Shortened Length of Stay and its Impact on Total Shoulder Arthroplasty Expenses

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INTRODUCTION: Both anatomic and reverse total shoulder arthroplasty has seen a noticeable increase in the United States over the last decade. The surge has raised concerns about the financial impact on healthcare institutions, particularly in the context of an aging population. A reduction in length of stay (LOS) postoperatively is a clear way to reduce hospitals' cost and labor burden. This study aimed to quantify how much the reduction in length of stay has impacted the costs of total shoulder arthroplasty.

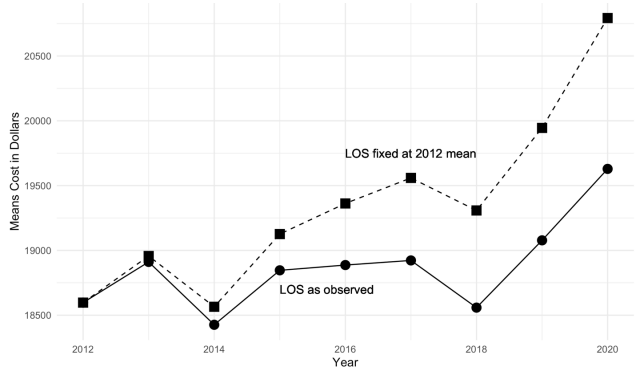
METHODS: The National Inpatient Sample (NIS) database was queried for patients who underwent elective TSA for a diagnosis of osteoarthritis between 2012 and 2020. Demographic, comorbidity, and general characteristics were quantified and presented in for the entire, 2012, and 2020 cohorts. To quantitate national estimates, results were adjusted according to the weights provided by the NIS database. Cost was calculated by multiplying the cost-to-charge ratio of the hospital provided in NIS by the charge of the surgery to the hospital. This cost was inflation-adjusted to the year 2020. Bivariate linear regression was conducted to examine the trend of length of stay over the 8-year span. A multivariate gamma regression with log link was utilized to model the cost of TSA. The covariates included were the patient's age, gender, presence of hypertension, history or current smoking, obesity, presence of other comorbidities, length of stay, and year of operation. Once the model was fitted, the predicted values of cost was plotted. Finally, instead of using the observed length of stay per year, the length of stay was fixed at the 2012 mean in the model, and those predicted values were plotted.

RESULTS SECTION: Numbers are reported as national estimates. In all, 527,300 patients were identified with an average age of 69.2 years, and 46.5% were male. The average LOS in 2012 was 2.01 days and had a decreasing trend to 1.24 days in 2020 (ß = -0.01, $p < 0.001$). Multivariate analysis revealed that increased LOS postoperatively was an independent predictor of increased cost of surgery after adjustment for covariates including overall health of the patient. There was an observed increase in cost even after accounting for the decrease in length of stay. Keeping pace with the rising costs of health care, the cost of surgery would have increased 11.8% ($18,597.03 to $20,792.84) from 2012 to 2020 if surgeons maintained the 2012 LOS; however, costs only increased 5.5% ($18,597.03 to $19,628.92) from 2012 to 2020 due to the overall decline in postoperative inpatient lengths.

DISCUSSION: Hospital costs for total shoulder replacement increased substantially from 2012 to 2020. These observed values were most likely dampened by the simultaneous reduction in length of stay from 2012 to 2020. By recognizing the tangible link between shorter lengths of stay and economic savings, healthcare institutions can make informed decisions that promote both fiscal responsibility and quality patient care. With the increasing utilization of total shoulder arthroplasty in the United States, continuing to decrease the length of stay is an imperative target in reducing hospital costs.

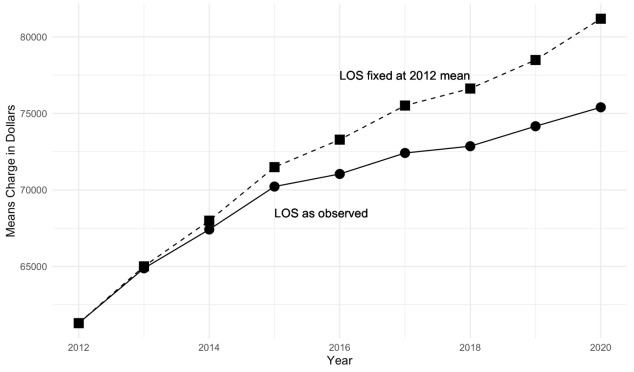
SIGNIFICANCE: This investigation emphasizes the essential link between shorter hospital stays and cost reduction in total shoulder arthroplasty. Insight into the financial impact of postoperative stay duration empowers healthcare institutions to optimize economic efficiency and patient care quality, crucially as demand for total shoulder arthroplasty rises.

Figure 1. Cost when LOS is Fixed vs. When LOS is Observed



Cost of TSA	2012	2020	% Increase
LOS as Observed	$ 18597.03	$ 19628.92	5.50%
LOS when Fixed	$ 18597.03	$ 20792.84	11.80%

Figure 2. Hospital Charge when LOS is Fixed vs When LOS is Observed



Hospital Charge	2012	2020	% Increase
LOS as Observed	$ 61295.06	$ 75398.82	23.00%
LOS when Fixed	$ 61295.06	$ 81185.04	32.40%

Figure 3. Linear Regression of Length of Stay per Year for TSA Patients