Postoperative Complications and Hospital Payment: Implications for Achieving Value

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BACKGROUND: As the current healthcare structure moves toward value-based purchasing, it is helpful for stakeholders to understand costs, particularly for those associated with postoperative complications. The objectives of this study were to assess hospital reimbursements for postoperative complications and generate insight into sustainability of quality.

STUDY DESIGN: American College of Surgeons NSQIP and Medicare claims data from 2009 to 2012 were merged for elective colectomy, total knee arthroplasty, and carotid endarterectomy. Payments associated with 7 postoperative complications across each operation were estimated from multivariable regression models. The impact on hospital marginal costs was estimated from the regression results by accounting for complication incidence rates.

RESULTS: Mean hospital payments per uncomplicated procedure were approximately $13,500 for colectomy (n = 19,089), $12,300 for total knee arthroplasty (n = 17,834), and $7,300 for carotid endarterectomy (n = 16,207). The payment amount per complication increased at a rate of $10,996 for colectomy, $13,732 for total knee arthroplasty, and $8,435 for carotid endarterectomy. When distinguishing between types of complications, the most expensive complication was prolonged ventilation, increasing mean payment by approximately $14,100 (colectomy) and $6,700 (carotid endarterectomy), respectively. Hospital marginal costs accounting for complication rates added additional amounts ranging from 0.82% to 9.2%.

CONCLUSIONS: Postoperative complications add an important marginal cost to Medicare payments, and lead to a substantial portion of payments to hospitals. Using high-quality clinical registry data to measure complication rates, we estimated the cost of complications for 3 commonly performed operations among the Medicare population. Harmonizing financial incentives for both payers and providers are needed to improve the delivery of high-quality surgical care. (J Am Coll Surg 2017;224:779–786. © 2017 by the American College of Surgeons. Published by Elsevier Inc. All rights reserved.)

Rising healthcare costs in the US pose a major problem.[1] Healthcare expenditures have increased substantially in the last several decades, reaching $3.0 trillion in 2014, or 17.5% of the gross domestic product.[2,3] Medicare spending alone accounted for 21% ($618.7 billion) of those expenditures.[2,3] Given the aging population, projections indicate that costs will continue to rise, and the anticipated burden has prompted efforts to reform the payment system.[4,5] Recent initiatives from the Centers for Medicare and Medicaid Services (CMS) have focused

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Abbreviations and Acronyms

ACS = American College of Surgeons
CMS = Centers for Medicare and Medicaid Services
MEDPAR = Medicare Provider Analysis and Review
MS-DRG = Medicare Severity Diagnosis-Related Group
SSI = surgical site infection
TKA = total knee arthroplasty

on efforts to increase value by reducing healthcare spending and improving quality of care, and have involved shifting financial accountability to hospitals and other providers.

The Patient Protection and Affordable Care Act of 2010 included provisions to address the high cost and suboptimal quality of healthcare in the US through pay-for-performance programs. One such program, the Hospital-Acquired Condition Reduction Program, is intended to improve patient safety by applying payment reductions to hospitals with poor performance related to reasonably preventable hospital-acquired conditions.[6] Reflecting the high cost and potential morbidity associated with surgical procedures, several Hospital-Acquired Condition Reduction Program measures relate to surgical care, with the most recent addition being postoperative surgical site infections (SSIs) after colectomy or hysterectomy. An intent of the program is to increase hospital accountability for preventing these costly postoperative complications.

The 2015 Medicare Access and CHIP Reauthorization Act encourages development of alternative payment models. Episodic payments or procedure-bundled payments are already changing reimbursement as well as clinical practice.[7] To help understand how these and other changes might affect both hospital-based payments and quality-improvement strategies that might involve payment restructuring, it is helpful to understand the degree to which postoperative complications affect hospital payments. The objectives of this study were to estimate the cost of individual postoperative complications for 3 common procedures using high-quality clinical registry data, and to estimate the marginal impact on hospital payments overall for these specific procedures.

METHODS

Data source and patient population

Data from 2009 to 2012 from the American College of Surgeons (ACS) NSQIP and the Medicare Provider Analysis and Review (MEDPAR) files were merged using a probabilistic matching algorithm based on the following indirect patient identifiers: hospital, age, sex, diagnosis, admission age, discharge date, and procedure.[8,9] Patients for whom Medicare was not the primary payer, who were missing an admission date or discharge date, or were discharged against medical advice, were excluded.

The ACS NSQIP has been described in detail previously.[10,11] Briefly, it is a prospectively specified, multi-institutional, clinical data registry that collects detailed patient and operative information, including preoperative patient comorbidities and postoperative occurrences within 30 days from the index operation. Data are derived from medical records, direct patient contact, or both, rigorously specified, and subject to internal validation procedures to ensure data integrity.

Claims submitted to CMS for reimbursement comprise the MEDPAR data.[12] The data contain hospital discharge abstracts for all fee-for-service acute care hospitalizations of US Medicare beneficiaries.[13] Although data are de-identified at the patient level, hospitals are identifiable and each Medicare beneficiary has a unique identification number, allowing for linkage of longitudinal hospital visits. Data include diagnoses, procedures, Medicare Severity Diagnosis-Related Group (MS-DRG), date of service, and actual Medicare payment amounts.[14]

Using this merged ACS NSQIP and MEDPAR data, the study cohort included patients at least 65 years of age who underwent elective colectomy, total knee arthroplasty (TKA), and carotid endarterectomy. These operations were chosen because they are commonly performed in the Medicare population, represent different degrees of perioperative risk, and vary in their postoperative care. Because MEDPAR data only contain inpatient payments, none of the included operations were performed on an outpatient basis.[12,13] This study was deemed exempt from additional review and oversight by the Northwestern University IRB, as patient information is pre-existing and de-identified in both data sources.

Hospital payment

The primary end point of interest was payments to hospitals, not charges. Payments made by CMS rely on the MS-DRG to categorize hospitalizations according to the illness treated and account for disease severity.[12-15] Each MS-DRG is assigned a specific payment weight, calculated from the national mean payments for Medicare patients in that MS-DRG, including nursing services, room and board, diagnostic and ancillary services, and procedures performed during the stay.[9] The relative weight for each MS-DRG is used to calculate a payment for each hospitalization above or below the annually set base operating and capital payment rates. Payments are then adjusted for geographic differences (eg cost of living and labor costs), for costs incurred by GME, and in