Race and Ethnicity and the Utilization of Security Responses in a Hospital Setting

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BACKGROUND: Security emergency responses (SERs) are utilized by hospitals to ensure the safety of patients and staff but can cause unintended morbidity. The presence of racial and ethnic inequities in SER utilization has not been clearly elucidated.

OBJECTIVE: To determine whether Black and Hispanic patients experience higher rates of SER and physical restraints in a non-psychiatric inpatient setting.

DESIGN: Retrospective cohort study.

PARTICIPANTS: All patients discharged from September 2018 through December 2019.

EXPOSURE: Race and ethnicity, as reported by patients at time of registration.

MAIN OUTCOMES: The primary outcome was whether a SER was called on a patient. The secondary outcome was the incidence of physical restraints among patients who experienced a SER.

KEY RESULTS: Among 24,212 patients, 18,755 (77.5%) patients identified as white, 2,346 (9.7%) as Black, and 2,425 (10.0%) identified with another race. Among all patients, 1,827 (7.6%) identified as Hispanic and 21,554 (89.0%) as non-Hispanic. Sixty-six (2.8%) Black patients had a SER activated during their first admission, compared to 295 (1.6%) white patients. In a Firth logit multivariable model, Black patients had higher adjusted odds of a SER than white patients (adjusted odds ratio (aOR) 1.37 [95% confidence interval: 1.02, 1.81], $p = 0.037$). Hispanic patients did not have higher odds of having a SER called than non-Hispanic patients. In a Poisson multivariable model among patients who had a SER called, race and ethnicity were not found to be significant predictors of restraint.

CONCLUSION: Black patients had higher odds of a SER compared to white patients. No significant differences were found between Hispanic and non-Hispanic patients. Future efforts should focus on assessing the generalizability of these findings, the underlying mechanisms driving these inequities, and effective interventions to address them.

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INTRODUCTION

Security emergency responses (SERs), or instances where security personnel are summoned to respond to an emergent patient situation, are commonly activated in hospitals to maintain the safety of both healthcare workers and patients.[1] SERs may range from minimal intervention by security personnel to the use of physical restraints or involuntary administration of medications.[1] Literature suggests that the use of physical restraints occurs in up to one-fifth of inpatients on psychiatric units.[2–4] It is associated with multiple adverse outcomes, including death, serious injury, falls, and increased agitation in the general patient population[5,6] and specifically among the elderly and patients living with a disability.[7] Additionally, patients report increased stress and perceived coercion[8,9] from being restrained.

The United States (US) healthcare system, like all systems in the US, is affected by structural racism that drives and perpetuates health inequities. Structural racism is defined by the National Institutes of Health as the set of macro-level conditions that limit opportunities, resources, power, and well-being of individuals and populations based on race/ethnicity.[10] Enforcement of safety in the US generally takes the form of policing, with Black, American Indian, and Alaskan Native men and women being more likely than white men and women to be killed by police.[9] Latino men are also more likely to be killed by police than white men.[11] Less is known regarding racial inequities in the use of police and security within the healthcare system. Recent studies in the emergency department setting demonstrate that Black patients, including children, are more likely to be restrained compared to white patients,[12–14] and a 2004 study of inpatient

psychiatric patients demonstrated that Asian and Black racial groups were more likely to have experienced forced seclusion, but not more likely to be restrained.[15] There is limited literature assessing inequities across race and ethnicity in the use of SERs and restraints in the non-psychiatric inpatient population to date. A 2018 study in a midwestern US hospital showed that Black patients were more likely to have "security standby requests" when being visited than white patients.[16] In this study, we aimed to determine whether Black and Hispanic patients experience higher rates of SER and physical restraints in a non-psychiatric inpatient setting.

METHODS

Patient Cohort

We performed a retrospective cohort study of patients who were discharged from Brigham and Women's Hospital (BWH), a 793-bed tertiary academic hospital in Boston, Massachusetts. We included all adult patients who were discharged between September 1, 2018, and December 31, 2019, from the primary inpatient facility which houses general medicine, medical and surgical intensive care units, oncology, surgical services, and neurology units. Cardiology, obstetrics, orthopedics, neurosurgery, and cardiac critical care units are not housed in this primary facility and were excluded due to lack of data on SERs. Of note, there is no inpatient psychiatric unit at BWH.

