

Disclosure/Conflict of Interest

- This study was funded by Johnson & Johnson MedTech
- M. F. Vanderkarr, J. Ruppenkamp, C. Holy are all employed by Epidemiology & Real-World Data Sciences, Johnson & Johnson MEDTECH
- A. Parikh and M. Vanderkarr are employed by DePuy Synthes a Johnson & Johnson Company
- C. Sparks was an employee of DePuy Synthes at the time the study was conducted



Racial Disparity in Treatments for Tibial Fracture using Propensity-Score Matched Cohorts in a Medicaid Database

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Background

- Prior studies have suggested that racial disparities exist amongst patients treated for orthopedic conditions.^{1,2}
- In a recent survey completed by 305 members of the American Orthopaedic Association, 12% respondents believed that patients could receive different care based on race.³

1. Pandya NK, Wustrack R, Metz L, et al. Current Concepts in Orthopaedic Care Disparities. *J Am Acad Orthop Surg* 2018;26(23):823-32. doi: 10.5435/JAAOS-D-17-00410 [published Online First: 2018/09/05]
2. Nelson CL. Disparities in orthopaedic surgical intervention. *J Am Acad Orthop Surg* 2007;15 Suppl 1:S13-7. doi: 10.5435/00124635-200700001-00005 [published Online First: 2007/10/03]
3. Adelani MA, O'Connor MI. Perspectives of Orthopedic Surgeons on Racial/Ethnic Disparities in Care. *J Racial Ethn Health Disparities* 2017;4(4):758-62. doi: 10.1007/s40615-016-0279-z [published Online First: 2016/08/31]

Objective



Our study compared patient demographics, diagnoses, and healthcare utilization in tibial fracture cases among racial groups.

Study Methods



Data Source: IBM® MarketScan® Medicaid (March 2015 – December 2020)



Study Population:

Patients with an inpatient diagnosis of a tibial fracture from March 2015 through December 2020. Index was defined as discharge from hospitalization with surgery or fracture diagnosis in absence of surgery, within a three-month window.

All patients had continuous enrollment in the database six months prior to index (baseline period). Patients were excluded if there was a concurrent femur or humerus fracture, amputation at index, other fractures prior to index, and race other than Black or White.



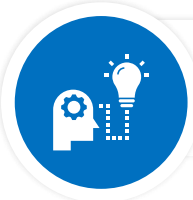
Healthcare Utilization Outcomes:

- **Post-index surgical treatment** (medication use (90 days), reoperations (2-years))
- **Complications** within 2-years post-index surgery (compartmental syndrome, deep infection, mechanical breakage, mechanical displacement, mechanical other, nonunion, malunion, delayed healing, device infection, other complications)

Variable Specification

	Primary Independent Variable: Race (Black or White)
	Patient Characteristics: Age, Gender
	Covariates: • Elixhauser Index (EI) (31 comorbidities): scores based on 6-month look back prior to index • Gustilo Fracture Type: open type I/II, open type III, closed • Procedural Characteristics: surgery type, implant used • Diagnosis indicating Fracture Anatomy and Severity

Standardization Method



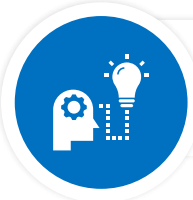
Standardizing

- Direct standardization of our study population to allow for comparison across racial groups
- Standard used was the entire Medicaid population stratified by race, age group, gender, and year

Statistical Analysis

- Descriptive statistics were reported for all study variables and outcomes

Statistical Modeling Considerations



Propensity Matching

- A 1:1 propensity score matching, using the R package MatchIt and method of nearest neighbor matching within 0.05 caliper width, was performed to match surgically treated Black patients versus surgically treated White patients.
- Post-match balance of covariates was examined using absolute mean differences (AMDs).

