Return to Sender

Hospital Readmission After Percutaneous Coronary Intervention*

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Percutaneous coronary intervention (PCI) plays a pivotal role in the therapeutic management strategies for patients with either acute or nonacute coronary artery disease syndromes. When legislation enacted in 1983 replaced cost-based payment for hospital days and services with a set payment per admission based on the patient’s diagnosis-related group (DRG), the goal was to encourage more efficient care and shorter hospital lengths of stay. Concerns were acknowledged that this reimbursement strategy might inadvertently provide incentive for premature hospital discharge for the index hospitalization and/or the “unbundling” of services in order to receive separate, additional payments for what could have been a single clinical episode. Thus, an unintended consequence of the DRG payment scheme could be an increase in rehospitalization rates. After more than 2 decades, policy makers are now focused on rates of rehospitalization in an effort to improve quality of care and to reduce health care costs. Although considerable data are available regarding rehospitalization attributable to specific conditions, especially heart failure, very limited information is available regarding the broader scope of diseases and processes that influence the frequency and patterns of rehospitalization.

In this context, Curtis et al. (1) provide a timely and intriguing analysis of PCI practice in the U.S. in this issue of the Journal. In a retrospective cohort study, they analyzed Medicare fee-for-service administrative claims from a large, contemporary PCI population and conclude that approximately 1 in 7 (14.6%) Medicare patients who undergo PCI are rehospitalized within 30 days of the index procedure. Although readmission rates varied widely across hospitals, patients who were readmitted were almost 6 times more likely to die. How should we interpret these observations, and what caveats should be applied?

First, the outcome of interest analyzed is all-cause readmission after PCI. Although most relevant from a patient standpoint, this variable may introduce “noise,” particularly in patient cohorts with multiple comorbidities. Further determination of a specific cardiovascular causality or relationship to the index PCI procedure may be difficult to adjudicate from the administrative claims-made database analyzed. Second, the 14.6% incidence of rehospitalization within 30 days after PCI requires closer examination from several perspectives. Although this figure appears to be significantly less than the 19.6% 30-day readmission rate reported using fee-for-service administrative claims from an unselected global cohort of almost 12 million Medicare beneficiaries, this difference is likely explained by the marked heterogeneity of Medicare patients, as well as the likelihood that Medicare patients who undergo PCI are younger and healthier than the overall Medicare population. Indeed, risk-averse utilization of invasive procedures (the “treatment risk paradox”) has previously been documented (3). Third, by restricting their analyses to hospitals that performed >50 PCIs on Medicare fee-for-service patients, the authors may have, to at least some degree, "volume credentialed" the hospitals included. As hospital procedural volume is a significant determinant of outcomes after PCI (4), this somewhat arbitrary cut point for exclusion may have influenced the observed readmission rate. It should be acknowledged that Medicare fee-for-service represents approximately 50% to 60% of all PCI volume in the U.S. and thus not the actual total hospital PCI volume. The exclusion of lower-volume centers was likely chosen in an attempt to filter out hospitals that only performed primary PCI for patients with ST-segment elevation myocardial infarction (STEMI), a group more vulnerable to readmission. In addition, the minimal volume threshold for inclusion should provide a more stable estimate of readmission rates at hospitals performing PCI. Although this exclusion applied to only 6,923 patients, the expected result would be a lower readmission rate, particularly because the authors identified acute myocardial infarction as a predictor of subsequent early rehospitalization. Furthermore, a statistically significant but clinically quite modest difference in readmission rates by hospital PCI volume strata was observed. Finally, no data are provided on the influence of physician PCI volume, an established determinant of PCI outcomes (5), on subsequent hospital readmission rates.

Fourth, although readmission within 30 days was significantly more frequent in patients who had myocardial infarction on their index hospitalization, stratification by type of infarction is not provided. It must be acknowledged that the International Classification of Diseases-Ninth Revision-Clinical Modification codes in administrative data do not accurately distinguish between STEMI and non-STEMI types of infarction (6). This limitation is unfortunate, as further
stratification by infarct type may have provided useful insight into PCI practice strategy and the role of planned readmission for “staged” PCI procedures. Intuitively, readmission for a staged PCI procedure would be more likely to occur after STEMI compared with non-STEMI infarction events. Indeed, multivessel (vs. culprit vessel only) PCI has been advocated for the treatment of non-STEMI syndromes (7,8), whereas this practice is not recommended during primary PCI for STEMI (9). The availability of more robust clinical information with which to complement the administrative claims-made data might have provided insights into the relative frequency of readmission by infarct type. Such data may also help identify the reasons prompting readmission, as well as its variable occurrence. For example, it has been estimated that ~10% of rehospitalizations are planned (2). In this regard, it is noteworthy that 27.5% of readmissions were associated with an additional revascularization procedure, which was PCI in 94% of cases (1). Interestingly, fewer than 20% of these readmissions were associated with an acute cardiovascular condition (myocardial infarction, unstable angina, arrhythmia, or heart failure), and the majority were ascribed to chronic ischemic heart disease. The most common index surgical procedure associated with subsequent rehospitalization in Medicare patients is cardiac stent placement, and the most frequent reason for rehospitalization after stent deployment is the placement of another cardiac stent (2). Although clinical practice guidelines for PCI acknowledge specific scenarios wherein the staging of PCI procedures may be reasonable (10), the present study raises questions regarding the more systematic utilization of this practice. Even in the most complex of clinical scenarios involving multivessel PCI for 3 vessels and/or left main coronary artery disease, in which an average of 4.6 stents per patient was deployed, staging of PCI procedures was required in only 14% of cases (11). Although data on the number of stents deployed per patient are not provided by Curtis et al. (1), the assumed lesser degree of anatomic complexity in the current Medicare cohort raises concern regarding procedural staging for nonclinical indications, such as reimbursement. To this point, the fixed-rate DRG-based payment does not provide incremental reimbursement in cases requiring multiple stent deployment. This limitation is particularly pertinent in the era of drug-eluting stents due to the relatively high unit cost (≥$2,000) associated with these devices. The practice of unbundling services in order to access incremental reimbursement is suggested by the reports of both Jencks et al. (2) and Curtis et al. (1). Indeed, in comparing the top and bottom deciles for hospital readmission (Fig. 2 of Curtis et al. [1]), the greatest relative increment is observed in that portion of readmissions associated with a revascularization procedure (PCI).

