Racial Disparities at Mixed-Race and Minority Hospitals: Treatment of African American Males With High-Grade Splenic Injuries

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Abstract

Introduction: Racial and socioeconomic disparities in health access and outcomes for many conditions is well known. However, for time-sensitive high-acuity diseases such as traumatic injuries, disparities in access and outcomes should be significantly diminished. Our primary objective was to characterize racial disparities across majority, mixed-race, and minority hospitals for African American ([AA] vs White) males with high-grade splenic injuries.

Methods: Data from the National Trauma Data Bank were utilized from 2007 to 2015; 24 855 AA or White males with high-grade splenic injuries were included. Multilevel mixed-effects regression analysis was used to evaluate disparities in outcomes and resource allocation.

Results: Mortality was significantly higher for AA males at mixed-race (OR 1.6; 95% CI 1.3-2.1; $P < .001$) and minority (OR 2.1; 95% CI 1.5-3.0; $P < .001$) hospitals, but not at majority hospitals. At minority hospitals, AA males were significantly less likely to be admitted to the intensive care unit (OR 0.7; 95% CI, 0.49-0.97; $P = .04$) and experienced a significantly longer time to surgery (IRR 1.5; $P = .02$). Minority hospitals were significantly more likely to have failures from angiographic embolization requiring operative intervention (OR 2.2, $P = .009$). At both types of nonmajority hospitals, AA males with penetrating injuries were more likely to be managed with angiography (mixed-race hospitals: OR 1.7; $P = .046$ vs minority hospitals: OR 1.6; $P = .08$).

Discussion: While multiple studies have shown that minority hospitals have increased mortality compared to majority hospitals, this study found this disparity only existed for AAs.

Keywords
racial disparities, trauma systems, splenic trauma

Introduction

Being male in the United States is associated with social and economic advantages. Globally, however, men have higher mortality rates than women for 14 of the top 15 leading causes of death.[1] Men of color, particularly Black men, account for much of the gender difference in mortality: the difference in life expectancy for Black (vs White) men far exceeds the difference in life expectancy for men (vs women).[2] US-born Black and Hispanic men have higher rates of fatal chronic conditions and a shorter average life expectancy than their White and female counterparts.[3] The age-adjusted mortality rate for Black men is 19% higher than for White men.[4]

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African American (AA) and Hispanic men face many racialized and gendered social norms, cultural expectations, and stressors that can negatively shape their health behaviors and explain their higher rates of morbidity and mortality. Furthermore, AA men are among the most disadvantaged racial/gender groups in the United States across several domains (eg, unemployment, incarceration, discrimination, and homicide); these social determinants of health contribute to disproportionately high rates of unhealthy behaviors, functional limitations, and premature mortality among men of color.[5-7]

Racial and socioeconomic disparities in health access and outcomes for many conditions, especially chronic diseases, is well known.[8] As compared with White males, AA patients are 2 to 3 times more likely to undergo bilateral orchiectomies and lower limb amputations due to suboptimal management of chronic diseases.[3] However, for time-sensitive high-acuity diseases such as traumatic injuries, which are not necessarily correlated with race or socioeconomic status, disparities in access and outcomes *should* be significantly diminished. Yet, are they?

Previous studies have demonstrated, even after controlling for payer status, that AA patients are more likely to die after major trauma.[9,10] Haider et al[11] have shown that Black-White disparities in trauma mortality may result from the fact that hospitals treating higher proportions of minority patients have worse outcomes compared with hospitals treating predominantly White patients.

In this study, our primary objective was to characterize racial disparities across majority, mixed-race, and minority hospitals for AA (vs White) males with high-grade splenic injuries. Our secondary objective was to identify differences in resource allocation by race and by hospital racial type.

Methods

Data

The data source for this study was the American College of Surgeons (ACS) National Trauma Data Bank (NTDB), the largest trauma registry in the United States.[12] It includes patient-level and hospital data on traumatic injuries and clinical outcomes for more than 800 trauma centers. We limited our analysis to years after 2006, because of data quality improvements implemented in 2007.

This study was approved by the University of Minnesota institutional review board (STUDY00001489).

