Patient-Level Value Analysis in Anatomic Total Shoulder Arthroplasty: Evaluating a One-year Episode of Care

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INTRODUCTION: Anatomic total shoulder arthroplasty (aTSA) is one of the most commonly performed procedures among shoulder surgeons. As the cost of care increases in North America, there is increased pressure to assess the value of procedures implement value-based care strategies. Patient-level value analysis (PLVA) is one tool that has been developed to assess value. This methodology has been implemented in other commonly performed orthopaedic procedures including rotator cuff repair and total joint arthroplasty, however it has not been conducted for aTSA. The purpose of this study was to assess the one-year value of care delivery of this procedure and identify characteristics influence value.

METHODS: The study institution's patient-reported outcome measure (PROM) database was queried for all aTSA procedures performed from 2018-2022. Any procedure that was not a unilateral primary aTSA for osteoarthritis or rotator cuff arthropathy, or lacked PRO data was excluded. The main PROM used was the American Shoulder and Elbow Surgeons (ASES) score. Cost was adjusted for inflation and assessed using time-driven activity-based costing (TDABC) over the course a one-year episode of care. The primary outcome was the one-year value quotient (Vq), which is the ratio of the one-year change in ASES scores to the TDABC total cost of care. Spearman correlations, independent sample t-tests, analysis of variance (ANOVA), and linear regression analyses were conducted to assess characteristics that may affect the value of care delivery.

RESULTS: A total of 145 aTSA patients were included. More than half of patients were female (n=79, 54.5%), with an average age of 67.5±7.5. The overall average one-year cost of care was $15,290±4,106. Implants were the largest contributor to cost (41.9%) (Figure 1). A diagnosis of diabetes and undergoing surgery on the dominant arm were associated with higher costs ($p<0.018$). Undergoing surgery at a hospital vs. ambulatory surgery center (ASC), surgery requiring an inpatient stay, and being discharged to specialized nursing facility (SNF) were all associated with a higher cost of care ($p<0.001$). The use of cement was also predictive of lower costs ($p=0.017$), while subscapularis repair and stem length were not ($p>0.095$). The average one-year change in ASES was +31.7±25.0. The total cost of care did not correlate with ASES scores ($r=-0.08$, $p=0.641$) (Figure 2). Female sex and surgery on the nondominant arm predicted larger positive changes in ASES scores ($p<0.044$).

DISCUSSION AND CONCLUSION: As costs increase, surgeons and healthcare administration need to find and implement strategies to reduce cost while maintaining patient outcomes. The cost of care was not found to correlate with patient outcomes, suggesting that meaningful cost containment strategies will not hinder care delivery and outcomes. This study found that the value of care delivery in aTSA is influenced by a patient's preoperative medical history, sex, arm dominance, implants, surgery setting, and discharge disposition. While some of these factors are not changeable, reducing implant cost, performing surgery in an ASC, and discharging patients home when medically appropriate appear to be meaningful ways to reduce costs while maintaining patient outcomes. Healthcare leaders can use PLVA to evaluate care at their respective institutions and maximize the value of care delivery.