Does Patient Race, Ethnicity, or Socioeconomic Status Impact Surgical Decision Making? Analysis of Casting vs. Surgery for a Common Pediatric Upper Extremity Fracture

Patrick Harston England, Lori Jia, Zoe Elizabeth Belardo, Apurva S. Shah[1]
[1]Children's Hospital of Philadelphia

INTRODUCTION:
Evidence of racial and socioeconomic disparity in the orthopaedic field has been increasingly demonstrated in recent decades, however there is a lack of current literature evaluating racial and ethnic disparities in outpatient surgical decision making for common pediatric fractures. This study aims to determine if racial and economic disparities exist in surgical indications for a common pediatric upper extremity fracture that can be variably treated with operative or non-operative management.

METHODS:
This retrospective cohort study compared the rate of operative intervention for patients who were treated for type II supracondylar humerus fractures at a single tertiary pediatric hospital based on self-reported race or ethnicity and insurance status. Patients between the ages of 2-12 years old who were initially evaluated at an outpatient orthopedic clinic visit between 2013-2021 were included. Patients with type I or III fracture patterns, open injuries, polytrauma, vascular injuries, or underlying metabolic bone disorders were excluded.

Demographic and injury characteristics were collected for each patient including sex, race, ethnicity, insurance status, and date and mechanism of injury. The treating physician's race was documented and grouped into white versus non-white categories. Surgical treatment, as defined by closed reduction with percutaneous pinning (CRPP) or open reduction with internal fixation (ORIF), was grouped as a single cohort and compared with the cohort of fractures that were treated nonoperatively.

Categorical variables were compared utilizing $\chi 2$ and Fisher exact tests. A significance threshold of $P < 0.05$ was applied in all cases.

RESULTS:
A total of 1539 patients with type II supracondylar humerus fractures were included with a mean age of 5.8+/-2.6 years (Table 1). The overall operative rate was 10.1% (155/1539). There was no difference in the operative rate based on patient race, ethnicity, or insurance status (Table 2). There was a significant difference in the operative rate based on surgeon race with non-white surgeons (5/14) having a higher operative rate than white (9/14) surgeons (14% [62/436] versus 8% [93/1103], p=0.001).

DISCUSSION AND CONCLUSION: Given that type II supracondylar humerus fractures can be variably treated operatively or nonoperatively, there is greater potential for bias in decision making. This study suggests that surgical decision making for type II fractures is not disproportionately influenced by patient race, ethnicity, or insurance status. Since outpatient surgical decision making may represent a significant number of supracondylar humerus fractures, our results are necessary to elucidate the decision making in this area to be more representative of the entire population of patients with these injuries. Other common pediatric fractures with equivocal surgical indications should be further evaluated to understand potential for bias in decision making. It is paramount that surgeons continue efforts to eliminate disparities in surgical indications based on race and socioeconomic status.

Table 1. Demographics of Pediatric Type II Supracondylar Humerus Fracture

Variable	Total Population (n=1539)
Age at Injury (y)	5.76 +/- 2.56
Sex	
Male	763 (49%)
Female	776 (51%)
Race	
White	908 (59%)
Black	174 (11%)
Asian	99 (6%)
South Asian	27 (2%)
American Indian/Native Alaskan/Hawaiian	7 (0.5%)
Multiracial	42 (3%)
Other	264 (17%)
Refused	18 (1.5%)
Ethnicity	
Non-Hispanic	1380 (90%)
Hispanic	136 (9%)
Refused	23 (1%)
Payor	
Commercial	1092 (71%)
Medicaid	391 (25%)
Self-Pay	19 (1.5%)
Government (Tricare)	10 (1%)
Other	27 (1.5%)
Mechanism of Injury	
Low energy fall	590 (39%)
High energy fall	214 (14%)
Sport	50 (3%)
Passenger in Body Powered Vehicle	35 (2%)
Passenger in Motorized Vehicle	12 (1%)
Direct Blow	15 (1%)
Not Reported	623 (40%)
Treating Surgeon Race	
White	1103 (72%)
Non-White	436 (28%)
Data are given as mean +/- standard deviation or n (%)	

Table 2. Demographic Differences in Treatment Type for Type II Supracondylar Humerus Fractures

Variable	Nonoperative Intervention (n=1384)	Operative Intervention (n=155)	P value
Race			0.865
White	812 (89.4%)	96 (10.6%)	
Black	157 (90.2%)	17 (9.8%)	
Asian	92 (92.9%)	7 (7.1%)	
South Asian	26 (96.3%)	1 (3.7%)	
American Indian/Native Alaskan	6 (86%)	1 (14%)	
Multiracial	39 (92.9%)	3 (7.1%)	
Other	235 (89%)	29 (11%)	
Refused	17 (94.4%)	1 (5.6%)	
Ethnicity			0.53
Non-Hispanic	1242 (90%)	138 (10%)	
Hispanic	120 (88%)	16 (12%)	
Refused	22 (96%)	1 (4%)	
Payor Status			0.906
Commercial	980 (90%)	112 (10%)	
Medicaid	352 (90%)	39 (10%)	
Self-Pay	18 (95%)	1 (5%)	
Government (Tricare)	10 (100%)	0 (0%)	
Other	24 (89%)	3 (11%)	
Data are given as adjusted percentage receiving procedure and significance level from Pearson Chi Square Test			