Participants

We obtained patient-level data from the NTDB from January 1, 2007, through December 31, 2015. The *inclusion criteria* were as follows:

- Age ≥16 years
- Abbreviated Injury Score (AIS) grade 3 or higher splenic injury

Excluded from our study were all females; males whose racial status was other than "Black non-Hispanic" or "White non-Hispanic"; hospitals that submitted fewer than 50 patients to the NTDB; males with no signs of life at initial evaluation in the emergency department (ED), that is, systolic blood pressure (SBP) = 0, pulse = 0, Glasgow Coma Scale (GCS) score = 3; and due to low sample size, males (n = 3) treated at an ACS-verified Level 4 trauma center.

Measures

We defined splenic injuries using the following 3 categories: (1) admission AIS codes (544299.2, 544210.2, 544212.2, 544214.3, 544220.2, 544222.2, 544224.3, 544226.4, 544228.5, 544240.3); (2) ICD-9 diagnosis codes (865, 865 .XX); and (3) ICD-10 diagnosis codes (S36.031A, S36.032A, S36.021A, S36.030A, S36.00XA, S36.020A, S36.029A, S36.039A, S36.09XA).

Approximately 5% or less of patient variables were missing; however, a small number of such variables were missing at a higher rate (alcohol level, 10% missing; minutes spent in transit via emergency medical services [EMS], 26% missing). We defined "minutes spent in transit via EMS" as the total elapsed time from dispatch of the EMS transporting unit to hospital arrival. To account for missing data, we used the Stata multiple imputation (mi) suite of commands, with 10 imputations for each missing value, applying all demographic, covariate, and outcome variables.

We defined angiography using the following 2 categories: (1) ICD-9 procedure codes (88.4, 88.40, 88.42, 88.45, 88.46-88.49, 39.71, 30.73-39.99) and (2) ICD-10 procedure codes (04L33DZ, 04L33ZZ, 04L03DZ, 04R04JZ, 04U04JZ, 04V03DZ,04V34ZZ, 04L43DZ, 04L43ZZ, 04L44CZ, 04L44DZ, 04L44ZZ).

We defined operations using the following 2 categories: (1) ICD-9 procedure codes (41.42-41.45, 41.95, 41.99, 54.10-54.12, 54.19) and (2) ICD-10 procedure codes (075P0ZZ, 07974ZX, 079P0ZZ, 079P4ZZ, 079T0ZX, 079T3ZZ, 07BB0ZX, 07B.C.0ZX, 7BH3ZX, 07BP0ZX, 07BP0ZZ, 07BP3ZZ, 07C10ZZ, 07C14ZZ, 07C20ZZ, 07C50ZZ, 07CM0ZZ, 07CP0ZZ, 07JP0ZZ, 07Q20ZZ, 07TP0ZZ, 07TP4ZZ).

We categorized hospital racial type by the percent of AA patients in all trauma admissions in 2007-2015: minority (>50%), mixed-race (25%-50%), and majority (<25%).

Statistical Analysis

To analyze demographic differences by hospital type and race, we used the χ^2 test (for binary variables) and the Kruskal-Wallis test (for minutes spent in transit via

EMS). For AA versus White males within and across hospitals, we compared the adjusted odds of all-cause in-hospital mortality, early mortality (defined as death within 48 hours after hospital arrival), intensive care unit (ICU) admission, and treatment (angiography or surgery); to do so, we used a multilevel mixed-effects regression model, accounting for hospital-level random effects. Our models included the following fixed effects: age, insurance status, presence of bowel injuries, blunt or penetrating mechanism of injury, Injury Severity Score (ISS), grade of splenic injuries, GCS score, ED heart rate, ED SBP, ED respiratory distress (defined as respiratory rate >29 or <10), transfer status, alcohol level, minutes spent in transit via EMS, year of admission, hospital ACS-verified level, and significant comorbidities on univariate analysis (bleeding disorders, congenital anomalies, congestive heart failure, chronic renal failure, diabetes mellitus, disseminated cancer, advanced directives limiting care, history of myocardial infarction [MI], hypertension requiring medication, obesity, cirrhosis, major psychiatric illness, and drug use disorders).

Our primary outcome was all-cause in-hospital mortality. Secondary outcomes included early mortality, ICU admission, major complications, treatment strategy, and time to treatment. We defined major complications as systemic sepsis, pulmonary embolism, pneumonia, acute renal failure, acute respiratory distress syndrome (ARDS), or a cardiovascular complication (arrest, MI, or cerebrovascular accident). Those major complications have previously been verified to have the highest attributable mortality among trauma patients.[13,14] To evaluate all-cause in-hospital mortality, early mortality, ICU admission, major complications, and treatment strategy, we used multilevel mixed-effects logistic regression models. To evaluate time to treatment, we used mixed-effects negative binomial regression models.

