# Trends in Pediatric Distal Radius Fractures Presenting to a Single Level 1 Emergency Department

Eric Wenzinger, BS; Simon Ivey, MD; and Fernando Herrera, MD
Division of Plastic Surgery, Medical University of South Carolina and Ralph Johnson VA, Charleston, SC

## Introduction

Distal radius fractures comprise between 20-35% of all pediatric fractures and have been increasing in prevalence over the past 40 years [1, 2]. These fractures occur at a higher frequency in males and the peak incidence occurs during early adolescence (10 years of age) [3]. Management protocols of distal radius fractures in the pediatric population are highly debated, depending on multiple variables including degree of angulation and malrotation, displacement, and extent of soft tissue injury. Currently, most cases are treated with closed reduction and casting while those with excessive angulation, late presentation, or with significant soft tissue damage are treated operatively [1]. Recent literature suggests no need for closed reduction in a child less than 8 years old lacking risk factors for redisplacement with no rotational displacement, signs of neurovascular compromise, or open fractures. Many younger patients, even in the presence of malalignment will remodel with little to no cosmetic impairment or loss of function [4]. The purpose of this retrospective chart review was to characterize the trends found in pediatric patients presenting to a single a Level 1 Metropolitan Emergency Department with distal radius injuries. The data obtained will help guide residency education, resource management, and community based preventative measures.

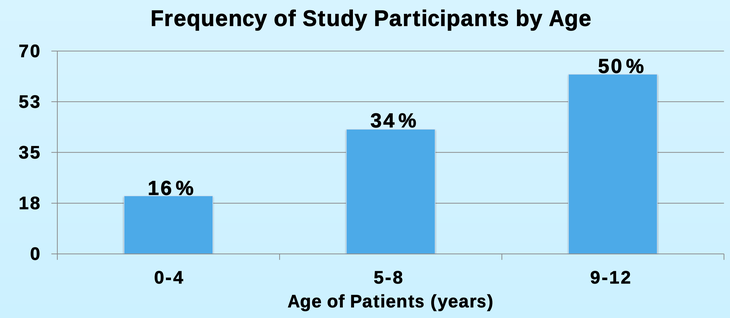
## Methods

Pediatric patients presenting to the emergency department with ICD 9 codes corresponding to distal radius fractures were identified. Patients with both bone fractures were excluded from the study. One-hundred and twenty-five patients met the exclusion criteria. Demographic information was collected for all patients including age, sex, race, insurance status, injury mechanism, treatment provided, fracture type, and co-morbid diagnoses. Patients were stratified into three age groups: 0-4 years, 5-8 years, and 9-12 years. Significance of categorical variables between groups was determined using chi squared analysis.

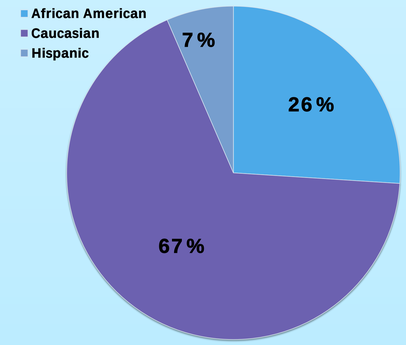
## Results

- Over half of patients in the study were male (57.6%).
- The most frequent age group was 9-12 years of age (49.6%) followed by 5-8 years (34.4%) and 0-4 years (16.0%).
- The majority of the patients were Caucasian (66.4%) while the remaining population were African American (25.6%), Hispanic (6.40%), and other (2.0%).
- Eight percent of patients had a psychiatric/developmental disorder (ADD, ADHD, ODD, MDD).
- The majority of patients had private insurance (54.4%) while (31.2%) had Medicaid, and (7.2%) were uninsured.
- The most common mechanism of injury was fall (89.6%) followed by MVA (4.8%) and blunt force trauma (4.8%).
- 49.6% of fractures were displaced, (12.0%) were non-displaced, and (38.4%) were buckle fractures.
- Displaced fractures were found to be more frequent in African American patients (59.4%) than Caucasian patients (44.6%).
- The majority of patients (57.6%) were treated with splinting while the remaining patients (42.4%) were treated with closed reduction and casting (CRC).
- Within the CRC group, 11% required further percutaneous pinning.