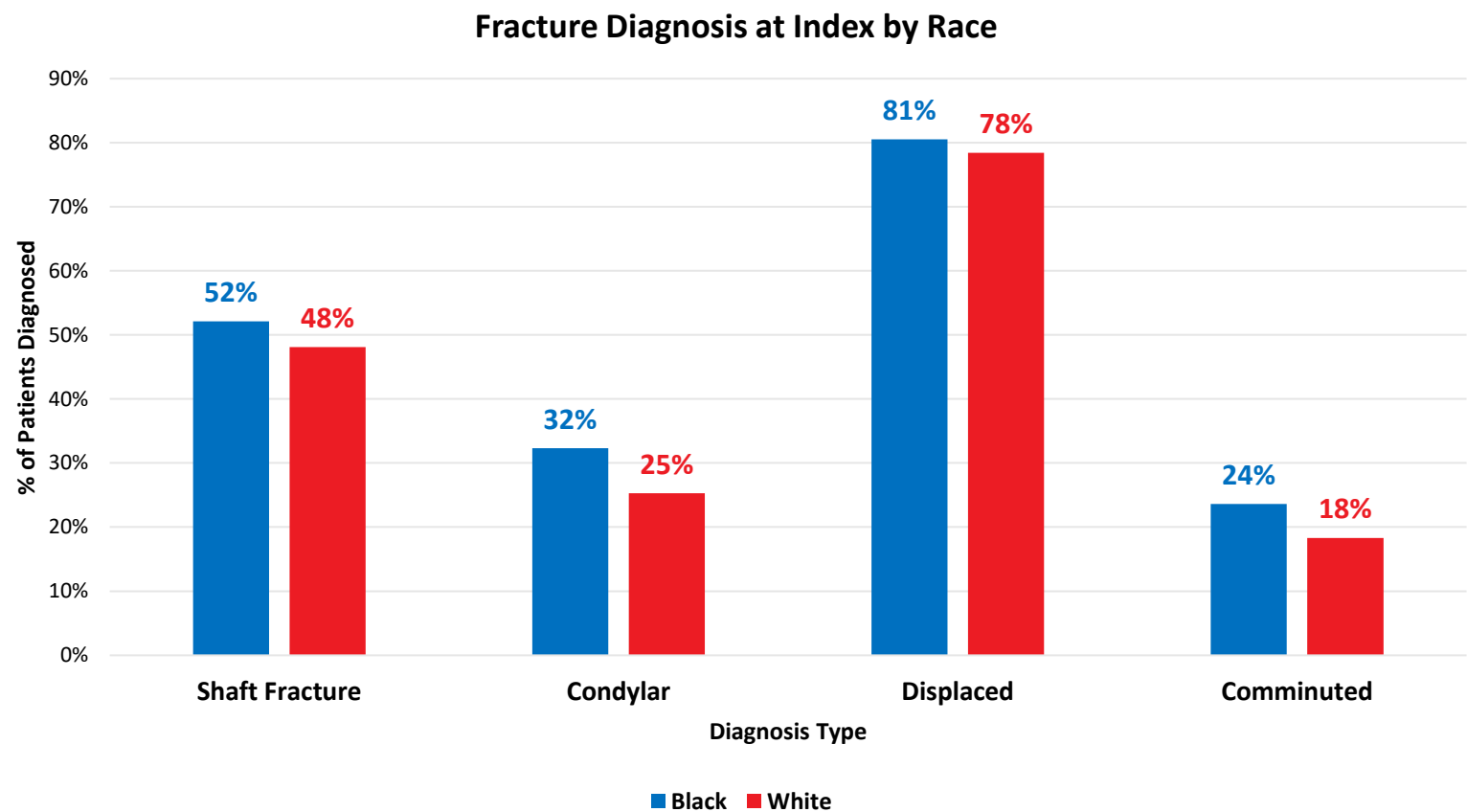
Statistical Analysis (post-match)

- Descriptive statistics were reported for all study variables and outcomes
- Survival analyses and Cox models were performed for reoperation and severe complications in the matched cohort