For all statistical analyses, we used SAS (version 9.4, SAS Institute, Cary, NC) and Stata MP, version 15 (StataCorp, College Station, TX). A P value <.05 was considered statistically significant.

Results

In the 2007-2015 NTDB database, records were available for 6 768 156 patients (Figure 1). After we applied our inclusion and exclusion criteria, 24 855 patients with high-grade (≥grade 3) splenic injuries were eligible for our study.

The baseline characteristics and comorbidities of patients, by hospital racial type, are shown in Table 1; their injuries and morbidities are in Table 2. AA (vs White) males were significantly more likely to suffer penetrating injuries, across all hospital racial types; to suffer bowel injuries; to have self-pay or Medicaid insurance status; and to be younger.

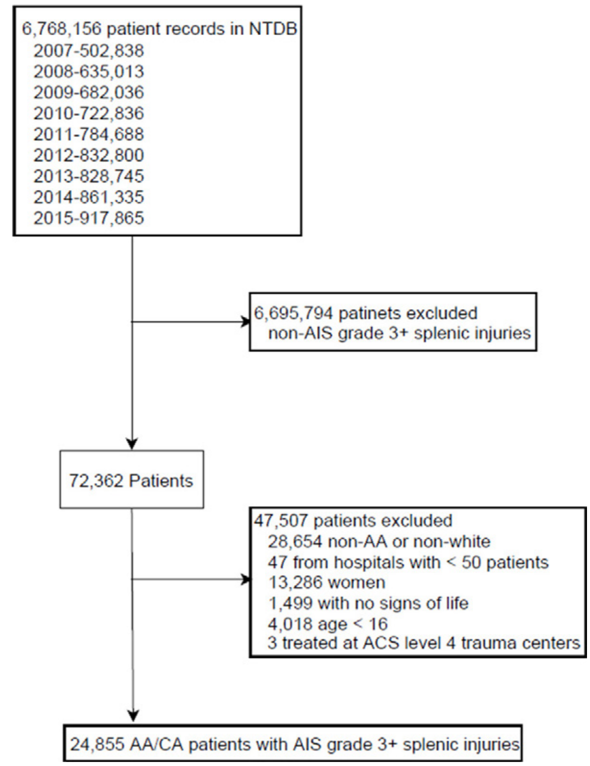

Figure 1. Study diagram detailing selection of patients in 2007-2015 National Trauma Data Bank. AA, African American; ACS, American College of Surgeons; AIS, Abbreviated Injury Scale; CA, Caucasian American; NTDB, National Trauma Data Bank.

All-Cause In-Hospital Mortality

AA males at mixed-race hospitals (vs White male majority hospitals) had significantly higher mortality (odds ratio [OR], 1.6; 95% CI, 1.3-2.1; $P < .001$). AA males at minority hospitals (vs White male majority hospitals) had significantly higher mortality (OR, 2.1; 95% CI, 1.5-3.0; $P < .001$). Within minority hospitals, AA (vs White) males had significantly higher mortality (OR, 1.55; 95% CI, 1.0-2.4; $P = .050$). But AA (vs White) males at majority hospitals did not have significantly higher mortality (OR, 1.2; 95% CI, 0.96-1.6; $P = .1$). For all these comparisons, see Figure 2.

Secondary Outcomes

Evaluating early mortality (a surrogate for a hemorrhagic cause of death), we found that AA males had a stepwise increase in early mortality at all hospital racial types. AA males (vs White males at majority hospitals) had 34%

Table 1. Baseline Demographics and Comorbid Characteristics of 24 855 Patients With Grade 3 or Higher Spleen Injury.

