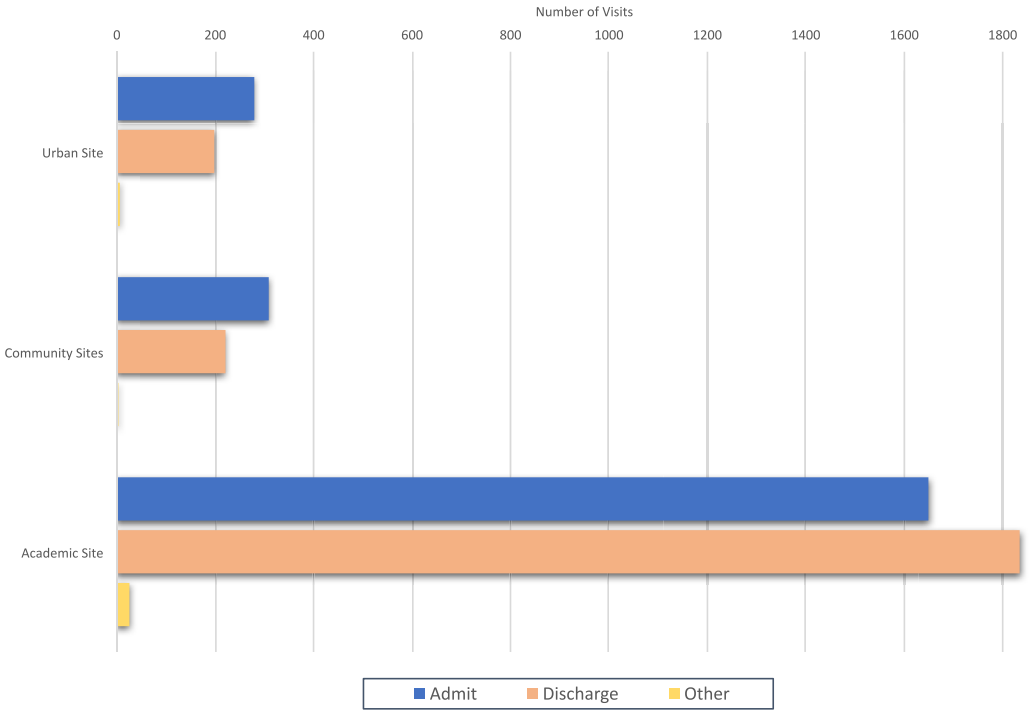

Figure 4. Disposition.

sedatives-hypnotics ordered. Of the restraints, 51.9% were 4 point and 38.8% were 2 point. Of restrained patients, 60.6% were restrained because of danger to self or others, and 28.1% were unwilling or unable to follow commands. Median length of stay was 439 minutes (IQR 292 to 679 minutes) and median restraint length of time was 237 minutes (IQR 99 to 268 minutes) (Table 2).

Our cohort differentiated into 2 significantly different clusters of physical restraints (Table 3), with cluster 1 containing 2,905 orders (67%) and cluster 2 containing

Table 2. Additional variables by individual physical restraint order.