Outcomes, Predictors, and Covariates

The primary outcome of interest was occurrence of a SER, defined as the arrival of a security officer to the bedside of a patient at the request of staff. Any staff member of the hospital (nurse, physician, unit coordinator, patient care assistant, etc.) can activate a SER at our hospital by calling the hospital operator and requesting a SER activation when there is concern that the patient is a threat to themselves or to others. Typical triggers for a SER might include a patient using threatening language or physical gestures towards staff, actual physical violence towards staff, or perceived risk of a patient to themselves due to agitation. Once a SER is activated, security officers are called to the patient's bedside and attempt to de-escalate the situation. The medical team (nurse and responding physician) are paged as well. If de-escalation is unsuccessful, the physician may place an order for physical restraints or medications to ensure the safety of the patient and others.

We obtained and reviewed all security reports filed for patients discharged from our primary medical facility during the study period. Reports referencing only visitors, staff, or family members were excluded. A patient was considered to have a SER if one or more security reports were filed during the admission. Per hospital policy, a security report is generated every time a security officer is called to a patient's bedside. The secondary outcome was physical restraint of the patient during a SER. For the reports included in our analysis, one of the authors read the narrative description of the SER and coded it as "yes"/"no" for physical restraints. If a patient was noted to be held by either security or medical staff, the report was coded as "yes." Use of any devices (soft or hard restraints, etc.) was also coded as "yes." For patients admitted multiple times over this period, only the first admission was considered in this analysis as we could not statistically incorporate readmissions into longitudinal models due to the rarity of events.

We extracted information on the clinical characteristics of the admission from the medical record. The primary predictors of interest were race and ethnicity. Race and ethnicity information is typically entered in the medical record through patient self-identification when a patient is registered. "Unknown" was used to describe patients who either declined or were not asked about their racial and ethnic identification at the time of registration. Patients that did not identify as "Black" or "white" were described as "Other" for the purposes of this study, since the total number of patients in each other racial category was not large enough to adequately power individual analyses.

Covariates of interest included age, sex, substance use disorder diagnoses, mental health diagnoses, length of stay, and insurance status (Medicaid vs. other). Substance use disorder diagnoses and mental health diagnoses were extracted from the set of diagnoses billed during the patient's first admission during the study period based on pre-defined groups of international classification of diseases-10 codes for these two diagnostic groups (groups are available by emailing the corresponding author). Selection of these covariates was based on prior literature on factors known to influence security responses.[12]

Statistical Analysis

Patient characteristics were summarized, with categorical variables tabulated as frequencies. We used Pearson's chi-square test for categorical comparisons, the Wilcoxon rank-sum test to compare variables between two groups, and a Kruskal-Wallis test for multiple group comparisons. We used univariate and multivariable Firth logit models (penalized maximum likelihood estimation for rare events) to model SER and estimate the odds ratio. This method adjusts the maximum likelihood estimates to decrease bias in the regression parameters. Given the association of race and Medicaid insurance status in our population, we built models both with and without insurance status. For the secondary outcome of physical restraint, we performed a Poisson regression analysis of the number of times a patient was physically restrained over their first admission. The same covariates of interest were included in the model. *P*-values are 2-sided and considered significant if <0.05. Stata v. 17.0 (College Station, TX) was used for analysis with the Firthlogit and Firthfit packages.

RESULTS

During the study period, there were 24,212 unique patients discharged from the primary inpatient facility. Across all discharges, 18,755 (77.5%) patients were white, 2,346 (9.7%) Black, 2,425 (10.0%) identified with another race, and 686 (2.8%) had an unknown race (Table 1). Among all patients, 1,827 (7.6%) identified as Hispanic, 21,554 (89.0%) as non-Hispanic, and 831 (3.4%) had an unknown ethnicity. white patients were older with a median age of 65 years compared to 58 years for Black patients ($P < 0.001$ Black vs. white). A quarter of Black patients (25.4%) were enrolled in Medicaid compared to only 6.9% of white patients ($P < 0.001$). 19.3% of Black patients had a substance use disorder diagnosis compared to 11.5% of white patients ($P < 0.001$).

