Burning the Midnight Oil: Do Off-Hour Surgical Start Times Influence Surgical Precision and Outcomes in Geriatric Hip Fracture Patients?

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Purpose: The "off-hour" effect has been demonstrated to impact outcomes following surgery in non-orthopaedic settings. This study aims to identify if the "off-hour" effect impacts surgical precision and outcomes in geriatric hip fracture patients.

Methods: An IRB-approved prospectively collected hip fracture registry at an urban academic medical center was queried for the surgical start time of all operative patients. All patients were part of a system-wide hip fracture protocol and pathway. Each patient was reviewed for demographics, hospital quality measures, perioperative details, radiographic parameters, surgeon information, and outcomes. Patients were grouped into standard (7 AM-4:59 PM) and off-hour (5 PM-6:59 AM) cohorts depending on their surgery start time. Comparative analyses were conducted between the cohorts. One subanalysis of intertrochanteric hip fracture patients compared the quality of reduction as represented by the tip-to-apex distance (TAD), residual calcar step-off, and post-fixation neck-shaft angle (NSA); another subanalysis of patients treated with arthroplasty compared the rates of inpatient transfusion need and postoperative dislocation.

Results: 2334 patients underwent operative treatment. Apart from the off-hour cohort being older, there were no demographic differences between cohorts. The off-hour cohort had similar hospital quality measures and outcomes to the standard cohort including length of stay, rates of inpatient complication, mortality, and readmission. A sub-analysis of 814 intertrochanteric hip fractures demonstrated similar TAD, residual calcar step-off, and post-fixation NSA while a subanalysis of 713 arthroplasty patients showed similar rates of transfusion and dislocation between the standard and off-hour cohorts (Table 1). We also found that trauma and adult reconstructive surgeons operated more in the off-hour cohort in comparison to other orthopaedic subspecialties (P<0.001).

Conclusion: The time of day patients undergo hip fracture repair does not affect their surgical outcomes or hospital quality measures. These results further highlight the need for standardized hip protocols and treatment pathways to provide equitable care to patients at all hours of the day.

Table 1: Hospital Quality Measures and Outcomes

Outcomes	Standard Hours n (%)	Off Hours n (%)	Total n (%)	*P-Value*
N	1836	498	2334	
Complications				
Major Complications	200 (10.89%)	53 (10.64%)	253 (10.84%)	0.993
Minor Complications	716 (39.00%)	203 (40.76%)	919 (39.37%)	0.681
Hospital Quality Measures				
LOS *(d, *mean ± std)*	6.54 ± 4.21	6.68 ± 4.85	6.57 ± 4.29	0.266
Operative Time *(m, *mean ± std)*	123.08 ± 71.28	116.03 ± 55.82	121.97 ± 48.68	0.063
Time to Surgery *(d, *mean ± std)*	1.35 ± 1.90	1.38 ± 1.65	1.36 ± 1.86	0.569
Need for ICU	347 (18.90%)	90 (18.07%)	437 (18.72%)	0.768
Discharged Home	438 (23.86%)	110 (22.09%)	548 (23.48%)	0.454
Readmissions				
Within 30 days	140 (7.63%)	44 (8.84%)	184 (7.88%)	0.362
Within 90 days	241 (13.13%)	87 (17.47%)	328 (14.05%)	0.068
Mortality				
Inpatient	32 (1.74%)	7 (1.41%)	39 (1.67%)	0.898
Within 30 days	80 (4.36%)	18 (3.61%)	98 (4.20%)	0.629
1 Year	200 (10.89%)	58 (11.65%)	258 (11.05%)	0.926
Reduction Quality Sub-Analysis	628	186	814	
Tip Apex Distance (mm)	17.50 ± 6.24	18.45 ± 7.62	17.64 ± 6.31	0.071
# Patients with TAD>25mm	78 (12.42%)	22 (11.83%)	110 (13.51%)	0.829
Residual Calcar Step-Off (mm)	2.65 ± 3.64	2.12 ± 1.70	2.48 ± 3.54	0.076
Post-Fixation Neck Shaft Angle	129.53 ± 35.84	129.17 ± 49.64	129.55 ± 5.28	0.425
Arthroplasty Sub-Analysis	561	152	713	
Need for Trnnsfusion	99 (17.65%)	31 (20.39%)	130 (18.23%)	0.100
Rate of Post Operative Dislocation	9 (1.60%)	4 (2.63%)	13 (1.82%)	0.164