	Total Sample, n=4,661 (%)	Urban Site, n=502 (%)	Community Sites, n=537 (%)	Academic Site, n=3,622 (%)
Visit characteristic				
Arrival type				
Ambulance	4,246 (91.1)	450 (89.6)	437 (81.4)	3,359 (92.7)
Car	261 (5.6)	51 (10.2)	31 (5.8)	179 (4.9)
Walk-in	154 (3.3)	1 (0.2)	69 (12.8)	84 (2.3)
Arrival time				
Day (7 AM–3 PM)	1,357 (29.1)	139 (27.7)	177 (33.0)	1,041 (28.7)
Evening (3 PM–11 pm)	2,458 (52.7)	245 (48.8)	268 (50.0)	1,945 (53.7)
Night (11 PM–7 AM)	846 (18.2)	118 (23.5)	92 (17.1)	636 (17.6)
Vital signs				
Pulse, median (IQR), beats/min	90 (73–105)	100 (75–106)	93 (81–108)	89 (73–104)
Respiratory rate, median (IQR), breaths/min	16 (16–18)	18 (16–18)	16 (16–22)	16 (16–18)
Pulse, median (IQR), %	98 (95–100)	98 (95–100)	97 (95–100)	97 (95–100)
Temperature, median (IQR), °F, °C	98 (97–98), 37 (36-37)	98 (97–98), 37 (37-37)	98 (98–99), 37 (36-37)	98 (97–98), 37 (36-37)
Systolic blood pressure, median (IQR), mm Hg	116 (106–128)	117 (106–127)	115 (106–127)	116 (107–129)
Diastolic blood pressure, median (IQR), mm Hg	71 (62–81)	67 (59–77)	69 (61–79)	72 (63–82)
Medications given				
Anxiolytics	2,081 (44.6)	289 (57.6)	378 (70.3)	1,414 (39.0)
Antipsychotics	1,839 (39.5)	242 (48.2)	342 (63.7)	1,255 (34.6)
Hypnotics/sedatives	530 (11.4)	80 (15.9)	47 (8.8)	403 (11.1)
Restraint characteristic				
Physical restraint type				
Locked	2,433 (53.8)	90 (19.3)	260 (48.4)	2,083 (58.7)
Nonlocked	1,984 (43.9)	364 (78.1)	244 (45.4)	1,376 (38.8)
Posey	76 (1.7)	0	2 (0.4)	74 (2.1)
Side rail	11 (0.2)	0	1 (0.2)	10 (0.3)
Soma	15 (0.3)	12 (2.6)	0	3 (0.1)
Restraint points, No.				
2	1,809 (38.8)	149 (32.1)	144 (26.8)	1,516 (43.4)
4	2,417 (51.9)	204 (44.0)	335 (62.4)	1,878 (53.8)
Not recorded	336 (7.2)	149 (32.1)	58 (10.8)	129 (3.6)
Restraint reason				
Aggressive, violent, combative	124 (2.7)	26 (5.2)	13 (2.4)	85 (2.3)
Danger to self/others	2,823 (60.6)	210 (41.8)	351 (65.4)	2,262 (62.5)
Intubation or life-preserving equipment protection	109 (2.3)	1 (0.2)	6 (1.1)	102 (2.8)
Unwilling/unable to follow commands	1,310 (28.1)	165 (32.9)	121 (22.5)	1,024 (28.3)
Other	295 (6.3)	100 (19.9)	46 (8.6)	149 (4.1)
Clinical outcomes				
ED length of stay, median (IQR), min	439 (292–679)	472 (293–742)	482 (308–802)	428 (290–649)
Restraint length of time, median (IQR), min	237 (99–268)	239 (119–1,216)	239 (102–651)	225 (98–239)

Table 3. Cluster analysis of restraint orders.

Characteristics	Cluster: Patient Subgroups 1	2
n	2,905	1,428
Patient demographics and history		
Age, median (IQR), y	39 (30–50)	64 (50–79)
Male sex (%)	2,038 (70.2)	852 (59.7)
Race/ethnicity (%)		
Black	864 (29.7)	286 (20.0)
Other	610 (21.0)	220 (15.4)
White	1,431 (49.3)	922 (64.6)
Insurance status (%)		
Commercial	413 (14.2)	363 (25.4)
Medicaid	1,751 (60.3)	203 (14.2)
Medicare	296 (10.2)	706 (49.4)
Other	400 (13.8)	119 (8.3)
Self-pay	45 (1.5)	37 (2.6)
Homelessness		
Yes	246 (8.5)	13 (0.9)
No	2,659 (91.5)	1,415 (99.1)
History of psychiatric illness (%)	2,164 (74.5)	542 (38.0)
Arrival type (%)		
Ambulance	2,637 (90.8)	1,305 (91.4)
Car	150 (5.2)	95 (6.7)
Walk-in	118 (4.1)	28 (2.0)
Chief complaint (%)		
Alcohol/illicit use	1,437 (49.5)	48 (3.4)
Medical	781 (26.9)	1,138 (79.7)
Psychiatric	475 (16.4)	73 (5.1)
Trauma	212 (7.3)	169 (11.8)
Arrival time (%)		
Day	556 (19.1)	702 (49.2)
Evening	1,860 (64.0)	437 (30.6)
Night	489 (16.8)	289 (20.2)
Restraint characteristics		
Restraint reason		
Aggressive, violent, combative	96 (3.3)	24 (1.7)
Danger to self/others	2,368 (81.5)	276 (19.3)
Intubation or life-preserving equipment protection	25 (0.9)	71 (5.0)
Unwilling/unable to follow commands	293 (10.1)	907 (63.5)
Other	123 (4.2)	150 (10.5)
Restraint points, No.		
2	867 (29.8)	805 (56.4)
4	1,902 (65.5)	357 (25.0)
Not recorded	136 (4.7)	166 (18.6)

1,428 orders (33%). Cluster 1 compared with cluster 2 had a significantly younger median age (39 years, IQR 30 to 50; versus 64 years, IQR 50 to 79), higher rate of male sex (70.2% versus 59.7%), and higher representation of black (29.7% versus 20.0%) and other race or ethnicities (21.0% versus 15.4%). Cluster 1 most frequently had Medicaid insurance (60.3%), whereas cluster 2 most frequently had Medicare insurance (49.4%), and the insurance patterns were significantly different between the 2 clusters. In addition, cluster 1 had significantly higher rates of homelessness compared with cluster 2 (8.5% versus 0.9%).

