The Impact of Transitioning Elective Orthopedic Surgeries to the Ambulatory Setting on Acute-Care Hospital Operations and Quality

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INTRODUCTION: Total joint arthroplasty (TJA) and spine surgery are historically among the most commonly performed procedures in the acute-care hospital setting. However, both TJA and spine surgeries are increasingly being performed as hospital outpatient procedures or in the ambulatory surgery center (ASC) setting, a trend that is expected to continue in the coming years. As high-volume elective surgeries shift out of the acute-care setting, the acuity and complexity of patients requiring hospital care in the U.S. has increased. However, a paucity of evidence evaluating the effects of shifts in care delivery models—and the resulting changes in patient populations—on hospital operations and patient outcomes exists. The current study evaluates how the transition of TJA and spine procedures from the hospital to the ASC setting affected patient acuity and outcomes on a historically specialized hospital Joint and Spine Unit (JSU).

METHODS:

A retrospective review of 12,067 patients receiving care on the JSU during calendar years 2018-19 and 2022-23 was performed. In 2021, our institution began performing TJA and spine procedures in a de-novo hospital-affiliated ASC. Calendar years 2020 and 2021 were excluded from the analysis, as this period coincided with both the COVID-19 pandemic and the ASC ramp up period after the center's opening. Bivariate analyses were performed using a pre-post intervention (i.e. ASC opening) design. Comparisons of patient characteristics and outcomes between the two periods were performed for all patients, patients undergoing total joint or spine surgery, and patients not undergoing total joint or spine surgery (i.e. other surgical or medical admissions to the unit). Operational measures, quality indicators, and staffing measures were compared between time periods for the entire unit. Statistical significance was assessed at $p<0.05$.

RESULTS:

Compared to pre-ASC patients, those receiving care on the JSU after the opening of the ASC were older and had higher BMIs on average (both $p<0.001$). Further, the post-ASC population was more diverse, with a greater percentage of Black/African American patients (17.7 vs. 14.0%, $p<0.001$), Medicaid patients (1.7 vs. 0.6%, $p<0.001$), and patients without a spouse or life partner (40.8 vs. 31.9%, $p<0.001$). During the post-ASC period, patients presented with a higher comorbidity burden as demonstrated by higher Charlson Comorbidity Index (CCI) scores severity of illness and risk of mortality scores, and ASA scores (all $p<0.001$). Significant differences in case mix were also observed between periods. After the opening of the ASC, joint/spine surgery patients accounted for 71.0% treated on the unit, compared to 90.7% during the pre-ASC period ($p<0.001$). In contrast, ED arrivals increased from 5.3% to 24.2% of JSU patients post-ASC ($p<0.001$).

In joint/spine surgery patients, ED arrivals accounted for 2.3 and 3.4% of patients during the pre- and post- periods, respectively ($p=0.001$). In non-total joint/spine surgery patients the increase in ED arrivals was more pronounced, accounting for 33.8% and 75.2% of patients during the pre- and post-ASC periods, respectively ($p<0.001$). Further, a shift in case mix of non-joint/spine surgery patients was noted as the percent of other orthopedic surgery patients declined from 81.3% to 46.6% between periods ($p<0.001$), while medical admissions increased from 36.8% to 50.5% of patients ($p<0.001$).

Average hospital length of stay (LOS) increased (pre-ASC: 1.6 ± 1.4 vs. post-ASC 2.6 ± 3.6 days, $p<0.001$), and rates of 0 and 1 day LOS decreased while rates of 2+ day LOS increased (all $p<0.001$) during the post-ASC period. In addition, rates of SNF discharge and 30 day readmissions increased (both $p<0.001$), but 30 day ED return rates remained stable post-ASC opening. These trends appear to be largely driven by the outcomes of non-total joint/spine surgery patients. In this population, average LOS increased from 2.1 ± 1.8 to 4.4 ± 5.0 days ($p<0.001$) with rates of 2+ day LOS increasing from 44.3 to 80.2% ($p<0.001$) between periods. Additionally, rates of SNF discharges ($p<0.001$), 30 day ED returns ($p=0.013$), and 30 day readmissions ($p=0.004$) all increased during the post-ASC period. In contrast, joint/spine surgery patient average LOS increased slightly from 1.6 ± 1.3 to 1.8 ± 2.4 days, but rates of 2+ day LOS declined from 31.3 to 27.3% post-ASC. In this subset of patients, rates of SNF discharge decreased from 8.6 to 7.3% ($p=0.024$), while 30 day ED return and readmission rates remained stable post-ASC opening.

After the opening of the ASC, average daily census increased from 13.10 ± 5.79 to 16.75 ± 4.47 patients ($p<0.001$). No significant differences in quality indicators, including falls, catheter associated urinary tract infection, and hospital acquired pressure injury rates were observed between periods. With regards to unit staffing, no differences in nursing hours per patient day (NHPPD) (pre-ASC: 11.8 ± 1.3 vs. post-ASC: 11.5 ± 1.1, $p=0.444$) were observed between periods. However, CCI-adjusted NHPPD rates decreased significantly (pre-ASC: 12.4 ± 1.5 vs. post-ASC: 11.0 ± 1.3, $p<0.001$). Finally, overall unit turnover increased from 27 to 59%, bedside RN turnover increased from 17 to 46% and non-bedside RN (ie. all other staff) turnover increased from 34 to 77% between the pre- and post-ASC periods.

DISCUSSION AND CONCLUSION:

This study highlights the changing patient landscape of a specialized orthopedic unit that has seen a growth in medically complex cases amidst the opening of a hospital-affiliated ambulatory surgery center. As surgical procedures continue to transition towards outpatient sites of care, hospital leaders must consider how to effectively modify staffing allocations to keep pace with rapid changes in patient mix and acuity. Further, the study highlights the challenges of caring for a more racially and socioeconomically diverse population; it is imperative that hospitals continue to refine strategies for delivering high quality, equitable care as the demographics of patients treated in the acute-care setting evolve.