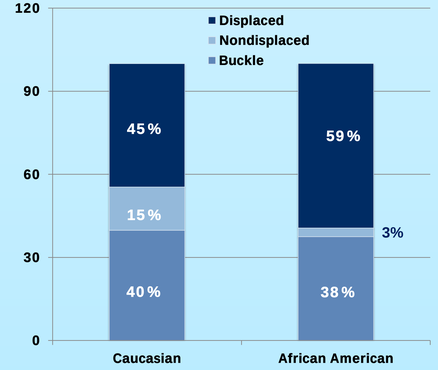
## Figures



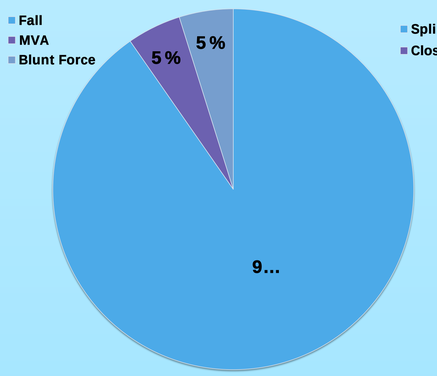

Distribution of Study Participants by Race



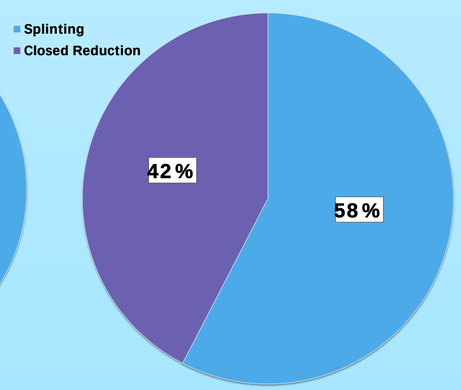

Distribution of Fracture Type by Race




Mechanism of Injury




Type of Intervention Provided




## Conclusions

Pediatric distal radius fractures are most commonly found in Caucasian males between the ages of 9 and 12 with private insurance. The most common mechanism was fall on the playground or at a sports related activity. Most of these fractures are displaced and do not involve the growth plate, requiring only conservative management (CRC or splinting). Due to the retrospective nature of this study, the precise setting and variables involved in these injuries will remain unknown. However, further investigation may provide insight into additional safety measures in order to decrease the occurrence of these injuries.

## Future Studies

Studies have suggested that pediatric distal radius fractures in the obese population may require more intensive initial treatment strategies such as percutaneous pinning under anesthesia [5]. We intend to complete a cost benefit analysis of using percutaneous pinning versus traditional closed reduction and casting for the treatment of displaced distal radius fractures in an obese population. Additionally, we plan to investigate the total cost of treating distal radius fractures in the obese population compared to their aged matched normal weight peers using conservative fracture management protocols.

## References

1) De Putter CE, van Beeck EF, Looman CW. Trends in wrist fractures in children and adolescents, 1997-2009. J Hand Surg Am. 2011 Nov; 36(11): 1810-1815.

2) Khosla S, Melton LJ 3rd, Dekutoski MB, Achenbach SJ, Oberg AL, Riggs BL. Incidence of childhood distal forearm fractures over 30 years: a population-based study. JAMA. 2003 Sep 17; 290(11): 1479-85.

3) Bailey DA, Wedge JH, McCulloch RG, Martin AD, Bernhardson SC. Epidemiology of fractures of the distal end of the radius in children as associated with growth. J Bone Joint Surg Am.1989; 71:1225-1231.

4) Parfitt AM, Travers R, Rauch F, Glorieux FH. Structural and cellular changes during bone growth in healthy children. Bone. 2000 Oct; 27(4): 487-94.

5) Auer RT, Mazzone P, Robinson L, Nyland J, Chan G. Childhood Obesity Increases the Risk of Failure in the Treatment of Distal Forearm Fractures. J Pediatr Orthop. 2015 Sep 20.