

Age and Frailty Influence Hip and Knee Arthroplasty Reimbursement in a Bundled Payment Care Improvement Initiative

Andrew M. Pepper, MD, David Novikov, BS, Zlatan Cizmic, MD, John Barrett, BS, Michael Collins, BS, Ran Schwarzkopf, MD, Richard Iorio, MD, William J. Long, MD

Introduction: The Bundled Payment Care Improvement (BPCI) initiative aims to improve the quality of patient care while mitigating cost. How patient age and frailty affect reimbursement after hip and knee total joint arthroplasty (TJA) is not known. This study aims to evaluate if patient age and frailty affect cost of care.

Methods: A retrospective review of 1821 patients undergoing TJA at our institution under the BPCI initiative was performed from 2013 to 2016. We recorded demographics for patients, including age, and calculated their modified frailty index (mFI). Cost of care was obtained for each patient. Statistical analyses included T-test and ANOVA to evaluate age and frailty as independent categorical variables. Beta coefficients were utilized to evaluate age as a continuous variable. Multivariate linear regression models evaluated age and frailty's combined contribution to cost.

Results: Age was evaluated as a categorical variable, with the median age of our sample population the categorical cutoff. Age greater than or equal to 72 years old increased cost by 8.6% and increasing mFI score increased cost by 4.4%, 10.8%, 31.7%, 35.3%, 69.1% for mFI scores 1-5, respectively (p-values<0.01). Age demonstrated an increase in cost of 0.68% per incremental age increase (p-value<0.01). Multivariate evaluation of increasing age and mFI revealed increased cost: mFI 2, 9.7% (CI 5.1%, 14.3%), mFI 3, 29.9% (CI 22.1%, 27.6%), mFI 4, 33.8% (CI 20.0%, 47.6%), mFI 5, 67.4% (CI 39.2%, 95.6%) (p-values<0.01).

Conclusions: Increasing age and frailty increase the cost associated with TJA. The BPCI initiative over-simplifies the cost associated with TJA. This information could de-incentivize care to older, higher-risk patients. Objective patient-specific/ risk-adjusted stratification of BPCI pricing is necessary to be considered as a valid financial model.