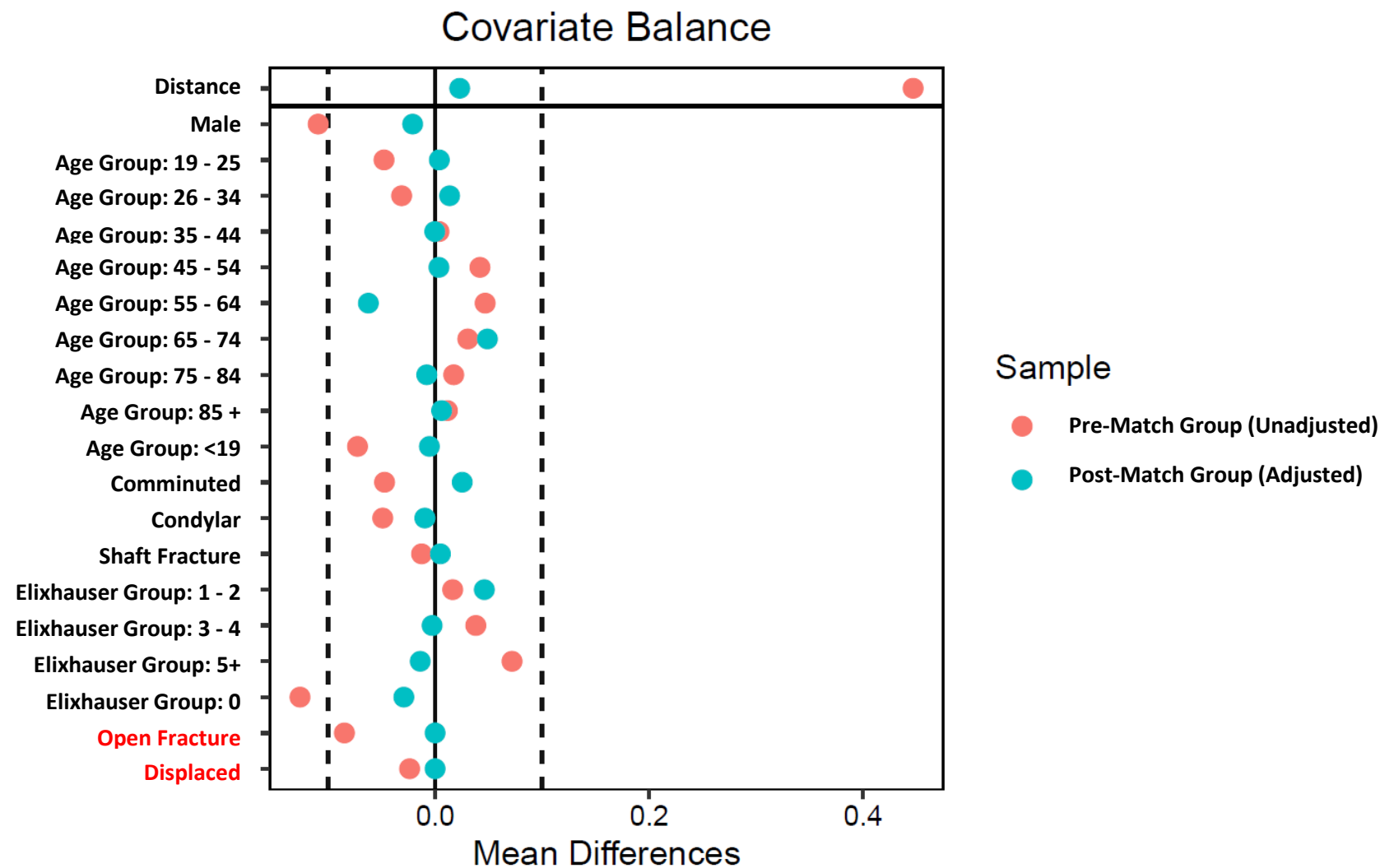
Result: Standardized Descriptive Report Pre-Matching

