Optimizing Healthcare Dollars Spent on Total Shoulder Arthroplasty: Can the Choice of Implant System Affect Total Cost?

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INTRODUCTION: The rate of both primary and revision shoulder arthroplasty procedures is projected to increase exponentially in the next 20 years. Currently, the growth of total shoulder arthroplasty (TSA) is surpassing that of total knee or total hip arthroplasty. Healthcare systems around the world are exploring ways to improve efficiencies and control costs. Studies have shown that optimizing instrumentation trays for orthopaedic procedures yield reduction in processing time and cost. In this descriptive summary, we report the real-world patient outcomes and healthcare resource utilization of a new total shoulder arthroplasty system, INHANCE™ Shoulder System. We have also included established shoulder arthroplasty systems that are equivalent comparators in this analysis to provide context for INHANCE™ Shoulder System.

METHODS: A descriptive, retrospective, observational cohort study design was used. No comparisons between INHANCE™ Shoulder System and equivalent comparators were made. Patients, aged 18 or older, who had an elective Anatomical TSA, Reverse TSA, or Hemiarthroplasty 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. Patients were limited to the TSA implant systems of interest. Patients were required to have a primary diagnosis of shoulder osteoarthritis, rotator cuff tear, post-traumatic osteoarthritis, rheumatoid arthritis, or shoulder dislocation. Patients were excluded if they had a diagnosis code at index TSA of acute proximal humerus fracture, proximal humerus fracture with malunion, nonunion, delayed healing, upper arm or shoulder fracture, trauma, infection or cancer. Patients were also excluded if they had evidence of revision TSA at index or during the follow up period, if they had revision or primary TSA in the year prior to index TSA or if they had bilateral TSA in the period after index TSA. Patient characteristics and outcomes were collected within the admission for index TSA and from one day post-operatively up to twelve months after TSA.
The data were analyzed descriptively for all patients, and separately for INHANCE™ Shoulder System and the class of comparators including frequency and percents for categorical data and mean and standard deviation for continuous data. No statistical testing was performed in this study. Hospital costs were inflated to year 2023 and represent United States Dollars (USD).

RESULTS SECTION: For the INHANCE™ Shoulder System cohort, there were 1,201 patients available for analysis. The mean age (standard deviation) of patients was 69.3 (9.0) years and 48.6% were male. Patients with an Elixhauser comorbidity score of >/=5 was 8.0%. Only 13% of TSAs were inpatient. The mean (SD) operation room time was 131.7 (74.9) minutes. Most patients were discharged to home or home health after TSA (95.6%). Within 30 days of TSA, there were no occurrences of irrigation and debridement procedures. The incidence of revision or device removal was 0.8%. The 30-day risk of all-cause hospital revisits was 16.9% and shoulder-related hospital revisits, which represent a subset of the all-cause revisits, was 2.6%. The risk of all-cause and shoulder-related readmissions was 1.1% and 0.5%, respectively. The risk of all-cause and shoulder-related emergency room (ER) visits was 2.9% and 0.5%, respectively. The one-year risk of irrigation and debridement was 0.3% and revision or device removal was 2.9%. All-cause hospital revisits within one-year was 47.9%, and shoulder-related hospital revisits was 6.6%. The one-year risk of all-cause readmissions was 6.6% and shoulder-related readmissions was 1.3%. The one-year risk of all-cause and shoulder-related ER admissions was 14.3% and 0.8%, respectively. The one-year total mean (SD) hospital cost, accounting for both index and any all-cause revisits to the same hospital, was $22,571 ($15,937). When accounting for only shoulder-related revisits, the one-year total mean (SD) hospital cost was $19,252 ($10,287).
In the established TSA systems cohort, there were 17,763 patients available for analysis. The mean (SD) age was 70.0 (8.6) years and 45.2% were male. Patients with an Elixhauser comorbidity score of >/=5 was 9.5%. Inpatient surgeries were not frequent (21.0%). The mean (SD) operation room time was 151.7 (232.2) minutes. 96.1% of patients were discharged to home or home health after TSA. Within 30 days of TSA, there were no occurrences of irrigation and debridement procedures. The incidence of revision or device removal was 0.3%. All-cause and shoulder-related hospital revisits within 30 days of TSA were 17.6% and 2.6%, respectively. The all-cause and shoulder-related readmission risks were 1.3% and 0.2%. The risk of all-cause and shoulder-related emergency room (ER) visits was 3.1% and 0.04%, respectively. The one-year risk of irrigation and debridement was 0.2% and the risk of revision or device removal was 2.2%. The one-year all-cause hospital revisits and shoulder-related revisits were 47.2% and 7.6%, respectively. The one-year risk of all-cause readmissions was 7.6% and shoulder-related readmissions was 1.5%. The one-year risk of all-cause and shoulder-related ER admissions was 12.1% and 0.2%, respectively. The one-year total mean (SD) hospital cost, accounting for both index and any all-cause revisits to the same hospital, was $24,800 ($15,842). When accounting for only shoulder-related revisits, the one-year total mean (SD) hospital cost was $21,579 ($10,549).

DISCUSSION: This study provides early clinical and economic data on a new TSA system, INHANCE™ Shoulder System as well as established systems in the marketplace. These results provide insights on the index and postoperative healthcare resource utilization in a hospital setting. One-year all-cause total healthcare costs were more costly than one year shoulder-related total healthcare costs for TSA. Therefore, preoperative medical optimization could be targeted as a prevention strategy to optimize cost-efficiency.

SIGNIFICANCE/CLINICAL RELEVANCE: (1-2 sentences): This study adds to the body of evidence on TSA devices by providing clinical and economic data on a newer TSA system to the market.