

# Racial Disparities in Surgical Timing Following Hip Fractures: A National Trauma Database Propensity-Matched Analysis

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## INTRODUCTION:

Hip fractures result in significant morbidity and mortality, with timely surgical fixation known to reduce complications and improve patient outcomes. Despite established benefits of early surgical intervention, racial disparities in surgical timing remain poorly characterized. This study aimed to investigate racial differences in the time to surgery for hip fractures managed by open reduction internal fixation (ORIF), utilizing a national trauma database and controlling for baseline characteristics.

## METHODS:

A retrospective cohort study was performed using data from the National Trauma Data Bank (NTDB) from 2017 to 2019. Adult patients undergoing ORIF for hip fractures were included. Exclusions were made for incomplete data or racial groups with fewer than 100 patients. Propensity score matching was used to balance baseline differences between Black and White patients in a 1:1 ratio. The primary outcome was the rate of surgery within 24 hours. Cox proportional hazards regression controlled for multicollinearity ( $VIF \leq 4.0$ ). Kaplan-Meier analysis was used to visualize surgical timing differences between groups.

## RESULTS:

A total of 882 patients (77 Black and 805 White) were included. After propensity matching (77 matched pairs), baseline demographics and comorbidities were balanced, with no significant differences observed in age (56.17 vs. 58.69 years,  $p=0.68$ ), sex (53.8% female for both,  $p>0.99$ ), or comorbidities including diabetes, hypertension, and renal failure. Insurance type and hospital characteristics, initially significantly different, also became balanced post-matching. Pre-matching analysis demonstrated that Black patients were less likely to undergo surgery within 24 hours than their matched White counterparts, though this difference was not statistically significant (33.3% vs. 43.9%,  $p=0.09$ ). Hospital length of stay was significantly different in pre-matched groups (Black: 8.41 days vs. White: 6.43 days,  $p=0.01$ ), but not different in the post-matched groups (Black: 8.41 days vs. White: 9.37 days,  $p=0.41$ ). Complication rates, including surgical site infection, deep vein thrombosis, embolism, return to OR, sepsis, and unplanned ICU admissions, showed no significant differences after matching. However, Black race independently predicted delayed surgery in Cox regression analysis ( $HR=0.79$ , 95% CI 0.63–0.99,  $p=0.046$ ). The Kaplan-Meier curve demonstrates this finding, where Black patients have consistently longer times to surgery.

**DISCUSSION AND CONCLUSION:** Despite guidelines advocating early fixation for hip fractures, racial disparities persist where Black patients experience delays in surgical timing compared to their White counterparts. While matching reduced baseline differences, delayed surgical timing persisted independently in multivariable analyses. Clinicians should remain vigilant of these disparities and pursue equitable surgical prioritization. Further prospective studies are warranted to understand and address the underlying systemic and institutional factors contributing to these disparities.

Figure 1. Kaplan-Meier curve for surgical timing compared with race

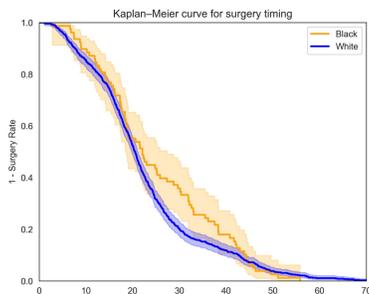


Table 1. Propensity-matched table of demographics, comorbidities, pre-hospital factors, insurance type, and hospital characteristics

