

# Comparative Analysis of Work Relative Value Units in Surgical Treatment of Common Orthopaedic Fractures: Ankle, Distal Radius, and Proximal Hip: A Propensity Score Matched Comparative Study

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## INTRODUCTION:

Ankle fractures, proximal femur fractures, and distal radius fractures are among the three most common fractures and have been estimated to comprise up to 40% of all fractures. Despite the high prevalence and cost of these fractures, there is limited understanding of how their treatment is valued within the current United States physician reimbursement system. In the United States, physician compensation under the fee-for-service healthcare model is determined through work Relative Value Units (wRVUs), a metric designed to standardize reimbursement based on the complexity and demands of medical procedures. Each medical procedure is assigned a Current Procedural Terminology (CPT) code and a corresponding wRVU value, calculated based on factors such as operative time, technical skill, and physician effort. Despite these measures, growing evidence suggests that wRVUs do not adequately capture physician time, skill, and effort. This study aims to evaluate the equity of wRVU allocation across ankle, proximal hip, and distal radius fracture fixation using the National Surgical Quality Improvement Program (NSQIP) database, with a particular focus on assessing potential undervaluation of ankle fracture management.

## METHODS:

NSQIP data from 2020-2022 was queried for ankle, proximal femur, and distal radius fractures based on CPT codes. Relative valuation between the three fracture types was assessed using operative time (OT), wRVUs, wRVU/hour, and reimbursement rates (\$/hour). Propensity score matching was conducted from age and sex variables to perform sensitivity analysis with the ankle fracture group as a reference. Two matched cohorts were constructed: (1) ankle fracture vs. proximal femur fracture patients (2) ankle fracture vs. distal radius fracture patients. Matched cohorts were constructed by finding patients with the same sex with an age within 2 years from each other. An analysis of covariance including postoperative complications and preoperative comorbidities were performed to adjust for their effect on the valuation of compensation metrics such as operative time, wRVU/hour, and reimbursement rate.

## RESULTS:

A total of 79,336 cases met inclusion criteria: 15,507 ankle fractures, 51,955 proximal hip fractures, and 11,874 distal radius fractures. Propensity score matched cohorts included 9,185 patients each for ankle vs. hip fractures and 10,423 each for ankle vs. distal radius fractures.

Rates of comorbidities were generally highest in proximal hip fractures patients. This finding was also observed in propensity score matched comparison between ankle and proximal hip fracture patients, while ankle fracture patients had more comorbidities in the matched comparison between ankle and distal radius fracture.

The proximal hip fracture group experienced higher rates of all primary and secondary outcomes, including mortality, readmission, and readmission rates. The only exception to this pattern is the elevated wound complication rates in the ankle fracture group compared to both the proximal hip and distal radius groups.

Compared to other fracture groups, the ankle fracture group had a significantly longer operative time (89.16 minutes for ankle fractures vs. 65.32 for proximal hip fractures vs. 71.21 for distal radius fractures, respectively,  $P < .001$ ), lower mean wRVU (10.29 vs. 17.94 vs. 11.55,  $P < .001$ ), wRVU/hour (10.37 vs. 21.66 vs. 11.393,  $P < .001$ ), and reimbursement rate (335.32 vs. 700.75 vs. 385.94,  $P < .001$ ). These trends persisted after adjusting for demographic differences, the rates of preoperative comorbidities, and postoperative complications.

Post-hoc analysis confirmed that ankle fractures had significantly lower wRVU, wRVU/hour, reimbursement/hour, as well as longer operative time, compared to proximal hip and distal radius fractures. In the matched analysis of ankle vs distal radius fractures, no difference in operative time is found after adjustment of the rates of preoperative comorbidities and postoperative complications, though wRVU, wRVU/hour, and reimbursement rate remain significantly different. All other compensation outcomes are unchanged in matched analysis of ankle vs. proximal hip and ankle vs. distal radius fractures.

## DISCUSSION AND CONCLUSION:

Our findings suggest that ankle fracture fixation is undervalued in the current wRVU system. Despite requiring significantly longer operative times, it yields lower wRVU/hour and reimbursement rate compared to proximal femur and distal radius fractures. This disparity persisted even after adjusting preoperative comorbidities and postoperative complication rates, pointing to the need to reevaluate wRVU allocation more accurately for the surgical treatment in ankle fracture.

