Trends in Total Joint Arthroplasty Cost During 2019-2023

Perry Lee Lim, Harry Liu, Antonia F Chen, Porter Jones, Vishal Hegde, Lucas Nikkel, Jonathan Franco¹, Ashish Mittal², Harpal Singh Khanuja, Catherine Julia Fedorka³

¹Mass General Brigham, ²Palo Alto Medical Foundation, ³Cooper University Hospital INTRODUCTION:

Total joint arthroplasty (TJA) is one of the most common and costly surgical procedures in the United States, with significant implications for healthcare economics and patient outcomes. The existing literature on TJA cost trends primarily focuses on insurance reimbursements and payer perspectives, leaving a gap in understanding the direct surgical costs from a provider's perspective. Such an understanding is crucial for healthcare providers seeking to implement cost-effective practices without compromising the quality of care. Previous studies on TJA hospital cost trends have been limited in scope, often based on data from a small number of institutions. These studies fail to capture the broader cost dynamics across diverse healthcare settings. Additionally, many studies do not disaggregate costs into specific categories such as personnel and supply costs, which are critical for identifying cost-saving opportunities. The objective of this study is to delineate TJA hospital cost trends from 2019 to 2023 using a comprehensive dataset that includes a large number of institutions across the United States. This study aims to analyze the overall trends in TJA hospital costs over the specified period, examine the underlying drivers of these cost trends, focusing on personnel and supply costs, and provide detailed cost breakdowns by type of surgery (hip, knee, shoulder), surgical phase, and type of implants. METHODS:

This retrospective analysis utilized the Avant-garde Health CareMeasurement database from 2019-2023. A random sample of 2,400 TJA procedures was extracted per calendar quarter, adjusting for the low volume during the second quarter of 2020 due to the COVID-19 pandemic, resulting in a total sample of 48,000 TJA procedures for the five-year study period. TJA procedures were identified using ICD-10, DRG, and CPT codes. Hospital characteristics were obtained from the 2024 Hospital General Information file from the Centers for Medicare and Medicaid Services. The procedure cost data were derived using the Time-Driven Activity-Based Costing (TDABC) approach. The cost estimates were categorized by type of surgery (hip, knee, shoulder), surgical phase (preoperative, surgery, post-acute care unit [PACU], and postoperative), and type of implants. Linear regression analyses were performed to examine the relationship between time and each cost category.

RESULTS:

Between 2019 and 2023, 48,000 TJAs were analyzed across 50 different institutions. Of these, 46,433 procedures (96.7%) were performed in hospitals, and 1,567 procedures (3.3%) were conducted in ambulatory surgical centers. The breakdown of TJAs included 51.5% TKAs, 41.2% THAs, and 7.3% TSAs. Over the five-year period, the average overall cost of TJA remained relatively stable, ranging from \$8,312.30 in 2019-1Q to \$8,424.10 in 2023-4Q (P=0.35). Specifically, TKA costs ranged from \$7,986.50 in 2019-1Q to \$7,795.00 in 2023-4Q (P=0.33), THA costs ranged from \$8,183.90 in 2019-1Q to \$8,148.20 in 2023-4Q (P=0.45), and TSA costs increased from \$11,895.80 in 2019-1Q to \$12,938.70 in 2023-4Q (P<0.001). However, when comparing the change in total cost over time, TKAs and THAs experienced a 2.4% and 0.4% decrease, respectively. In contrast, the cost of TSAs increased by 8.8% in 2023 compared to 2019. The average personal cost of TJA decreased by 18.6% (P<0.001), ranging from \$3,717.4 to \$3,024.7. A further breakdown of TJA personnel costs reveals a 3.5% decrease in preoperative personnel costs (P<0.001), 9.4% decrease in surgery personnel cost (P<0.001), and a significant 42.9% decrease in postoperative personnel cost (P<0.001). Conversely, there was a notable 25.6% increase in PACU personnel costs (P<0.001). The average supply cost of TJA increased significantly by 17.5%, rising from \$4,594.90 to \$5,399.30 (P<0.001). Specifically, the average supply cost increased by 11.2% (P<0.001) for THA, 16.0% (P<0.001) for TKA, and 19.4% (P<0.001) for TSA. Implant costs rose by 12.6% (P<0.001) for THA, 16.8% (P<0.001) for TKA, and 20.2% (P<0.001) for TSA. The primary drivers were acetabular components (12.0% increase, P<0.001) for THA, patella components (14.9% increase, P<0.001) for TKA, and glenoid components (27.9% increase, P<0.001) for TSA.

DISCUSSION AND CONCLUSION: The present study reveals that while overall THA and TKA costs have slightly decreased, TSA costs have increased. While personnel costs overall decreased, it is interesting to note the overall increase in PACU costs and decrease in postoperative costs likely reflecting the trend to more outpatient arthroplasties over the study period. Meanwhile, supply costs, particularly implant costs, have increased. These findings highlight the need for targeted cost-management strategies focusing on supply and implant expenses to enhance the cost-effectiveness of TJA procedures without compromising the quality of care.