

Institutional Differences Underlie Variations in Efficiency and Outcomes of Hip Fracture Surgical Care: A Comparative Analysis within a Single Academic Health System

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INTRODUCTION: Hip fractures are a common injury associated with high rates of mortality and morbidity, often occurring in older patients who typically present with underlying comorbidities. The risks posed by these injuries warrant timely and effective surgical intervention to ensure appropriate treatment. In this study, we compared patient demographics and infrastructural characteristics across four closely situated hospitals (less than 6 miles apart) within a single urban academic health system to assess the critical factors underlying the varying efficiency with which hip fracture surgical care was provided.

METHODS:

We conducted a retrospective review of all patients who received surgical treatment for a hip fracture at four distinct critical access hospitals (CAH) within a single hospital system between August 1, 2020 – March 11, 2022. In total, 618 patient records were analyzed. Inclusion criteria consisted of patients over the age of 50 treated surgically for a femoral neck fracture, peritrochanteric fracture, or a subtrochanteric fracture by hip hemiarthroplasty (HHA), total hip arthroplasty (THA), or open reduction-internal fixation (ORIF). Conversion total hip arthroplasties, as well as greater trochanteric and periprosthetic fractures, were excluded from the analysis.

Patient demographics, preoperative comorbidities, time-to-surgery (TTS), procedure type, length of stay (LOS), 90-day complication rates, and incidences of patient transfer between hospitals were recorded. Complication categories and rates are tabulated in Table 1. LOS, shown in Table 2, was calculated as the total duration between the patient’s first presentation to the emergency department and discharge. Patient comorbidity scores were recorded in accordance with the Health-Related Quality of Life index.

RESULTS:

The patient populations were clinically comparable across all four hospitals with no significant differences in age, gender, or comorbidity scores. The pooled average complication rate was 47.70%. Blood transfusion was most commonly encountered (19.09%), as well as readmission (14.40%) and urinary tract infection (10.84%). Overall mortality was 3.72% (Table 1).

The average time required to transfer a patient between hospitals in the system was .88 days (SD = 1.173). Patients who were transferred experienced a slower TTS (2.71 days vs. 1.65 days, $p < .001$), as well as a longer overall LOS (9.85 days vs. 7.03 days, $p = .043$). Patients with higher comorbidity scores also experienced significantly longer delays in their TTS ($\beta = .065$, $p = .004$). Ultimately, a longer TTS was associated with a longer LOS ($\beta = 1.003$, $p < .001$) and a greater frequency of 90-day complications (OR = 1.117, $p = .026$).

LOS was significantly longer for those who experienced a complication within 90 days of their operation ($\beta = 2.682$, $p < .001$) and those with higher comorbidity scores ($\beta = .208$, $p = .019$). Patients with higher comorbidity scores across all four hospitals were associated with a greater frequency of 90-day complications ($\beta = 1.113$, $p < .001$).

DISCUSSION AND CONCLUSION: There are notable differences in outcomes and course of hospital stay among patients treated for hip fractures at four CAHs operating synchronously within a single academic health system. An analysis of key pre- and postoperative characteristics revealed that patients who required interfacility transfer were subject to significant delays before reaching the OR. Prolonging a patient’s time-to-surgery subsequently increased their cumulative length of stay and odds of experiencing a surgical complication. These findings suggest that hospitals within a multi-institution regional system may not function uniformly. It is crucial to understand the source of these differences - whether they be managerial, infrastructural, or logistical - as they may portend poorer patient outcomes.

Complication	Hospital A (%) n=136	Hospital B (%) n=103	Hospital C (%) n=302	Hospital D (%) n=77	% of All Cases n=618
Mortality	4 (2.94%)	4 (3.88%)	13 (4.30%)	2 (2.60%)	3.72%
Readmission	22 (16.18%)	17 (16.50%)	33 (10.93%)	17 (22.8%)	14.40%
Surgical site infection	0 (0.00%)	0 (0.00%)	3 (0.99%)	0 (0.00%)	0.00%
Urinary tract infection	17 (12.50%)	12 (11.65%)	33 (10.93%)	5 (6.49%)	10.84%
C. Diff Infection	1 (0.74%)	0 (0.00%)	1 (0.33%)	0 (0.00%)	0.32%
Sepsis	9 (6.62%)	6 (5.83%)	22 (7.28%)	5 (6.49%)	6.80%
Deep Vein Thrombosis	1 (0.74%)	1 (0.95%)	5 (1.66%)	4 (5.19%)	1.78%
Pulmonary Embolism	3 (2.21%)	3 (2.91%)	6 (1.99%)	3 (3.90%)	2.43%
Pneumonia	9 (6.62%)	4 (3.88%)	20 (6.62%)	4 (5.19%)	5.99%
Pressure Ulcer	7 (5.15%)	3 (2.91%)	7 (2.32%)	1 (1.30%)	2.91%
Transfusion	26 (19.12%)	26 (25.24%)	52 (17.22%)	14 (18.18%)	19.09%
Myocardial Infarction	0 (0.00%)	1 (0.95%)	5 (1.66%)	2 (2.60%)	1.29%

	Hospital A	Hospital B	Hospital C	Hospital D	Pooled Avg.
Time-to-Surgery (Days)					
Mean (SD)	1.12 (1.90)	1.45 (1.30)	2.04 (1.75)	1.92 (1.47)	1.73 (1.72)
Length of Stay (Days)					
Mean (SD)	6.73 (5.80)	7.06 (4.34)	9.01 (8.21)	8.10 (4.66)	8.08 (6.87)