The 2 clusters had similar patterns of modes of arrival, with both most frequently arriving by ambulance (90.8% versus 91.4%). However, chief complaints were significantly different between the 2 clusters, with cluster 1 containing 49.5% alcohol or drug use, followed by 26.9% medical, 16.4% psychiatric, and 7.3% trauma. Cluster 2 was predominantly represented by 79.7% medical complaints, followed by 11.8% trauma, 5.1% psychiatric, and 3.4% alcohol or drug use. Cluster 1 arrived more in the evening shift (64.0%), whereas cluster 2 arrived more during the day shift (49.2%). Cluster 1 also had significantly higher rates of reported psychiatric illness compared with cluster 2 (74.5% versus 38.0%). For restraint characteristics, cluster 1 was predominantly restrained for danger to self or others (81.5%), whereas cluster 2 was restrained mostly for being unwilling or unable to follow commands (63.5%). Cluster 1 predominantly received 4-point restraints (65.5%) and cluster 2 most frequently received 2-point restraints (56.4%).

LIMITATIONS

Our study may be limited in its generalizability to other regions, especially in more rural areas. Because patient populations and clinical practice for behavioral emergencies are highly variable between institutions, municipalities, and states, our results may be subject to care delivery processes unique to our health system or geographic area. In addition, we recognize that the cross-sectional design of our study creates uncertainty in regard to the temporal implications for reported clinical variables related to restraint orders placed for our cohort. Lack of medical decisionmaking documentation justifying clinical outcomes may limit interpretation of our results. Categories created for chief complaints and chemical sedatives may lead to loss of information. Our study lacks randomization and comparisons with the larger general ED population who did not have physical restraint orders placed during their

visit, which limits our ability to make causal inferences from the study findings. Demographic data and social history were obtained from the clinical chart rather than from the patients directly and thus may be subject to missing data, documentation error, and reporting bias. Finally, because our primary interest was in the use of physical restraint in the ED, our data represented only a subset of the ED agitated patient population at large. Without capturing patients who were sedated but not restrained and those who successfully received de-escalation with noninvasive means, implications of our results for the management of ED agitation may be limited and require further investigation.

DISCUSSION

To our knowledge, our study is the first of its kind to describe characteristics of patients who received physical restraint placement for a general ED population across different sites and varied patient classes in a large hospital network system. We found that our cohort of restrained patients represented a wide spectrum of demographics and pathologies. Medical illness and alcohol or drug use served as the most frequent chief complaints. In addition, a cluster analysis identified 2 distinct cohorts based on our physical restraint orders. Cluster 1 was younger, was predominantly men, and had higher rates of psychiatric illness and homelessness. Alcohol or drug use and psychiatric issues were the most common chief complaints in this first cluster. Cluster 2 was significantly older, was less proportionally men, and had a smaller percentage with psychiatric illness and homelessness. Medical chief complaints dominated and patients arrived more during the day for this second cluster. Data about restraint patterns in the health care setting are severely limited,[26] and we hope that our results will shed light on physical restraint use in the emergency setting to help guide policy and research in safer management of ED agitation for both these vulnerable populations and the staff members caring for them.

Previous studies have characterized ED restraint placement within specific subsets of patients with the highest risk of receiving physical restraints, including the psychiatrically ill[13-15] and the elderly presenting with excited delirium,[16,17] or focusing on body sites and types of restraints used.[27] We identified only one previous study, from 2003, that examined restraint patterns for a broader general ED population.[12] Zun[12] described a prospective, observational cohort of 304 consecutive patients who were primarily black and restrained in a community, inner-city, teaching hospital ED during a 1-year period. Comparing our current results with this earlier study, we noted some commonalities and interesting contrasts. In terms of demographics, Zun[12] found similar male sex predominance but a younger mean age of 36.5 years (versus 47 years). In addition, there are notable differences in restrained patients' reasons for ED visits. We found medical illness as the most frequent chief complaint at 45.4%, followed by alcohol or drug use at 33.7%, psychiatric at 12.3%, and trauma at 8.5%. In contrast, Zun[12] reported 69.7% of visits as psychiatric, followed by medical illness at 21.3%, and only 7.4% with alcohol or drug intoxication. Although we had lower representation of psychiatric chief complaints, 61.9% of our entire sample reported a history of psychiatric illness. These differences may be due to a discrepancy in parameter definitions because 60.6% of our cohort was restrained for danger to self or others regardless of chief complaint. With 15 years spanning these 2 studies, there may also be regional differences in patient populations between them or longitudinal changes over time.

