

Cost of Surgical Treatment for Distal Radius Fractures and the Implications of Episode-Based Bundled Payments

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Purpose To examine the cost of care of surgical treatment for a distal radius fracture (DRF) and develop episodes that may be used to develop future bundled payment programs.

Methods Using 2009 to 2015 claims data from the Truven MarketScan Databases, we examined the cost of care for surgical treatment of DRFs among adult patients in the United States. We excluded patients with concurrent fractures, patients who required complex care, and patients in assisted living facilities. We extracted data on cost and type of services provided to eligible patients, tracking patients from 3 days prior to operation to 90 days after operation. From these data, we developed 4 episode-of-care scenarios to develop an estimated bundled payment. We computed the variation in cost between surgery types, time periods, and type of service provided.

Results Our final sample included 23,453 DRF operations, of which 15% were performed on patients 65 years of age or older. The majority (88%) underwent open fixation, the option associated with the highest cost. The average cost of care for a DRF patient ranged from \$6,577 to \$8,181 depending on the definition of an episode-of-care. Regardless of definition, the variation in cost was high. The cost of surgery itself composed 61% to 91% of the total cost of an episode. Of claims not directly related to the surgery, anesthesia and drugs, imaging, and therapy costs composed the next greatest proportions of the total cost of care.

Conclusions Many DRF surgical episodes incur substantially higher costs than the average. To maximize cost reduction, bundled payments for DRFs are best designed with a clinically narrow definition that is limited to services related to the fracture and long enough to capture relevant postoperative therapy and imaging costs.

Clinical relevance This study provides insight on spending to lay the foundation for shifting reimbursement strategies. (*J Hand Surg Am.* 2018; ■(■):■—■. Copyright © 2018 by the American Society for Surgery of the Hand. All rights reserved.)

Key words Bundled payment, cost, distal radius fracture, episode-of-care, surgery.

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EPISODE-BASED BUNDLED PAYMENTS are on the foreseeable horizon as a reimbursement method in hand surgery. In contrast to historic fee-for-service models, standard bundled schemes provide a single payment that is split among relevant providers and facilities within a predefined episode-of-care.^{1,2} Because providers must share a single fee, there is a greater incentive to reduce spending on services that might be considered discretionary, to achieve higher quality care, and to prevent a loss in profit.¹⁻³ Bundled payments have been suggested as

a feasible method of controlling the escalating costs of health care in the United States, one of policy makers' top priorities.^{2,4}

Surgery, which is predicted to account for about 40% of hospital and physician spending,⁵ has been identified as a prospective area for cost containment through bundled reimbursement.^{5,6} Historically, episode-based bundles have been developed around either a diagnosis or an operation. In other words, the episode-of-care may be based on a condition, like diabetes, or a procedure, such as total knee arthroplasty. As of 2017, the Centers for Medicare and Medicaid Services (CMS) Bundled Payments for Care Improvement Initiative has been pilot testing programs for over 45 different episodes using 4 broad models of care.⁷ Bundled payment schemes also exist in the private sector.^{8,9} Although they have not yet gained popularity in the field of hand surgery, bundled payments may be introduced to stabilize or reduce national health care expenditure.

Based on recommendations from the Center for American Progress,¹⁰ numerous hand procedures warrant consideration for episode-based reimbursement. Surgical treatment of a distal radius fracture (DRF), for instance, is a strong candidate. Because treatments have an identifiable beginning and end point, episodes are easily defined. In addition, DRFs are common. The incidence of DRF among U.S. adults has grown over the past two decades.^{11,12} Among individuals ages 65 and older, DRFs account for about 18% of all fractures.^{12–14} Furthermore, there are multiple operations for a DRF that produce similar long-term functional outcomes.^{15–17} Although certain interventions may be favored by surgeons or patients, existing guidelines do not suggest a clearly superior option. Finally, treatment requires participation of a broad spectrum of providers. Throughout the care process, an individual may interact with emergency department personnel, surgeons, anesthesiologists, radiologists, therapists, and others.

In this historical claims analysis, we assessed costs and developed an episode-based payment scheme for the surgical treatment of DRFs in adult patients. Similar investigations have been performed for cardiac, orthopedic, spinal, and oncological procedures.^{5,18,19} First, we aimed to examine the general cost of DRF surgery and break down payments by the type of service provided. Second, we aimed to develop a bundled payment scheme and compare the implications of various episode-of-care definitions on the development of the bundles. We hypothesized that there would be substantial differences in cost among procedure types and that the majority of cost

would be associated with the operation itself, rather than pre- or postoperative services. Given the paucity of information on case rates in hand surgery, this study can identify sources of high cost and provide insight on spending to lay the foundation for a shift in reimbursement strategies.

MATERIALS AND METHODS

Data source

We used insurance claims from the 2009 to 2015 MarketScan Commercial Claims and Encounters Database and Medicare Supplements to compile payment information. The MarketScan dataset includes data from over 43 million individuals across the United States. It is the largest convenience sample available among proprietary datasets and is large enough to be nationally representative of individuals in the United States with employer-provided insurance.²⁰ These data facilitate longitudinal tracking of enrollees over time. They also permit researchers to capture complete episodes of care through the compilation of claims from office visits, hospital stays, prescription information, and laboratory tests.^{20,21}

Sample selection

We identified patients who underwent surgical intervention of a closed fracture of the distal radius using Current Procedural Terminology (CPT) Codes (Fig. 1). Three surgical options were considered: open reduction and internal fixation (ORIF), percutaneous pinning, and external fixation. We included multiple operations to best portray how a bundled payment scheme would likely be implemented into practice. Inclusion of multiple procedures also helps dilute physician-level influence on which operation the patient undergoes. Although a viable treatment option, we did not consider casting or orthosis fabrication in our bundled payment schemes. It is well known that the cost of nonsurgical treatment is considerably less than that of surgery,²² and its inclusion into a bundled payment scheme would disproportionately skew the average cost of the bundle estimates to such an extent that is unreasonable for implementation into clinical practice.

To ensure our sample included only patients who underwent surgery for an associated injury, we used *International Classification of Disease*, Ninth Revision (ICD-9), codes to exclude patients without a primary diagnosis of DRF as well as patients treated for major trauma. Because bundled payment plans attend to the costs for a single episode-of-care, patients who sustain multiple injuries that require simultaneous care plans would likely be ineligible for this type of reimbursement plan. Thus, we excluded

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