Variable	Hospital minority status by race, N (%)						P value
	Majority		Mixed		Minority		
	CA patients (n = 17 843)	AA patients (n = 1221)	CA patients (n = 3421)	AA patients (n = 1119)	CA patients (n = 549)	AA patients (n = 702)	
Age							
16-25	5595 (31.4)	451 (36.9)	1030 (30.1)	373 (33.3)	145 (26.4)	235 (33.5)	<.001
26-45	5721 (32.0)	456 (37.4)	1101 (32.2)	447 (40.0)	190 (34.6)	292 (41.5)	
46-65	5027 (28.2)	276 (22.6)	1019 (29.8)	264 (23.6)	168 (30.6)	159 (22.7)	
66-75	901 (5.0)	29 (2.4)	162 (4.7)	30 (2.7)	30 (5.5)	11 (1.6)	
>75	598 (3.4)	9 (0.7)	109 (3.2)	5 (0.4)	16 (2.9)	5 (0.7)	
Insurance type							
Medicaid	2107 (12.6)	304 (26.3)	427 (13.2)	260 (24.5)	85 (16.7)	191 (29.8)	<.001
Medicare	1417 (8.5)	56 (4.8)	311 (9.6)	63 (5.9)	39 (7.7)	24 (3.8)	
Private	10610 (63.6)	460 (39.8)	1784 (55.1)	371 (35.0)	268 (52.8)	232 (36.2)	
Self-pay	2555 (15.3)	336 (29.1)	716 (22.1)	367 (34.6)	116 (22.8)	193 (30.2)	
Year of admission							
2007	497 (2.8)	36 (3.0)	78 (2.3)	23 (2.1)	40 (7.3)	66 (9.4)	<.001
2008	1138 (6.4)	82 (6.7)	231 (6.8)	68 (6.1)	44 (8.0)	63 (9.0)	
2009	1377 (7.7)	92 (7.5)	191 (5.6)	75 (6.7)	45 (8.2)	63 (9.0)	
2010	1767 (9.9)	122 (10.0)	276 (8.1)	95 (8.5)	51 (9.3)	66 (9.4)	
2011	2066 (11.6)	129 (10.6)	390 (11.4)	133 (11.9)	38 (6.9)	70 (10.0)	
2012	2503 (14.0)	151 (12.4)	543 (15.9)	157 (14.0)	56 (10.2)	70 (10.0)	
2013	2515 (14.1)	168 (13.8)	519 (15.2)	168 (15.0)	78 (14.2)	87 (12.4)	
2014	2845 (15.9)	216 (17.7)	551 (16.0)	187 (16.7)	85 (15.5)	94 (13.4)	
2015	3135 (17.6)	225 (18.5)	642 (18.7)	213 (19.0)	112 (20.4)	123 (17.4)	
Other comorbidity	4014 (23.7)	227 (20.3)	728 (23.0)	213 (20.9)	148 (28.3)	162 (25.3)	.002
Bleeding disorder	570 (3.4)	23 (2.1)	107 (3.4)	18 (1.8)	12 (2.3)	4 (0.6)	<.001
Congestive heart failure	203 (1.2)	13 (1.2)	43 (1.4)	6 (0.6)	4 (0.8)	3 (0.5)	.2
Chronic renal failure	71 (0.4)	9 (0.8)	15 (0.5)	10 (1.0)	3 (0.6)	2 (0.3)	.08
Diabetes mellitus	1139 (6.7)	55 (4.9)	210 (6.6)	67 (6.6)	27 (5.2)	31 (4.8)	.06
Disseminated cancer	82 (0.5)	3 (.3)	10 (.3)	1 (.1)	1 (.2)	0 (0)	.1
Advanced directive	80 (0.5)	4 (.4)	11 (.4)	0 (0)	2 (.4)	0 (0)	.1
History of MI	155 (0.9)	4 (.4)	29 (.9)	3 (.3)	3 (.6)	5 (.8)	.1
Hypertension	2888 (17.1)	168 (15)	565 (17.9)	188 (18.5)	64 (12.3)	63 (9.8)	<.001
Obesity	872 (5.2)	46 (4.1)	174 (5.5)	52 (5.1)	13 (2.5)	15 (2.3)	<.001
Cirrhosis	165 (1.0)	7 (0.6)	35 (1.1)	9 (0.9)	14 (2.7)	2 (0.3)	.001
Major psychiatric illness	712 (4.2)	41 (3.7)	166 (5.3)	35 (3.4)	35 (6.7)	20 (3.1)	.002
Drug use disorder	1071 (6.3)	91 (8.2)	237 (7.5)	111 (10.9)	45 (8.6)	38 (5.9)	<.001

Abbreviations: AA, African American; CA, Caucasian American; MI, myocardial infarction.

higher odds of early mortality (OR, 1.3; 95% CI, 1.008-1.8; *P* = .04) at majority hospitals, 61% higher odds at mixed-race hospitals (OR, 1.6; 95% CI, 1.2-2.2; *P* = .003), and 86% higher odds at minority hospitals (OR, 1.9; 95% CI, 1.3-2.7; *P* = .002). But we found no significant differences in early mortality for White males at majority (vs minority or mixed-race) hospitals (Figure 3A).

