

# African-American Patients Are at Higher Risk of Postoperative Complications and Longer Time to Operative Fixation for Pathologic Fractures of the Long Bones: A Propensity Score Matched Analysis

Micheal Raad, MD<sup>1</sup>, Varun Puvanesarajah, MD<sup>1</sup>, Claire McDaniel, MD<sup>1</sup>, Uma Srikumaran, MD<sup>1</sup>, Adam Levin, MD<sup>1</sup>, Carol Morris, MD<sup>1</sup>

1. Division of Orthopaedic Oncology at the Johns Hopkins Hospital, Baltimore, MD, 21287

## Introduction

- Racial disparities in outcomes following orthopaedic surgery have been well documented in the fields of arthroplasty, trauma and spinal surgery.
- There is a paucity of the literature when it comes to assessing differences in outcomes among patients undergoing surgery for oncologic musculoskeletal disease.

## Objectives

- The aim of this study is to investigate the role of race and its relationship to outcomes after surgery for pathologic fractures of the long bones.

## Methods

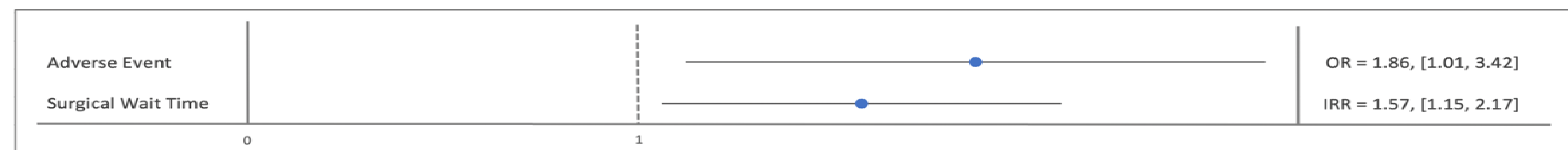
- 828 patients who underwent fixation for pathologic fractures in the National Surgical Quality Improvement Program (2012 – 2018) database were analyzed.
- List-wise deletion of patients with incomplete data or additional procedures.
- The database-specific variable describing patients' race were used to identify two groups: 1) African-American (AA) and 2) Non African-American (AA)
- Propensity score matching was then used to match the 94 AA patients with 94 NAA patients based on age, gender, body mass index, anemia, end-stage renal disease, independence in performing activities of daily living, congestive heart failure and pulmonary disease.
- Outcomes measures include adverse events (AE), defined as mortality within thirty days or any of the following complications: wound complications, thromboembolic disease, cardiovascular event, pneumonia, urinary tract infection, failure to wean off of ventilation, cerebrovascular events, need for reoperation and need for readmission.
- This was analyzed using logistic regression with robust estimates of the variance and reported as an odds ratio (OR).
- Our secondary outcome was the number of days between admission and operative fixation, which was assessed using Poisson regression and reported as an incidence risk ratio (IRR).
- Significance was at p=0.05 for appropriate tests. All statistical analyses were performed using STATA, StataCorp. 2019.

	Total		African-American		Unmatched Non-African-American		Matched Non-African-American	
	N	%	N	%	N	%	N	%
<b>Age</b>	66.7		64.6		67.0		66.7	
<b>BMI</b>	27.5		26.9		27.6		27.6	
<b>Sex</b>								
Female	462	55.8%	54	0.58%	408	55.6%	53	56.4%
Male	366	44.2%	40	0.43%	326	44.4%	41	43.6%
<b>ASA</b>								
1 - No Disturbance	0	0.00%	0	0.00%	0	0.00%	0	0.00%
2 - Mild Disturbance	82	9.90%	10	10.6%	72	9.81%	15	16.0%
3- Severe Disturbance	552	66.7%	61	64.9%	491	66.9%	62	66.0%
4 - Life Threatening	193	23.3%	23	24.5%	170	23.2%	17	18.1%
5 - Moribund	1	0.12%	0	0.00%	1	0.14%	0	0.00%
<b>Anemia**</b>	277	33.5%	34	36.0%	243	33.1%	35	37.2%
<b>End-stage renal disease</b>	15	1.81%	4	4.26%	11	1.50%	4	4.26%
<b>CHF</b>	10	1.21%	2	2.13%	8	1.09%	1	1.06%
<b>Pulmonary Disease</b>	137	16.6%	11	11.7%	126	17.2%	10	10.6%
<b>Functionally Dependent</b>	135	16.3%	12	12.8%	123	16.8%	11	11.7%

## Results

- After implementing our inclusion and exclusion criteria, 828 patients had complete data on race, comorbidities and outcomes.
- Of these patients, 94 (11.4%) were AA and 734 (88.6%) were NAA. Prior to matching, there was a significant difference between the age of the two groups (64.6 years vs. 67.0 years, p=0.038; **Table 1**).
- There were no significant differences between any of the other patient demographics and comorbidities assessed (all, p>0.05; **Table 1**).
- Detailed information on patient demographics and comorbidities is displayed in **Table 1**.
- Propensity-score matching based on the previously described variables was performed to identify 94 NAA with equal propensity scores (p=0.99).
- After matching, there were no significant differences between any patient demographics and comorbidities assessed, including age (all, p>0.05; **Table 1**).

## Figure 1. Multivariable Analyses for Adverse Events and Time to Operative Fixation between African-American and Non-African American Patients



- After matching, there were no significant differences between any patient demographics and comorbidities assessed, including age (all, p>0.05; **Table 1**).
- After matching, there were no significant differences between any patient demographics and comorbidities assessed, including age (all, p>0.05; **Table 1**).
- On univariate analysis, the AA group had significantly higher rates of adverse events (44.7% vs. 29.8%, p=0.035), as well as significantly longer average wait times to procedure (2.78 days vs. 1.70 days, p=0.005).
- On multivariable analysis between the two matched groups, AA patients undergoing operative fixation for pathologic fractures of the long bones had significantly higher rates of adverse events (OR=1.86, 95% Confidence Interval=1.01-3.42, p=0.047).
- Similarly there were longer wait times between admission and operative fixation (IRR=1.57, 95% Confidence Interval=1.15-2.17, p=0.005).

## Conclusion

Racial disparities are well-known to exist within the medical system. This is the first study to demonstrate them in terms of care delivery for orthopaedic oncology patients. We found that black patients were significantly more likely to have delays in surgical management of pathologic long bone fractures and ultimately had higher rates of adverse events post-operatively. Knowledge of these racial disparities is needed to ensure appropriate and fair delivery of medical care.