Variables	Black		White	
	N	%	N	%
All	3,063	100.0%	3,652	100.0%
Gender: Male	1,691	55.2%	1,618	44.3%
Age: mean (SD)	55.04 (20.72)		58.13 (18.94)	
Age Category				
under 19	80	2.6%	64	1.7%
19 to 25	198	6.4%	131	3.6%
26 to 34	298	9.7%	260	7.1%
35 to 44	405	13.2%	396	10.8%
45 to 54	499	16.3%	654	17.9%
55 to 64	559	18.2%	766	21.0%
65 to 74	371	12.1%	558	15.3%
75 to 84	316	10.3%	447	12.2%
85+	339	11.1%	376	10.3%
Elix Index: mean (SD)	3.15 (3.01)		3.60 (3.00)	
Elix Index Category				
0	726	23.7%	615	16.8%
1 or 2	798	26.0%	931	25.5%
3 or 4	697	22.7%	885	24.2%
5 or greater	843	27.5%	615	33.4%
Gustilo Type				
Closed	2,365	77.2%	3,062	83.8%
Open Type I/II	443	14.5%	367	10.0%
Open Type III	224	7.3%	184	5.0%
Other	31	1.0%	39	1.1%
Surgical Intervention	2,018	66.0%	2,306	63.0%