Overall, 423 patients experienced a SER during their first admission (Table 2). Sixty-six (2.8%) Black patients had a SER called on the during their first admission, compared to 295 (1.6%) white patients (odds ratio (OR) for Black vs. white 1.82 [95% CI 1.39, 2.39], $P < 0.01$) (Table 3). Forty (2.2%) Hispanic patients had an SER called compared to 355 (1.7%) non-Hispanic patients (OR 1.35 [95% CI 0.97, 1.88], P=0.073). In a multivariable model adjusting for ethnicity, age, sex, length of stay, mental health/substance use disorder diagnoses, and insurance status, Black patients had significantly higher adjusted odds of having a SER compared to white patients (adjusted odds ratio (aOR) without insurance status in the model 1.55 [95% CI 1.17, 2.05], $P = 0.002$; aOR with insurance status in the model 1.36 [CI 1.02, 1.81], $P = 0.037$). In both multivariable models, Hispanic patients did not have significantly different odds of having a SER than non-Hispanic patients. Patients with unknown ethnicity had significantly higher odds of a SER than non-Hispanic patients in both univariate and multivariable analyses.

Among the 423 patients who experienced a SER, 148 (34.9%) were physically restrained as during at least one of those SERs (Table 2). In univariate Poisson modeling among patients who had at least one SER, Black patients had lower incidence of restraint than white patients, but this did not reach the prespecified threshold for significance (incidence rate ratio (IRR) 0.57 [95% CI 0.31, 1.03], $P = 0.062$). In multivariable modeling, Black patients did not have a significantly different incidence rate than white patients (Table 4). Hispanic patients did not have a significantly different incidence rate ratio than non-Hispanic patients.

DISCUSSION

In our study to evaluate whether racial and ethnic disparities exist in SER for non-psychiatric inpatients, Black patients had higher odds than white patients of experiencing a SER in their first admission even after controlling for previously described predictors (aOR 1.36 [CI 1.02, 1.81], $P = 0.037$)). There was no significant association between Hispanic ethnicity and SER or physical restraint during a SER after adjusting for covariates. These findings suggest a nuanced and incompletely understood association between race, ethnicity, and utilization of security.

The finding of higher security utilization for Black patients is concordant with previous studies. Green et al. showed that Black patients in a midwestern US hospital were more likely to have a "security stand by request" when being visited than white patients, although they did not control for any confounders.[16] Schitzer et al. showed that Black patients had significantly higher odds of being physically restrained compared to white patients during an emergency department visit at another tertiary Boston hospital.[11] The authors were unable to construct a multivariable model with all relevant covariates

Table 1 Patient demographics

	Total	Black	white	Other Race	Unknown Race	*P* value
	N (%)	*N* (%)	*N* (%)	*N* (%)	*N* (%)	
Total, eligible pts.	24212 (100)	2346 (9.7)	18755 (77.5)	2425 (10.0)	686 (2.8)	
Age (years), median (range)	63 (16, 108)	58 (16, 108)	65 (16, 104)	55 (17, 104)	65(17, 98)	< 0.001
Ethnicity						
Hispanic	1827 (7.6)	124 (5.3)	361 (1.9)	1248 (51.5)	94 (13.7)	
Non-Hispanic	21554 (89.0)	2154 (91.8)	17856 (95.2)	1150 (47.4)	394 (57.4)	
Unknown	831 (3.4)	68 (2.9)	538 (2.9)	27 (1.1)	198 (28.7)	
Sex						
Female	12625 (52.1)	1353 (57.7)	9593 (51.2)	1343 (55.4)	336 (48.9)	< 0.001
Language						
English	21945 (90.6)	2141 (91.2)	17971 (95.8)	1377 (56.78)	456 (66.5)	< 0.001
Spanish	921 (3.8)	46 (2.0)	120 (0.6)	693 (28.6)	62 (9.0)	
Other	1336 (5.5)	159 (6.8)	663 (3.5)	355 (14.6)	159 (23.2)	
Unknown	10 (0)	0	1 (0)	0	9 (1.3)	
Insurance						
Medicaid	2598 (10.7)	596 (25.4)	1289 (6.9)	619 (25.5)	94 (13.7)	< 0.001
Medicare	11881 (49.1)	1065 (45.4)	9558 (50.9)	889 (36.7)	369 (53.8)	
Commercial	7837 (32.4)	495 (21.1)	6533 (34.8)	646 (26.6)	163 (23.8)	
Other	1896 (7.8)	190 (8.1)	1375 (7.3)	271 (11.2)	60 (8.8)	
Mental health diagnosis	4381 (18.1)	402 (17.1)	3426 (18.3)	424 (17.5)	129 (18.8)	0.44
Substance use disorder diagnosis	3019 (12.5)	454 (19.3)	2160 (11.5)	313 (12.9)	92 (13.4)	< 0.001