AA (vs White) males at mixed-race hospitals—but not at minority hospitals—had a significantly higher rate of major complications (Figure 3B).

AA males in all hospital racial types were less likely to be admitted to the ICU compared with White males at majority hospitals, but the difference was not statistically significant (Figure 3C). However, within minority hospitals, AA (vs White) males were significantly less likely to be admitted to the ICU (OR, 0.69; 95% CI, 0.49-0.97; *P* = .035).

For patients managed nonoperatively, we found that White (vs AA) males were significantly more likely to undergo angiography at minority hospitals (OR, 1.7; 95% CI, 1.08-2.7; *P* = .02) (Figure 4A).

Table 2. Baseline Injury Severity Characteristics of 24 855 Patients With Grade 3 or Higher Spleen Injury.

	Hospital minority status by race, N (%)						
	Majority		Mixed		Minority		
Variable	CA patients (n = 17843)	AA patients (n = 1221)	CA patients (n = 3421)	AA patients (n = 1119)	CA patients (n = 549)	AA patients (n = 702)	*P* value
ISS score							
9-15	3407 (19.6)	165 (13.8)	502 (15.8)	127 (12)	96 (18.7)	80 (11.8)	<.001
16-24	5253 (30.3)	308 (25.8)	945 (29.8)	291 (27.5)	148 (28.7)	180 (26.6)	
25-35	5142 (29.6)	426 (35.7)	1009 (31.8)	410 (38.7)	150 (29.1)	262 (38.8)	
>35	3566 (20.5)	295 (24.7)	721 (22.7)	232 (21.8)	121 (23.5)	154 (22.8)	
Respiratory distress							
Yes	2859 (16.0)	248 (20.3)	546 (16.)	193 (17.3)	119 (21.7)	148 (21.1)	<.001
No	14 984 (84.0)	973 (79.7)	2875 (84.0)	926 (82.7)	430 (78.3)	554 (78.9)	
Blood pressure							
≤60 mmHg	741 (4.2)	86 (7.0)	185 (5.4)	76 (6.8)	23 (4.2)	61 (8.7)	<.001
61-90 mmHg	1915 (10.7)	123 (10.1)	347 (10.1)	119 (10.6)	57 (10.4)	82 (11.7)	
>91 mmHg	15 187 (85.1)	1012 (82.9)	2889 (84.5)	924 (82.6)	469 (85.4)	559 (79.6)	
Penetrating injury	651 (3.8)	410 (35.0)	141 (4.2)	392 (36.2)	44 (8.4)	332 (48.5)	<.001
Bowel injury	1769 (9.9)	321 (26.3)	442 (12.9)	304 (27.2)	73 (13.3)	263 (37.5)	<.001
Pulse							
≤50 bpm	169 (1.0)	10 (0.9)	20 (0.6)	4 (.4)	5 (.9)	4 (.6)	<.001
51-119 bpm	14 492 (83.0)	953 (81.2)	2676 (80.8)	884 (81.8)	424 (79.6)	535 (80.3)	
≥120 bpm	2797 (16.0)	210 (17.9)	617 (18.6)	193 (17.9)	104 (19.5)	127 (19.1)	
GCS score							
3-8	2846 (16.5)	219 (18.4)	613 (18.5)	181 (16.7)	104 (19.4)	106 (15.5)	<.001
9-13	769 (4.5)	92 (7.8)	172 (5.2)	67 (6.2)	26 (4.8)	38 (5.6)	
14-15	13 636 (79.0)	876 (73.8)	2520 (76.3)	838 (77.1)	407 (75.8)	540 (78.9)	
Splenic grade (AIS)							
3	1266 (7.1)	75 (6.1)	192 (5.6)	66 (5.9)	35 (6.4)	44 (6.3)	<.001
4	12 348 (69.2)	851 (69.7)	2376 (69.5)	758 (67.7)	381 (69.4)	438 (62.4)	
5	4229 (23.7)	295 (24.2)	853 (24.9)	295 (26.4)	133 (24.2)	220 (31.3)	
Transfer in	5797 (32.5)	224 (18.4)	1055 (30.8)	242 (21.6)	114 (20.8)	59 (8.4)	<.001
EMS minutes, median	45	29	48	31	29	24	<.001
Alcohol							
Yes–Above legal	2048 (12.9)	175 (16.0)	502 (15.8)	176 (16.8)	60 (12.2)	93 (15.8)	<.001
Yes–Below legal	983 (6.2)	100 (9.1)	195 (6.1)	82 (7.8)	42 (8.5)	76 (12.9)	
No–Confirmed	6992 (43.9)	426 (38.8)	1413 (44.3)	433 (41.3)	254 (51.4)	252 (42.9)	
Not tested	5894 (37.0)	396 (36.1)	1077 (33.8)	357 (34.1)	138 (27.9)	167 (28.4)	

