Refining Risk Adjustment of 90-Day Costs Following Surgical Fixation of Ankle Fractures: Moving Toward Bundled Payments in Orthopaedic Trauma

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Purpose: Current literature revolving around understanding determinants of 90-day costs following ankle fractures is limited to single-institution studies. As the current health-care model transitions from fee for service to value-based payments, risk adjustment of 90-day costs will be a key factor driving success of these bundled payment models. The current study utilizes a national Medicare database to understand patient-level, procedure- level, and state-level variation in 90-day costs following open reduction and internal fixation (ORIF) of isolated ankle fractures.

Methods: The 2005-2014 5% Medicare SAF (Standard Analytical Files) database was queried using CPT codes to identify patients undergoing ORIF for unimalleolar (27766, 27769, 27792), bimalleolar (27814), and trimalleolar (27822, 27823) isolated ankle fractures. All payments/reimbursements starting from day 0 of surgery up to day 90 postoperatively were used to calculate 90-day costs. Patients with missing data were excluded. Multivariate linear regression modeling was used to derive marginal cost-impact of patient-level (age, gender, comorbidities), procedure-level (fracture type, morphology, location of surgery, concurrent ankle arthroscopy, and syndesmotic fixation), and state-level factors on 90-day costs following surgery.

Results: A total of 6499 patients were included in the study. The risk-adjusted 90-day cost of a non-geriatric (age <65 years) female patient undergoing outpatient ORIF for a closed unimalleolar ankle fracture was $8915 ± $1054. Individuals aged 65-69 years versus <65 had significantly lower costs (–$1967). Procedure-level factors associated with significant marginal cost increases were inpatient surgery (+$5577), trimalleolar fracture (+$1082), and syndesmotic fixation (+$2822). The top 5 comorbidities with largest marginal cost increases were chronic kidney disease (+$8897), malnutrition (+$7908), obesity (+$5362), cerebrovascular disease/stroke (+$4159), and anemia (+$3087). Significant state-level variation in 90-day costs was seen with Nevada (+$6371), Massachusetts (+$4497), Oklahoma (+$4002), New Jersey (+$3802), and Maryland (+$3,043) having the highest marginal cost increase and Idaho (–$6025) having the lowest.

Conclusion: The current study identifies numerous patient-level, procedure-level, and state-level factors that significantly contribute to the cost variation seen in 90-day costs following ORIF for ankle fractures. Risk adjustment of 90-day costs will become a necessity as bundled-payment models begin to take over the current fee-for-service model in fracture patients.