p value indicates a Kruskal-Wallis test for the continuous variable of age and a chi-square test for categorical variables between the groups shown

Table 2 Incidence of SER and physical restraints among study patients during their first admission by race and ethnicity

	Total patients	Patients with SER (% of total)	Patients with restraint (% of those with SER)
Race			
Black	2,346	66 (2.8)	17 (25.8)
white	18,755	295 (1.6)	113 (38.3)
Other	2,425	42 (1.7)	4 (9.5)
Unknown	686	20 (2.9)	14 (70.0)
Ethnicity			
Hispanic	1827	40 (2.2)	12 (30)
Non-Hispanic	21554	355 (1.7)	127 (35.6)
Unknown	831	28 (3.4)	9 (32.1)
Total	**24,212**	**423 (1.7%)**	**148 (34.9%)**

due to event rarity. Research by Wong et al. also demonstrated that Black patients at 3 New Haven emergency departments were more likely to have an order placed for a physical restraint after adjusting for sex, age, insurance status, alcohol use, discharge diagnosis, homelessness, chief concern, emergency severity index, arrival time, number of emergency department visits, and number of hospital admissions.[10] Overall, our findings of higher security utilization for Black patients in the hospital are concordant with known policing patterns outside the hospital setting. Our study expands upon this prior research by being one of the first studies examining SER occurrences in the non-psychiatric inpatient setting. Additionally, our study relied on written reports by security officers rather than orders placed in the electronic medical record, thus capturing more comprehensively the actual incidence of security responses and physical restraints. Lastly, our large sample size and statistical model choice allowed us to control for relevant covariates.

Our study methodology does not provide mechanistic insights into the reasons behind the inequities observed in SER activation. Based on prior research, we hypothesize there could be several mechanistic processes at play. First, cultural and language barriers between providers and patients of discordant race and ethnicity might lead to more frequent SER activations for Black patients. Other studies have shown that provider-patient race concordance influences cardiovascular medication adherence, and a similar mechanism might be occurring here as well.[17] We do not have data on the race and ethnicity of the hospital staff to test this hypothesis. Second, stigmatizing language in the patients' medical records during previous healthcare system interactions might bias providers negatively towards some patients. Previous studies have shown that stigmatizing language in the medical record is associated with inadequate management of patients' pain, [18] and prior documentation of patient behavior hypothetically could lead to increased perceptions of threat towards staff. Third, there could be unmeasured covariates accounting for the association shown, although this is unlikely to fully explain our findings given the degree of the effect size. Lastly, previous studies have demonstrated race and ethnicity implicit bias among healthcare professionals,[19,20] including greater association of negative connotations with Black faces compared to white faces among healthcare professionals.[15] Combining our findings with this literature, we hypothesize that a main driver of the inequity observed in our study may be healthcare provider implicit bias and racism, leading hospital employees to perceive Black patients as threatening and thus decide to activate a SER. Notably, the use of multivariable adjustment led to a decrease in the estimated impact of race and ethnicity on the odds of having a SER called. This is likely because Black patients in our study population were younger and more likely to be on Medicaid insurance than white patients, both factors that were associated with SER.

