

Cost Analysis of Primary Shoulder Arthroplasty in the United States: What are the Economics Behind Cost-Efficient Care?

Emilie Cheung¹, Katherine Corso², Biju Varughese³, Jill Ruppenkamp², Manuel Fuentes⁴

¹Stanford Medicine, Redwood City, CA, ²Johnson & Johnson, MedTech Epidemiology, Raynham, MA & New Brunswick, NJ, ³Johnson & Johnson MedTech Health Economic and Market Access, Warsaw, IN, ⁴Johnson & Johnson MedTech Medical Affairs, Palm Beach Gardens, FL

Email of Presenting Author: evcheung@stanford.edu

Disclosures: Dr. Emilie Cheung (Consultant of Johnson & Johnson), Katherine Corso², Biju Varughese³, Manuel Fuentes⁴ (Employees of Johnson & Johnson, Inc.)

INTRODUCTION: The rate of Total shoulder arthroplasty (TSA) has significantly increased in the United States, with projected growth volume of >235% over the next 5 years. Given this growth, it's important for payers, hospital providers and clinicians to understand costs associated with this procedure to foster cost-efficient care. The objective of this study was to describe the index and post-operative costs of patients receiving TSA in both an inpatient and outpatient hospital setting.

METHODS: A descriptive, retrospective, observational cohort study design was used. Patients aged 18 or older, who had an elective Anatomic TSA, Reverse TSA or Hemi-arthroplasty from January 2021 to September 2024 were identified in the PINC AI Healthcare Database, a hospital-based data source that represents all regions of the United States, using International Disease Procedure Code, 10th edition or Current Procedural Terminology 4th edition codes. Inclusion criteria were primary diagnosis of shoulder osteoarthritis, rotator cuff tear, post-traumatic osteoarthritis, rheumatoid arthritis, or shoulder dislocation. Patients were excluded if they had a diagnosis of acute proximal humerus fracture, proximal humerus fracture with malunion, nonunion or delayed healing, upper arm or shoulder fracture, trauma, infection or cancer. In addition, patients were excluded if they had revision or primary TSA in the year prior to the index TSA or if they had bilateral TSA in the period after index. Hospital costs were collected within the admission for index TSA and from one day post-operatively, up to twelve months after the TSA procedure. Hospital costs were adjusted to year 2023 in United States Dollars (USD). Descriptive analysis was performed to summarize index, post-operative and total one-year hospital costs using mean and standard deviation. One-year hospital costs were summarized for patients that had post-operative infection or revision. Only patients with continuous hospital information for 365 days after TSA were included in the one-year hospital cost analysis.

RESULTS SECTION: This study had 18,964 patients available for analysis. Patients' mean (standard deviation (SD)) age was 70.0 (8.6) years and 54.6% of patients were female. Most surgeries were performed in hospital outpatient settings (80%). The mean (SD) length of stay was 0.35 (1.0) days. Operating room time was 150.4 (225.5) minutes. The total index hospital costs were \$20,476 (9,007). Within this cost, mean (SD) supply costs were \$11,649 (\$7,499), operation room costs were \$6,500 (\$3,199), and room and board costs were \$491 (\$1,649) (Figure 1). The remainder of the total hospital costs (\$1,836) were for services such as, but not limited to, laboratory tests, radiology, and EKG (Figure 1). There were 10,752 patients with continuous one-year hospital information available for analysis. Of these patients, 47.3% had an all-cause hospital revisit within one-year post TSA; 7.6% patients returned for a shoulder-related hospital revisit. Among the all-cause hospital revisits, 7.6% were readmissions, 12.2% were in the emergency room (ER) and 41.8% were in "non-ER, non-inpatient settings" which can include but is not limited to hospital outpatient. For the shoulder-related visits, most were in non-ER, non-inpatient settings (6.5%), followed by readmissions (1.5%) and ER (0.3%). The mean (SD) total one-year all-cause hospital revisit cost was \$3,955 (\$12,243) and shoulder-related hospital revisit cost was \$730 (\$4,575). Among each cost type, non-ER, non-inpatient settings of care incurred the highest mean cost for both all-cause at \$2,012 and for shoulder-related at \$382). ER incurred the lowest cost for both all-cause, at \$154 and for shoulder-related at \$2.39). The mean (SD) one-year hospital cost, when accounting for both index and all-cause revisit costs, was \$24,722 (\$15,850). When considering the shoulder-related revisit costs plus index cost only, the mean one-year hospital cost was \$21,498 (\$10,548). Patients with post-operative infections (representing 0.7% of patients) had a total mean (SD) one-year hospital cost of \$52,952 (\$30,339) and without infection had mean (SD) costs of \$24,521 (\$15,519). The mean (SD) shoulder-related revisit costs plus index cost for patients with post-operative infection was \$ 47,316 (\$24,012) and without infection was \$ 21,314 (\$10,160).

DISCUSSION: This study suggests hospital supply costs are the most expensive item of an index TSA procedure, accounting for 57% of costs. Operating room costs account for the second most expensive component. Therefore, these two factors should be the targeted when striving for cost-efficiency during an index TSA. Post-operative hospital visits to non-inpatient, non-ER care settings are key contributors to the cost of all-cause and shoulder-related revisits. Patients with post-operative infection had higher total one-year hospital costs. Therefore, cost containment efforts should be directed towards the following: 1.) Supply costs, 2.) Operating room costs, 3.) Medical optimization to avoid all-cause (non-shoulder related) revisits and 4.) Post-operative infection.

SIGNIFICANCE/CLINICAL RELEVANCE: (1-2 sentences): The results from this study suggest potential options for cost containment strategies for TSA procedures.

Figure 1. Breakdown of hospital costs