Abbreviations: AA, African American; AIS, Abbreviated Injury Scale; bpm, beats per minute; CA, Caucasian American; EMS, emergency medical services; GCS, Glasgow Coma Scale; ISS, Injury Severity Score.

Minority hospitals were significantly more likely to have failures from angiographic embolization requiring operative intervention compared with majority and mixed-race hospitals (CA males: OR 2.2, $P = .009$; and AA males: OR 1.8, $P = .053$) (Figure 4B).

Additionally, AA males in mixed-race and minority hospitals with penetrating injuries were more likely to be managed by angiography compared with White males treated at majority hospitals (mixed: OR 1.7, $P = .046$; minority: OR 1.6, $P = .08$) (Figure 4C).

There were no differences in time to angiography across races and hospital groups. However, minority hospitals had significantly longer times to operative intervention compared with White males treated at majority hospitals (CA males: risk ratio 1.5, $P = .03$, AA males: risk ratio 1.5, $P = .02$) (Figure 4D).

Discussion

In the United States, racial disparities in outcomes and in health care processes have been documented for patients with a wide spectrum of illnesses.[8] In our study, we demonstrated racial disparities in hospital mortality for AA (vs White) males with splenic injuries at majority, mixed-race, and minority hospitals. We found that, as compared with White males at majority hospitals, AA

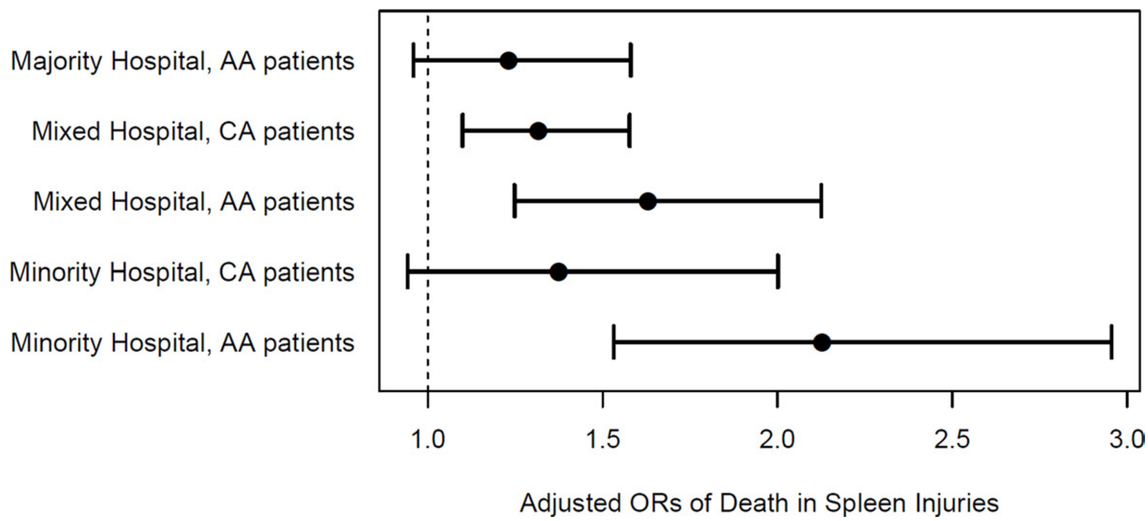

Figure 2. All-cause in-hospital mortality across races and hospital types. Whites at a majority hospital. C-statistic = 0.9. AA, African American; CA, Caucasian American; OR, odds ratio.