Our study did not show an association between Hispanic ethnicity and SER. This might be related to differential bias towards Hispanic versus Black patients or differential effect of unmeasured covariates on the two patient populations. It is also possible that the racial and ethnic composition of the staff of our hospital led to different interactions with Hispanic and Black patients. While both Black and Latino men are more likely than white men to be killed by police in the US, it is possible that such findings from the criminal justice setting do

Table 3 Univariate and multivariable Firth logit models for SER (n = 24,212)

	Univariate Firth logit* OR [95% CI]	*P*	Multivariable (1) Firth logit* OR [95% CI]	*P*	Multivariable (2) Firth Logit* OR [95% CI]	*P*
Race						
Black vs. white	1.82 [1.39, 2.39]	<0.001	1.55 [1.17, 2.05]	0.002	1.36 [1.02, 1.81]	0.037
Other vs. white	1.11 [0.81, 1.54]	0.51	0.92 [0.61, 1.39]	0.69	0.85 [0.56, 1.29]	0.45
Unknown vs. white	1.92 [1.22, 3.03]	0.005	1.41 [0.86, 2.33]	0.18	1.34 [0.81, 2.22]	0.25
Ethnicity						
Hispanic vs. non-Hispanic	1.35 [0.97, 1.88]	0.073	1.33 [0.88, 2.03]	0.18	1.20 [0.78, 1.83]	0.41
Unknown vs. non-Hispanic	2.12 [1.43, 3.12]	<0.001	1.73 [1.13, 2.65]	0.011	1.71 [1.12, 2.62]	0.014
Age	0.99 [0.98, 0.99]	<0.001	1.00 [0.99, 1.00]	0.26	1.00 [0.99, 1.01]	0.43
Sex M vs. F	2.52 [2.04, 3.10]	<0.001	2.25 [1.82, 2.79]	<0.001	2.24 [1.81, 2.78]	<0.001
Mental health Dx	1.76 [1.42, 2.18]	<0.001	1.56 [1.24, 1.95]	<0.001	1.51 [1.21, 1.90]	<0.001
Substance use Dx	5.92 [4.87, 7.20]	<0.001	4.86 [3.95, 5.97]	<0.001	4.28 [3.46, 5.30]	<0.001
Length of stay	1.03 [1.02, 1.04]	<0.001	1.03 [1.02, 1.03]	<0.001	1.03 [1.02, 1.03]	<0.001
Medicaid vs. other insurance	3.62 [2.93, 4.48]	<0.001			2.20 [1.70, 2.84]	<0.001

**Penalized logistic regression; OR odds ratio. Dx: diagnosis.*
Univariate and multivariable modeling for the association between race and ethnicity and SER. Model 1 incorporated listed covariates except Medicaid insurance status. Model 2 incorporated listed covariates including Medicaid insurance status

Table 4 Univariate and multivariable Poisson models for restraint usage (n = 423)

	Univariate Poisson IRR [95% CI]	*P*	Multivariable (1) Poisson IRR [95% CI]	*P*	Multivariable (2) Poisson IRR [95% CI]	*P*
Race						
Black vs. white	0.57 [0.31, 1.03]	0.062	0.64 [0.34, 1.19]	0.16	0.64 [0.34, 1.20]	0.17
Other vs. white	0.82 [0.42, 1.61]	0.56	1.29 [0.50, 3.33]	0.60	1.30 [0.50, 3.37]	0.59
Unknown vs. white	0.44 [0.15, 1.28]	0.13	0.44 [0.13, 1.48]	0.19	0.45 [0.14, 1.51]	0.20
Ethnicity						
Hispanic vs. non-Hispanic	0.79 [0.39, 1.58]	0.50	0.85 [0.31, 2.32]	0.75	0.85 [0.31, 2.32]	0.75
Unknown vs. non-Hispanic	0.87 [0.39, 1.95]	0.74	1.03 [0.41, 2.63]	0.94	1.02 [0.40, 2.59]	0.97
Age	1.03 [1.02, 1.04]	<0.001	1.03 [1.01, 1.04]	<0.001	1.03 [1.01, 1.04]	<0.001
Sex M vs. F	1.58 [1.01, 2.47]	0.046	1.39 [0.87, 2.23]	0.17	1.39 [0.86, 2.23]	0.18
Mental health Dx	0.66 [0.41, 1.04]	0.075	1.05 [0.63, 1.75]	0.85	1.06 [0.64, 1.77]	0.82
Substance use Dx	0.49 [0.32, 0.74]	0.001	0.74 [0.46, 1.18]	0.21	0.76 [0.47, 1.24]	0.28
Length of stay	1.03 [1.01, 1.04]	<0.001	1.02 [1.01, 1.04]	0.004	1.02 [1.01, 1.04]	0.004
Medicaid vs. other	0.43 [0.27, 0.70]	0.001			0.86 [0.48, 1.53]	0.60