Within our cohort of restrained ED patients, we saw variability in use of chemical sedatives and types of restraints between the urban, academic, and community sites of our health network. Management of ED agitated patients often includes chemical sedation, as well as physical restraint placement. A national survey of EDs reported that 30% of sites used physical restraints alone, whereas another 30% used chemical sedation concurrently with physical restraints.[28] Details about concomitant use of sedation with physical restraints for individual patients were not provided. Although chemical sedation usually requires an immediate order from a physician or licensed independent practitioner, TJC standards on restraint and seclusion state that physical restraints may be applied as long as a provider evaluates the patient in person within 1 hour.[29] These situations suggest that some organizational factors associated with less chemical sedation may represent nursing decisions in the management of agitation. Further investigation through a wider analysis of the entire agitation care delivery system to examine the timing and team members involved in the restraint decision processes may offer a more complete representation of these potential mechanisms.

When placing a patient in physical restraints, clinical teams may consider a number of factors when choosing between 2- and 4-point options. TJC standards recommend using the least restrictive form of restraint possible, but also found that 2-point rather than 4-point restraints were a frequent source of failure in root-cause analyses of restraint-related deaths.[29] Patients presenting by ambulance with agitation often are likely to be in restraints before ED arrival, and may continue in physical restraints during the transition process in the ambulance bay, without direct oversight by a physician.[30] Thus, the individual

providers who placed the restraint order in the electronic health record for our cohort of patients may not necessarily have been driving the clinical decisions to use physical restraints in every instance. Specific factors that affect health worker choices for restraint type will need to be evaluated further. Various institutional protocols and state regulations currently exist in regard to the logistic requirements of physical restraint placement in the acute care setting. However, more evidence-based studies are required to determine best practices for placing physical restraints in the ED setting while maintaining patient and staff safety.

Finally, our cluster analysis identified 2 distinct cohorts based on our physical restraint orders. First, cluster 1 represented a younger, male group with higher rates of history of psychiatric illness (74.5%) and homelessness (8.5%). They presented for alcohol or drug use (49.5%) and psychiatric issues (26.9%) and arrived more often in the evening. Although it may seem intuitive that alcohol and drug use can precipitate agitation events when patients present to the ED and lead to a need for physical restraints, this causal effect has been suggested but not clearly established in the literature.[31] A national survey of emergency physicians reported that intoxicated patients were often cited as perpetrators of workplace violence in the ED.[32] Previous research has also shown that substance use comorbidity in psychiatric patients significantly increased ED visits and was associated with higher-acuity ED complaints.[33,34] A recent study using mixed methods of ED staff data corroborated this, with health workers reporting that alcohol and substance use were linked to agitation events and restraint use.[35] However, when staff members in that study specifically referenced a distinct population with alcohol or drug use, psychiatric illness, homelessness, and frequent ED visits, likely reflecting patients belonging to cluster 1 in this current study, they expressed strong feelings of frustration and resentment toward that population. These negative sentiments highlight a potential pitfall for implicit bias and stigmatization by ED health workers of an already marginalized population because of their underlying health conditions.[36,37] Further research with direct observations of agitation events in the clinical environment may be needed to characterize the causal effects of alcohol and substance use chief complaints that lead to physical restraints in the ED, including staff, environmental, and logistic factors during the visit.

On the other hand, cluster 2 was older, with an average age of 64 years and less proportionally men, with higher rates of Medicare insurance and a lower percentage with psychiatric illness (38%) and homelessness (0.9%). Medical chief complaints dominated (79.7%) and patients arrived more during the day. Cluster 2 was restrained primarily for being unwilling or unable to follow commands. The older, medically ill second cluster of restrained patients poses unique challenges to care provision. Although behavioral health–related ED visits by older adults are increasing, limited evidence exists about safe practices to managing agitation for this vulnerable population in the ED. Two previous retrospective studies of elderly ED patients with behavioral emergencies reported significant rates of cognitive impairment and multiple comorbidities that may be affected by sedation and restraint use.[16,17] Both cohorts had high levels of acuity, with admission rates of 72.7% and 100%, and the latter cohort included 32% of patients who were admitted to the ICU. These results indicate that a distinct approach is needed to manage agitation for the population represented in cluster 2 because medically complex and elderly patients may be at significantly higher risk of restraint-use complications from physical trauma, rhabdomyolysis, aspiration, and respiratory depression.[4,6]

In conclusion, to our knowledge we conducted the first cross-sectional study of physical restraint use in a large hospital network containing 5 EDs with diverse populations and geographic locations. Our results highlight a need for better characterization of alcohol and drug use presentations and causes during visits that lead to restraint use in the ED. In addition, targeted strategies for safe practices may be needed to manage agitation for a medically ill elderly population in the emergency setting.

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