Results: Standardized Diagnosis Report Pre-Matching



Results: Absolute Mean Difference



Results: Descriptive Report Post-Matching

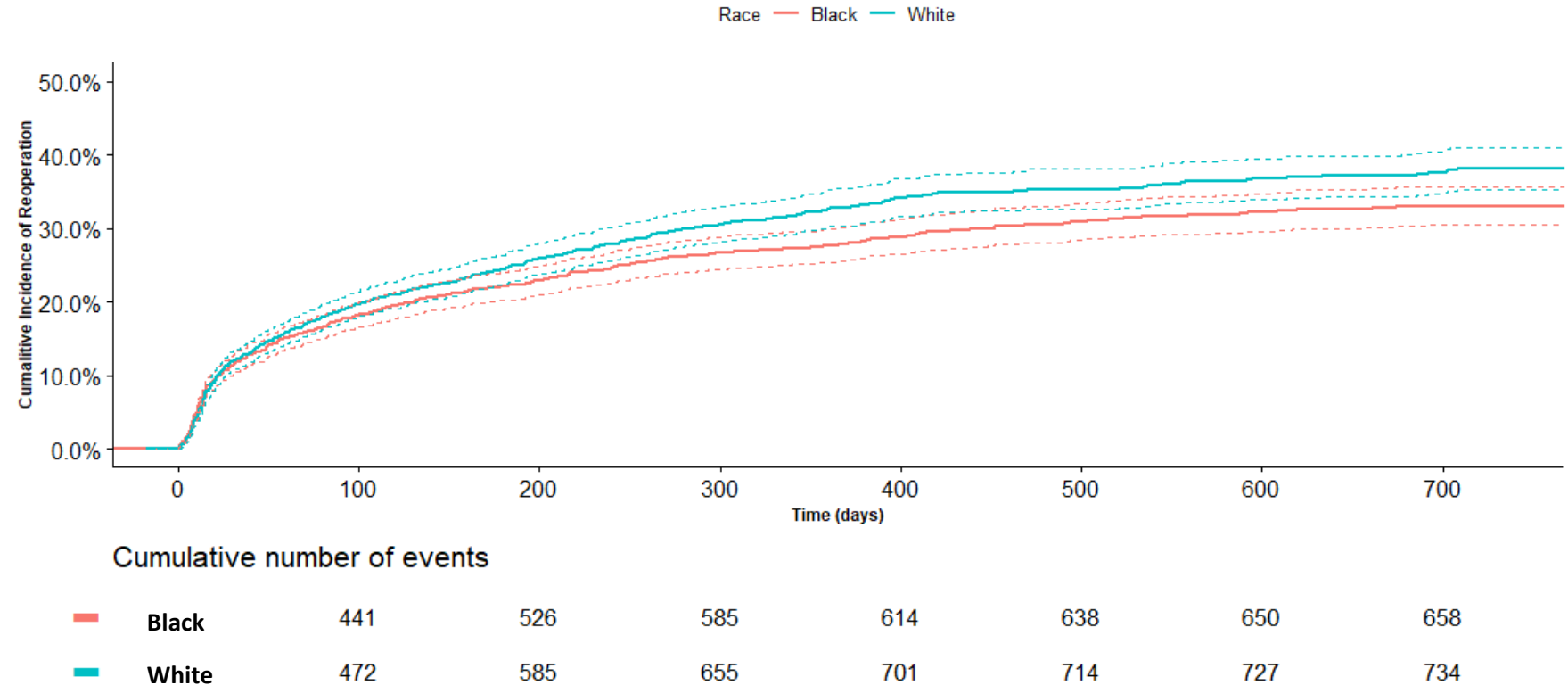
N = 5,506

Variables	Black		White	
	N	%	N	%
All	2,753	100.0%	2,753	100.0%
Gender: Male	1,364	49.5%	1,399	50.8%
Age: mean (SD)	41.00 (18.88)		42.42 (19.05)	
Age Category				
under 19	491	17.8%	424	15.4%
19 to 25	184	6.7%	206	7.5%
26 to 34	388	14.1%	374	13.6%
35 to 44	456	16.6%	443	16.1%
45 to 54	458	16.6%	513	18.6%
55 to 64	516	18.7%	468	17.0%
65 to 74	175	6.4%	199	7.2%
75 to 84	56	2.0%	82	3.0%
85+	29	1.1%	44	1.6%
Elix Index: mean (SD)	2.24 (2.65)		2.07 (2.51)	
Elix Index Category				
0	976	35.5%	975	35.4%
1 or 2	811	29.5%	951	34.5%
3 or 4	488	17.7%	399	14.5%
5 or greater	478	17.4%	428	15.5%
Gustilo Type				
Closed	1,981	72.0%	1,998	72.6%
Open Type I/II	510	18.5%	501	18.2%
Open Type III	255	9.3%	249	9.0%
Other	7	0.3%	5	0.2%

Results: Complication and Reoperation Post-Matching

- The observed 2-year complication rate was 27.5%
 - No significant difference in rates was observed across racial groups ($p=0.117$)
- White patients were 14% more likely to have a reoperation compared to Black patients, 2-years post-index
 - (HR: 1.14, 95% CI: 1.02-1.27, $p=0.013$)

Risk of Reoperation



Results: 90-day Medication Prescription Post-Matching

Variables	Black	White	Chi.sq
	%	%	p-value
All *	1,879 (100%)	1,749 (100%)	
Antibiotics	30.9%	40.0%	.000
Anticonvulsants	28.7%	36.0%	.000
Antidepressants	20.4%	33.2%	.000
Muscle Relaxants	24.1%	30.8%	.000
Benzodiazepines	7.3%	14.4%	.000
CNS Agents	2.7%	5.5%	.000
Opiate Agonists (strong)	4.1%	6.7%	.001
Other Drugs	78.0%	80.8%	.040
Analgesics	25.4%	22.9%	.078
Opiate Agonists (mild/mod)	82.4%	81.7%	.565
NSAIDS	29.6%	29.3%	.837

* Patients in the cohort had 90-day post-index surgery continuous medical and drug enrollment in the database

Discussions/Conclusions



Prior to matching, Black patients were generally younger with more severe trauma compared to their White counterpart.



After matching, fracture repair outcome rates were similar between White and Black patients. However, post-surgical reoperation rates and medication use was lower in Black patients compared to White patients.



Exact causes for the differences in treatments are unknown and warrant further research.

Thank you

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