Fifth, what are the reasons for variability in readmission, and what can be done to further address this issue? Curtis et al. (1) identify statistically significant but clinically modest variability in readmission on the basis of hospital profit, teaching, and specialty status. Wider variability in the frequency of hospital readmission by geography was observed. Patient demographic factors that were associated with readmission included increasing age, female sex, and comorbidities such as diabetes, heart failure, renal insufficiency, and known prior ischemic heart disease. Acknowledging the complexity and diversity of factors that contribute to hospital readmission, the 2008 MedPAC report recommendation that “risk-adjusted” rehospitalization rates be published within 2 years is concerning (12). The striking variability in this measure across various patient populations in addition to the challenge of appropriate and accurate risk adjustment is evident from the rates of hospital readmission to 30 days after PCI in commercially insured populations (Anthem Blue Cross/Blue Shield of Ohio; UnitedHealthcare U.S. commercial cohort) during 2008. Average readmission rates by payor ranged between 5.6% and 10.8%, with wide variability by market and facility. These readmission rates appear appreciably lower than those reported by either Curtis et al. (1) or Jencks et al. (2) and may be explained by the younger average age (55.3 to 57.0 years) of the patient cohorts analyzed, as well as a lower prevalence of comorbidities (R.F. Shonk, B.C. Malinowski, personal communications, April 28, 2009). Of note, the National Quality Forum has adopted 2 measures of hospital performance based on the rate of rehospitalization (13), and the Centers for Medicare and Medicaid Services (CMS) has suggested making rehospitalization rate a measure for value-based hospital payment (14). In an attempt to create shared incentives to provide more efficient and coordinated care between the inpatient and outpatient domains, MedPac has gone so far as to recommend that hospitals be allowed to financially reward physicians for helping to reduce readmissions and that CMS establish a pilot program to test bundling payments for an episode of care extending beyond discharge for select conditions (15).

The need for enhanced coordination of care is suggested by the fact that no physician encounter occurred between the time of hospital discharge and subsequent readmission in more than one-half of all Medicare patients discharged with a medical condition who required rehospitalization (2). In this regard, controlled studies have demonstrated that specific interventions at the time of hospital discharge can reduce the rate of subsequent rehospitalization (16,17). The most definitive evidence comes from studies evaluating the coordination of care for congestive heart failure. It may be appropriate for the CMS pay-for-performance program to incorporate indicators that reflect the coordination of care after discharge, such as the reconciliation of medications both on discharge and again after home arrival, the arrangement of timely follow-up, and the provision of timely and complete medical records regarding the hospital course to the outpatient provider.

Should hospital readmission after PCI be adopted as a quality measure for the performance of PCI? Benchmarking a quality performance measure without firm understanding of the multiple and diverse factors (patient, procedural, hospital, practice process, and so on) that contribute to its occurrence is challenging and potentially unreliable. Furthermore, the integration of inpatient and outpatient do-
 mains required to efficiently effect process change, and thus impact readmission rates, is tantamount to the creation of programs for disease management across multiple disease processes and procedures. The seamless integration of information technology (hardware, software, personnel for data management) necessary to provide continuous quality improvement is logistically formidable and costly. Indeed, the very low levels of adoption (<10%) of electronic health records by U.S. hospitals suggest that organizations such as MedPAC, CMS, and National Quality Forum should first thoughtfully provide incentives for these changes in an effort to enhance the integration and quality of patient care (18).

The current proposal is to develop readmission benchmarks for specific conditions on the basis of a weighted average of all related DRGs that is risk-adjusted for patient severity of illness and case type (19). The readmission benchmark would include all readmissions that result from complications or related conditions, but would exclude readmissions deemed not to be potentially preventable (including planned readmissions). When patients are readmitted to a hospital different from their index admission hospital, the readmission counts toward the index hospital rate. Beginning in October 2012, hospitals with readmission rates above the 75th percentile for selected conditions would be subject to a 20% payment withhold on a DRG-by-DRG basis based on the prior year’s performance. Payment withhold could be reimbursed if the patients involved do not have “preventable” readmissions within 30 days of discharge. Beginning in October 2014, acute hospital services and post-acute care services occurring or initiated within 30 days of hospital discharge will be paid through a bundled payment. The first phase of this payment bundling policy will apply to admissions for conditions accounting for the top 20% of post-acute care spending.

The alignment of incentives among doctors and hospitals to create better integrated systems for care is a desirable objective of these policy changes and will likely require a waiver or revision of current law, which precludes collaboration in collective bargaining between these entities. Furthermore, the ultimate success (quality and cost) of the integration strategy may require that patients who are currently free to migrate between hospital systems stay within their index system for care.

Readmission after PCI is but 1 piece from the larger puzzle of health care process reform. Although a 30-day “warranty” after hospital discharge is an admirable aspiration, the incentives and tools required to successfully accomplish process improvement must first be put into place.

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