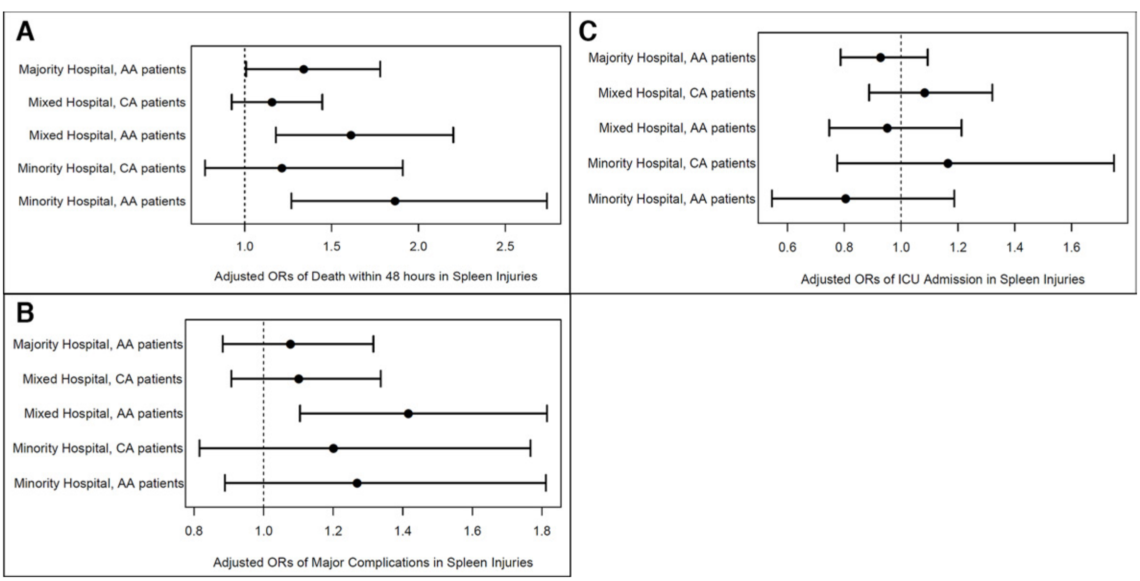

Figure 3. Secondary outcomes across races and hospital types; (A) odds of 48-hour all-cause in-hospital mortality; (B) odds of development of major complication; (C) odds of ICU admission. Whites at a majority hospital. OR, odds ratio.

males had higher odds of mortality at mixed-race (60% higher) and minority hospitals (110% higher). Furthermore, within minority hospitals, AA males had significantly higher mortality than White males.

In terms of early mortality (again, defined as death within 48 hours after hospital arrival), we found that, as compared with White males at majority hospitals, AA males had 34% higher odds of early mortality at majority hospitals, 61% higher odds at mixed-race hospitals, and 86% higher odds at minority hospitals. But we found no significant differences in early mortality for White males across hospital types.

Among the common injury mechanisms seen in the United States, gunshot wound (GSW) is associated with the highest mortality rate. AAs suffer a disproportionate burden of mortality from this mechanism.[15,16] We used splenic injury which typically occurs following blunt injury from motor vehicle collisions or falls in this study

