TITLE: Admission Time Impact on Hip Fracture Outcomes: Retrospective Cohort Study in a Rural Hospital Setting

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INTRODUCTION: Rural hospitals and community centers often serve as comprehensive safety nets but frequently face limited resources and personnel for complex cases. Hip fractures, among the most common fractures in the elderly, carry high morbidity and resource demands. Limited research has examined how the timing of patient admission influences hip fracture outcomes in rural emergency departments. We hypothesized that admission timing would significantly affect delays between key procedural milestones and patient recovery.

METHODS**:** A retrospective cohort of 500 patients diagnosed with a hip fracture in the emergency department from January 1, 2020, to December 31, 2024, was included. Institutional Review Board approval was obtained. Hip fracture surgery outcomes and time intervals were compared to time on admission (12 AM-8:59 AM, 9 AM-4:59 PM, 5 PM-11:59 PM). Statistical analysis was conducted using chi-square and Kruskal-Wallis tests.

RESULTS: A total of 500 patients were included in the study, with 20.4% (102/500) admitted between 12 AM-8:59 AM, 39.8% (199/500) between 9 AM-4:59 PM, and 39.8% (199/500) between 5 PM-11:59 PM. Admission to procedure time was greatest during midday admission, roughly 10 hours and 3 hours longer than morning and night admissions, respectively (1373.5 vs 745.5 vs 1140 min; $p<0.001$). Nighttime admissions showed the longest median admission to orthopedic consult wait times at 747.5 min, roughly a 5-hour and 7-hour difference between morning and midday admits, respectively (747.5 vs 428 vs 296.5 min; $p<0.0001$). Readmittance after 28 days and complication rates were not significantly different between cohorts. However, there was a roughly 4% and 3% increase in complications for patients admitted in the morning compared to midday and night, respectively. Additionally, the median length of stay was found to be the greatest in hip fracture patients who were admitted midday compared to morning and night shift.

DISCUSSION: With an aging population, the incidence of hip fractures is expected to rise, placing increased strain on healthcare systems, particularly in rural settings with limited resources. Our findings demonstrate that admission timing significantly impacts patient care milestones, with midday admissions experiencing the longest delays to surgery and length of stay despite higher staffing levels, suggesting workflow inefficiencies or surgical scheduling conflicts. Nighttime admissions also showed substantial delays to orthopedic consultation, reflecting the challenges of limited on-call specialty availability in rural hospitals. Although complication and readmission rates were not significantly different between cohorts, the trend toward higher complication rates in morning admissions suggests that even modest delays may influence patient outcomes. These delays not only prolong hospitalization but also contribute to increased healthcare costs and resource utilization. Expanding midlevel provider coverage during peak hours and overnight may help streamline consultations, expedite surgical preparation, and alleviate surgeon workload. Such interventions could be particularly impactful in rural hospitals where staffing and resource constraints are more pronounced. Limitations of this study include its single-site design and the lack of national benchmarks for admission-to-consult and consult-to-procedure times, which limits generalizability. Future multicenter studies are needed to validate these findings and to establish standardized benchmarks that can guide quality improvement initiatives in hip fracture care.

CLINICAL RELEVANCE**:** Rural hospitals face unique challenges in timely hip fracture care due to limited resources. Identifying admission-based delays highlights opportunities for systematic interventions to shorten hospital stay, reduce costs, and improve patient outcomes.

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