US Regional Trends in Total Hip Arthroplasty Facility Costs and Relationship with Readmission and Revision: 2016-2021

Austin Ryan Chen, Kaitlyn L Hurka, Ria M Desai, Kranti C Rumalla, Isaac Sontag-Milobsky, Adam Edelstein

INTRODUCTION:

Total hip arthroplasty (THA) is a common and cost-effective procedure that provides pain relief and restores function to a growing population of advanced arthritis patients. There is significant variability in THA costs, especially between inpatient and outpatient facilities. Implementation of bundled payment models to replace fee for service models in 2016 reduced costs for patients undergoing THA. Existing studies have examined trends in THA costs at individual institutions, but there is a paucity of literature regarding regional trends and differences. This study seeks to fill this gap and assess regional variation in THA costs and their relationship to readmissions and revisions.

METHODS:

Patients undergoing elective primary THA between January 2016 and December 2021 were identified from the Premier Healthcare claims database, a national multi-payor claims dataset recording data from 1,076 facilities. Patient were grouped into the 9 US census divisions based on recorded demographics and comorbidities. Encounter features (outpatient setting, length of stay (LOS), discharge status), costs (index encounter, 90-day post discharge), and outcomes (90-day readmission, 1-year reoperation) were calculated per quarter per region. Costs were adjusted to 2023 dollars. Using multivariate linear and logistic regression, regional differences in costs and postoperative outcomes were compared, adjusting for comorbidities, demographics, and length of stay. To assess for the relationship between costs and outcomes, univariate and multivariate models were constructed.

RESULTS:

627,593 THA patients were included (Table 1). Nationally, between Q1-2016 and Q4-2021, LOS has declined (2.44 to 0.87,p<0.001) and home discharge has risen (77.5% to 90.5%,p<0.001) (Figure 1). Same-day discharge THA% increased from 0.0% in Q1-2016 to 25.1% in Q1-2020 (p<0.001) and grew to 69.6% by Q42021 (p<0.001). Nationally, index encounter total costs decreased 15.9% from $19,915.78 to $16,748.38 (p<0.001) (Figure 2). 90-day readmission (7.1% to 4.4%,p<0.001) and 1-year revision rate (8.6% to 3.4%, p < 0.001) declined significantly (Figure 2). Multivariate analysis shows significant cost differences between regions from -$3.33K (CI 95%[-$3.45k,-$3.22k],p<0.001) in East South Central to +$3.14k (CI 95%[+$3.02k,+$3.25k],p<0.001) in the Pacific relative to the South Atlantic (Figure 3). In multivariate adjusted analysis of costs and outcomes, higher costs are associated with slightly lower risk for 1-year revision (OR0.99[CI95%0.97,1.00],p=0.04) and slightly higher risk for 90-day readmission (OR1.02[CI95%[1.00,1.03],p=0.05) (Table 2).

DISCUSSION AND CONCLUSION:

This study provides an epidemiological analysis of trends in THA encounter features, costs, and outcomes across a time of major policy changes to THA medical management and reimbursement. The impact of the Center for Medicare and Medicaid Services bundled payment model for THA is reflected in declining encounter total costs, 1-year revision rates, and 90-day readmission rates. These changes are accompanied by an increase in outpatient THAs and home discharges and steadily declining LOS since 2016.

We find significant differences in costs and outcomes between regions that persist after adjustment in multivariate linear and logistic models. Further study into the unique features of regions, hospitals, and providers delivering high value care is needed. This study also establishes a significant relationship between costs and outcomes. We hypothesize this significant relationship is a function of cost capturing patient complexity and risk that cannot be adequately captured by administrative codes but is reflected in higher costs of care. This study is limited by its observational nature and data collection. In particular, post-discharge costs are only tracked at the hospital where the index surgery occurred. Costs attributable to readmission and revision are well tracked while outpatient recovery, like discharge to an skilled nursing facility or physical therapy, are not. This study provides insights into the national and regional level response to bundled payments and the shift to outpatient THA that have driven costs and outcome improvements described in the literature.