

# **Resident Involvement in the Surgical Treatment of Geriatric Femoral Neck Fractures Does Not Increase Risk: An Analysis of the ACS-NSQIP Database**

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## **INTRODUCTION:**

This study utilizes a national database to evaluate outcomes of resident surgeons participating in the surgical treatment of femoral neck fractures. Geriatric femoral neck fractures are a common orthopaedic injury which can have debilitating consequences for patients. Some authors have estimated hip fracture rates between 500,000 and one million per year by 2050. Educating orthopaedic residents on the surgical treatment of these fractures is important to optimize outcomes in this fragile patient population. Resident education requires sufficient case volume and exposure to treat injuries independently in clinical practice. Prior research of resident involvement in surgical management of intertrochanteric hip fractures showed no difference in mortality at 30-days, but with an increase in length of stay, time to discharge, and surgical time. Our hypothesis is that resident involvement in the surgical management of geriatric femoral neck fractures does not increase the risk of mortality.

## **METHODS:**

The American College of Surgeons National Surgical Quality Improvement (ACS-NSQIP) database from years 2011-2013 was surveyed for all patients treated for femoral head and neck fractures. Pathologic and periprosthetic fractures were excluded. Patients were divided into those treated with attending only involvement and those with resident and attending involvement. Procedural codes for replacement included total hip arthroplasty (CPT 27130) and hip hemiarthroplasty (CPT 27125, 27136) and codes for fixation included screw fixation (CPT 27235), extramedullary fixation (CPT 27244) and intramedullary fixation (CPT 27245). Within the inclusion criteria, A total of 485 patients were treated by resident and attending and 1,522 were treated by attendings.

Primary outcomes were 30-day mortality, readmission, and major complication rates. Secondary outcomes were length of stay, and length of surgery.

Propensity score matched cohorts were created with a 2:1 control:case ratio using the nearest-neighbor clustering algorithm. Univariable statistics were calculated using a Fisher's exact test for categorical variables and Kruskal-Wallis test for continuous variables. Multivariable regressions were performed using standard logistic regression for binary outcomes and linear regression for continuous outcomes. An alpha value of 0.05 was used to identify significant variables.

## **RESULTS:**

30-day mortality rate in the attending treated group was 5.0% and, in the resident treated group was 3.5% ( $p < 0.217$ ), 30-day readmission rate was 13.2% and 13.5% ( $p = 1$ ) respectively, neither of which was found to be statistically significant. Reoperation rate within 30-days was 3.3% in the attending treated group and 3.9% in the resident and attending group ( $p < 0.601$ ). Additional major complications assessed included superficial infection, deep incisional infection, pneumonia, pulmonary embolism and DVT, renal failure and urinary tract infection, stroke, and myocardial infarction. None were not found to be statistically different between treatment groups. Sepsis in the attending treated group occurred in 1.2% of patients while it was 2.9% of patients treated by residents and attendings ( $p < 0.023$ ). Additionally, 11.3% of patients treated by attending only and 17.3% of patients treated by resident and attending required post-operative blood transfusions ( $p < 0.001$ ).

Operative time for attending treated patients was 62 minutes (45 – 83.75) in the attending only group versus 89 minutes (66 – 110) in the resident and attending treatment group ( $p < 0.001$ ). Total length of stay was longer in the resident group at 6 days (4.0 – 8.0) versus the attending only group which was 5 days (4.0 - 7.0) with a  $p < 0.001$ .

After controlling for modifiers via propensity-score matching of controls (attending treated patients) and cases (resident and attending treated patients), only the requirement for blood transfusion, length of surgical time, and length of hospital stay were found to have statistical significance. Requirement for post-operative transfusion was higher in the resident and attending group at 17.1% compared to 9.4% in the attending only group ( $p < 0.001$ ). Operative time was also higher in the resident treated group at 89 minutes compared to 60 minutes ( $p < 0.001$ ). Patients treated by residents also stayed in the hospital a day longer on average with LOS of 6 days compared to 5 in the attending only group ( $p < 0.001$ ).

## **DISCUSSION AND CONCLUSION:**

Resident participation in the surgical treatment of geriatric femoral fractures does not increase the risk of mortality, readmission, or reoperation within 30 days. Patients treated by attendings only had a higher risk of mortality which corrects after matching for confounding variables via propensity-score matching. Patients treated by residents have a longer total surgical time, longer length of hospital stay, and higher likelihood of requiring a post-operative blood transfusion. Resident involvement in the surgical treatment of geriatric femoral neck fractures is essential to maintaining a capable and competent workforce for these devastating injuries. Attendings, residents, and patients should be aware that

resident involvement in the treatment of geriatric femoral neck fractures does not increase mortality or return to the operating room.