IRR: incidence rate ratio. Dx: Diagnosis.
Univariate and multivariable modeling for the association between race and ethnicity and physical restraints. Model 1 incorporated listed covariates except Medicaid insurance status. Model 2 incorporated listed covariates including Medicaid insurance status

not directly translate to healthcare settings.[9,10] Further research, including qualitative research with staff and patients, will be necessary to ascertain the underlying explanation for our findings. Interestingly, in our study, patients with unknown ethnicity had higher odds of a SER than non-Hispanic patients. The driver of this finding is unknown. Obtaining more complete and precise race and ethnicity data during patient registration will allow clearer identification of drivers of inequity.

We did not find an association between race and ethnicity and the incidence of physical restraints once a SER had been activated. This might be related to lack of adequate statistical power since this was a rare event or be due to unaccounted for or unmeasured confounding. It might also reflect different decision thresholds: Calling an SER is usually decided by one hospital employee who perceives a patient threat, while the decision to restrain a patient usually involves a physician, a nurse, and a security officer, and requires the placement of a physician order in the electronic medical record. If implicit racial bias plays a role in such decisions, it is possible that joint decision-making by multiple providers reduces the effect of such bias.

Our study has several limitations. First, the single site nature limits its generalizability to other settings. In the case of our hospital, the racial demographics of our study population do not reflect the demographics of the Greater Boston Area, as our hospital cares for proportionally fewer Black patients than other hospitals in the area. This is a manifestation of the effect of structural racism on healthcare access and may result in lack of experience caring for historically marginalized patients in our institution. Second, we did not have access to data on the race and ethnicity of medical providers to assess whether it influenced SER activation. Third, as with many observational studies, there may be residual confounding, such as the involvement of psychiatry, time of day when a SER was called, the presence of family members, and others. Third, events prior to the study period, such as prior SERs and documentation in the medical record, could influence the outcomes. Based on the rarity of SER events, we chose to include in our models covariates that could be reliably measured and had been previously investigated in relevant literature. Given the rarity of restraint events, it is likely that our study was not adequately powered to detect small differences in incidence based on patient race and ethnicity.

To conclude, in our study, we noted a significant difference in rate of SERs called on Black patients compared to white patients. This effect was demonstrated over a substantial time period in a large academic tertiary hospital in Boston and remained statistically significant after adjustment for previously reported predictors. Given known structural racism in the American healthcare system, it is possible that these findings are due to provider implicit bias and racism. Further investigation is needed to better understand whether this is a broader problem across health care institutions, and how to manage agitation safely and more equitably for historically marginalized populations. Qualitative studies involving both healthcare providers and patients might help clarify how decisions to activate SERs are made and the role that implicit bias might play. To our knowledge, there are currently no proven interventions that have successfully reduced inequities in use of security or restraints in the medical setting. We hope that future studies will design and evaluate different interventions, including specific education initiatives for medical staff. Lastly, future studies should assess the utilization of involuntary pharmacologic interventions to treat agitation in non-psychiatric inpatients and the association with race and ethnicity. These future studies should aim to eliminate these inequities.

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