	Unmatched		P-value	Matched		P-Value
	Black (n=77)*	White (n=805)*		Black (n=77)*	White (n=805)*	
<b>Demographics</b>						
Age (years)	58.69 (±22.53)	70.38 (±16.56)	<b>0.01</b>	56.17 (±23.44)	56.17 (±23.44)	0.68
Sex (female)	42 (53.8%)	508 (63.2%)	0.13	42 (53.8%)	42 (53.8%)	>0.99
<b>Comorbidities</b>						
Alcoholism	6 (7.7%)	22 (2.7%)	<b>0.04</b>	3 (3.8%)	3 (3.8%)	0.49
Anticoagulant Use	4 (5.1%)	103 (12.8%)	0.07	9 (11.5%)	9 (11.5%)	0.25
CCRD	4 (5.1%)	136 (16.9%)	<b>0.01</b>	2 (2.6%)	2 (2.6%)	0.68
Diabetes	23 (29.5%)	137 (17.0%)	<b>0.01</b>	25 (32.1%)	25 (32.1%)	0.86
Congestive Heart Failure	3 (3.8%)	72 (9.0%)	0.18	2 (2.6%)	2 (2.6%)	>0.99
Hypertension	45 (57.7%)	432 (53.7%)	0.58	38 (48.7%)	38 (48.7%)	0.34
Renal Failure	5 (6.4%)	34 (4.2%)	0.54	2 (2.6%)	2 (2.6%)	0.44
Smoking	23 (29.5%)	110 (13.7%)	<b>&lt;0.01</b>	15 (19.2%)	15 (19.2%)	0.19
Substance Abuse	8 (10.3%)	29 (3.6%)	<b>0.01</b>	10 (12.8%)	10 (12.8%)	0.80
None	15 (19.2%)	106 (13.2%)	0.19	20 (25.6%)	20 (25.6%)	0.44
<b>Pre-hospital factors</b>						
Motor Vehicle Accident	1 (1.3%)	2 (0.2%)	0.63	1 (1.3%)	1 (1.3%)	>0.99
Ambulance Transport	7 (9.0%)	73 (9.1%)	>0.99	9 (11.5%)	9 (11.5%)	0.79
<b>Insurance Type</b>						
Medicare/Medicaid	39 (51.3%)	600 (74.5%)	<b>&lt;0.01</b>	34 (44.9%)	34 (44.9%)	0.52
Private	24 (32.1%)	155 (19.3%)	<b>0.01</b>	25 (33.3%)	25 (33.3%)	>0.99
Other	13 (16.7%)	50 (6.2%)	<b>0.01</b>	17 (22.8%)	17 (22.8%)	0.54
<b>Hospital Characteristics</b>						
University	44 (57.7%)	205 (25.5%)	<b>&lt;0.01</b>	53 (69.2%)	53 (69.2%)	0.18
Non-Teaching	14 (18.0%)	193 (24%)	0.29	10 (12.8%)	10 (12.8%)	0.51
Community	18 (24.4%)	377 (46.9%)	<b>&lt;0.01</b>	13 (16.7%)	13 (16.7%)	0.32
Trauma Level I	32 (42.3%)	159 (19.8%)	<b>&lt;0.01</b>	33 (45.6%)	33 (45.6%)	>0.99
Trauma Level II	16 (20.5%)	241 (30.2%)	0.10	17 (22.8%)	17 (22.8%)	>0.99

\*Values presented as mean (± standard deviation) or n (%)

† Significance

Table 2. Hospital complications and outcomes

	Unmatched		P-value	Matched		P-Value
	Black (n=77)*	White (n=805)*		Black (n=77)*	White (n=805)*	
<b>Hospital Complications</b>						
Surgical Site Infection	0 (0.0%)	1 (0.1%)	>0.99	2 (2.6%)	2 (2.6%)	0.49
Deep Vein Thrombosis	1 (1.3%)	2 (0.2%)	0.63	2 (2.6%)	2 (2.6%)	>0.99
Embolism	0 (0.0%)	4 (0.5%)	>0.99	2 (2.6%)	2 (2.6%)	0.50
Kidney	2 (2.6%)	6 (0.7%)	0.32	0 (0.0%)	0 (0.0%)	0.32
Return to OR	2 (2.6%)	4 (0.5%)	0.16	3 (3.8%)	3 (3.8%)	>0.99
Sepsis	0 (0.0%)	3 (0.4%)	>0.99	3 (3.8%)	3 (3.8%)	0.23
Superficial Surgical Site Infection	2 (2.6%)	0 (0.0%)	<b>0.01</b>	4 (5.1%)	4 (5.1%)	0.47
Unplanned ICU	1 (1.3%)	17 (2.1%)	0.94	4 (5.1%)	4 (5.1%)	0.36
Ventilator-Assisted Pneumonia	0 (0.0%)	2 (0.2%)	>0.99	3 (3.8%)	3 (3.8%)	0.24
None	71 (91.0%)	735 (91.4%)	>0.99	64 (82.1%)	64 (82.1%)	0.16
<b>Outcomes</b>						
Surgery < 24h	26 (33.3%)	353 (43.9%)	0.09	25 (32.1%)	25 (32.1%)	>0.99
Hospital Length of Stay (Days)	8.41 (±5.53)	6.43 (±4.66)	<b>0.01</b>	9.37 (±8.74)	9.37 (±8.74)	0.41

\*Values presented as mean (± standard deviation) or n (%)

† Significance