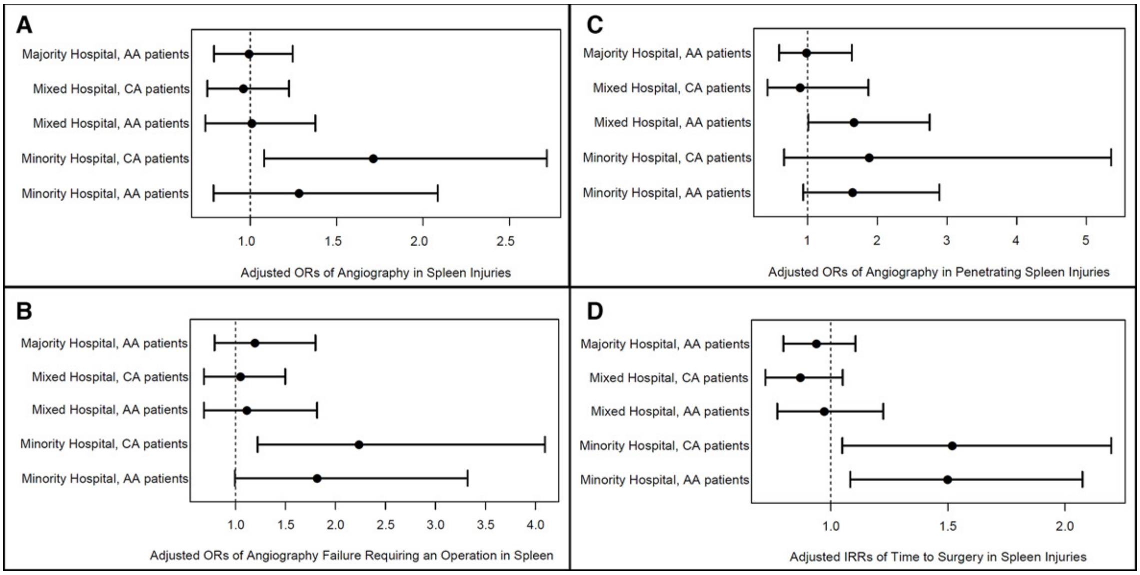

Figure 4. Treatment evaluation across races and hospital types; (A) odds of receiving angiography for patients managed nonoperatively; (B) odds of angiographic failure requiring operative intervention; (C) odds of receiving angiography as initial/sole therapy in penetrating injuries; (D) incidence rate ratio of time to surgery. Whites at a majority hospital. AA, African American; CA, Caucasian American; IRR, incidence rate ratio; OR, odds ratio.

so as to overcome the disproportionate burden of penetrating trauma in Black men. Within majority hospitals, we found no statistically significant difference in mortality between CA and AA men. The differences in outcomes based on racial categorizations of hospitals may be attributable to hospital characteristics that are reflective of the socioeconomic status of the catchment population it serves. In other words, minority, mixed, and majority hospital designations serve as a proxy for quality of care.

Disparities in the quality of hospital care between White and AA males can be attributed to differences within or across hospitals, or perhaps both. Such disparities might be a symptom of racial segregation that unofficially but persistently occurs in the health care delivery system or by residence. It is possible that White and AA males are typically served by different hospital racial types (as defined in our study) and that minority hospitals provide lower-quality care than majority hospitals. Residential segregation likely plays a key role in segregating the health care delivery system, but other factors contribute. Historically, until the 1960s, hospitals were racially segregated in the South and in most Northern cities.[17,18] During the 1960s, sanctioned forms of hospital segregation were essentially eliminated, but in reality, segregation remains, partly due to social and economic pressures that are unique to health care. Other factors that can divide hospitals racially include racial differences in physician referrals, in transportation systems, in hospital emergency department capacity, and in patients' preferences. Studies have shown that patients with high-grade solid organ injuries have improved outcomes when treated at tertiary trauma centers.[14,19] Unfortunately, we were unable to evaluate transfer practices between majority, mixed-race, and minority hospitals. Hospital segregation may, in turn, affect health outcomes and service utilization differently than residential segregation does, for example, through racial differences in providers' medical practice patterns and in patients' access to high-quality providers and specialized services.

This study further confirms the findings of Dimick et al[20] revealing that AA patients are more likely to undergo surgery at low-quality hospitals, particularly in segregated regions. They found a strong relationship between residential segregation and the use of low-quality hospitals. This is supported by our findings that minority hospitals were significantly more likely to have failures from angiographic embolization requiring operative intervention compared with majority and mixed hospitals. In addition, we found in this study that AA males in mixed and minority hospitals with penetrating injuries were more likely to be managed by angiography compared with White males. This finding is concerning as the standard of care for patients with penetrating abdominal trauma is operative intervention and not angiography.

This study has several limitations. First, like all administrative databases, the exact method and accuracy of racial designation is unknown. We cannot tell whether racial categories are self-assigned or administratively designated. Second, though the racial categorization of hospitals used in this study has been previously utilized in other studies, we make assumptions as to the capabilities of the hospitals based on the arbitrary categorization.

Conclusion

While multiple studies have shown that minority hospitals have increased mortality compared to majority hospitals, this study found this disparity only existed for AAs. We were able to identify significant racial disparities in resource allocations. Future studies should characterize modifiable factors associated with disparities in resource allocations to guide interventions aimed at reducing disparities in health care.

Declaration of Conflicting Interests

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