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DRG MIGRATION: A NOVEL MEASURE OF INEFFICIENT SURGICAL CARE IN A VALUE-BASED WORLD

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Abstract

Background—Diagnosis-Related Group (DRG) migration, DRG 331 to 330, is defined by the assignment to a higher cost DRG due only to post admission comorbidity or complications (CC).

Methods—We assessed the 5% national Medicare data set (2011–2014) for colectomy (DRG's 331/330), excluding present on admission CC's and selecting patients with one or more CC's post-admission to define the impact on payments, cost, and length of stay (LOS).

Results—The incidence of DRG migration was 14.2%. This was associated with statistically significant increases in payments, hospital cost, and LOS compared to DRG 331 patients.

Conclusions—When DRG migration rate was extrapolated to the entire at risk population, the results were an increase of Centers for Medicare and Medicaid Services (CMS) cost by \$98 million, hospital cost by \$418 million, and excess hospital days equaling 68,669 days. These negative outcomes represent potentially unnecessary variations in the processes of care, and therefore a unique economic concept defining inefficient surgical care.

Keywords

DRG Migration; Value-Based Care; Colectomy; Medicare

INTRODUCTION

Colectomy is a common procedure in the patient population covered by the Center for Medicare and Medicaid Services (CMS) and is performed for a number of common disease states including, but not limited to colorectal cancer, diverticulitis, and inflammatory bowel disease. CMS reimburses hospitals for colectomy based on Medicare Severity-Diagnosis Related Group (**MS-DRG**). The MS-DRG uses a three-tier system adopted in 2007, felt to better reflect the severity of illness and economic exposure of the provider compared to the prior two-tier DRG system. This system for colectomy also represents significant

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incremental cost to CMS by category for the MS-DRGs (331- \$9,913; 330- \$15,150; and 329- \$ 29,586). The primary drivers of MS-DRG assignment are (in increasing order of severity: no complication/comorbidity, Complication/comorbidity (CC), Major complication/comorbidity (MCC).

For colectomy, patients with no CC are classified as DRG 331; patients with at least 1 CC but no MCC are classified as DRG 330 and patients with MCC are classified as DRG 329. As a result, it is possible to further separate DRG 330 patients into three groups: 1) only CC's which occur during the admission; 2) only CC's present on admission (i.e., pre-existing co morbidity); or 3) a combination of pre-existing CC's and CC's developing during the admission. The first group of 330 patients mentioned would have been considered DRG 331 on admission, and therefore, would have "migrated" to the more expensive MS-DRG 330 only due to postoperative events implying potentially inefficient care with opportunities for process improvement for prevention. Such inefficiency has been described differently by others; however, the conclusion remains the same regarding the negative impacts on cost and resource use.¹ Therefore, understanding the specific reasons for this "migration" and its effect on healthcare resource utilization may help surgeons, hospitals, and policymakers to better collaborate on meaningful quality improvement to realize shared savings. This type of analysis allows all the stakeholders to understand the potential cost of new processes of care, the effectiveness of these processes, and the potential impact on provider margin and payor savings. A rational assessment of these factors is important before making conclusions about quality or implementing significant changes in payment policy.

The purpose of this study was to use the concept of DRG migration to assess the impact only of postoperative complications on payor and provider costs, and hospital bed consumption utilizing only the mandated and regulated data reported to CMS for billing purposes.

METHODS

Data

The retrospective study uses 5% national Medicare data from the CMS. The database contains information pertaining to claims for procedures and services provided to Medicare beneficiaries. Specifically, we used Medicare provider analysis and review file (MedPAR) for inpatient claims and beneficiary summary files.

Study Population

The study population included patients undergoing colectomy in 2011–2014. We identified patients with DRG 331 and 330. DRG 331 is described as the code for major abdominal small and large bowel surgery without comorbidity/complication, whereas, DRG 330 is described as major abdominal small and large bowel surgery with comorbidity/complication. We included patients if they were 65 years or older.

DRG Migration Rate

DRG migration was defined as the occurrence of only post admission CC's in patients assigned to DRG 330 in the database. The exclusion of pre-admission CC's helps to define a

population where adverse outcomes were related exclusively to the processes of care rather than the impact of significant physiologic derangements, which would require risk adjustment methodologies to compare outcomes. CCs were identified based on the Medicare CC database. We defined the DRG migration rate as the ratio of patients designated as “migrated” to the sum of migrated 330 patients and DRG 331 patients.

Outcomes

We distinguished the impact of DRG migration on excess hospital length of stay (LOS) and CMS charges and payments. These charges refer to the total value (covered and non-covered) of all services provided, and these payments refers to the amount covered by Medicare and therefore, underestimates patient or secondary insurer costs by as much as 20%.

Covariates

Patient demographics such as age, gender, race/ethnicity, and region were used as covariates in this study. Race/ethnicity was classified as non-Hispanic white, non-Hispanic black, Hispanics and others. Regions were classified as South, Northeast, West, and Midwest.

Statistical Analysis

We used descriptive statistics to describe the study cohort and outcomes. Categorical variables were reported using proportion and continuous variables using mean and standard deviation. Analysis of variance was used to compare LOS, charges, and payments across different groups.

The Institutional Review Board at the University of Texas Medical Branch approved the study. SAS 9.4 was used for all statistical analysis.

RESULTS

DRG Migration Rate

A total of 22,673 colectomies were performed during the study period, of which, 15,380 (68%) were DRG 330 and 7,383 (32%) were DRG 331. In the DRG 330 group, 1,577 patients had no CC present on admission but developed post-admission CC's: 644 patients with 1 CC, 371 with 2 CC, 129 with 3 CC, 47 with 4 CC and 33 with 5 CC. As for 353 patients, zero CCs were coded and they were excluded ($1,577 - 353 = 1,244$ post-admission CCs). We used 7,383 patients with DRG 331 and 1,244 patients from DRG 330 for DRG migration analysis. The DRG migration rate was 14.4% ($1,244 / [1,244 + 7,387]$).

Demographics and Outcomes

The mean age was 73 years, and the majority of patients were female (59%) and non-Hispanic Whites (86%). No significant difference was observed between two groups of patients, i.e., DRG 331 and DRG migrated patients, for demographic characteristics.

DRG migrated patients had significantly higher LOS (7.6 vs. 4.8 days), total charges (\$63,149 vs. \$46,339), and CMS Payment (\$11,159 vs. \$7,210) compared to DRG 331

patients. In DRG migrated patients, a greater number of CC's were associated with higher LOS, total charges and Medicare payments (Figure 1).

Complications

The top five post-admission complications that led to DRG migration are reported in Table 1 with postoperative ileus (POI) being the most common (27%). All complications resulted in greater resource consumption, increasing total charges and Medicare payments (Table 1).

DISCUSSION

In this study, we wanted to re-visit the concept of DRG migration, the movement of a patient between MS-DRG classes due only to post admission complications. This approach is potentially attractive because it relies only on claims data, which is easily accessible to providers, patients, and CMS, thus allowing transparency of outcomes for a fair assessment of value by stakeholders. Although these data are limited by the veracity of coding, the nomenclature is well defined and should provide a clear platform for the provider to assess clinical factors that impact outcomes. The data in this study identified a DRG migration rate of 14.4%, which if applied to the entire CMS population in these DRGs was associated with an increase of CMS cost by \$98 million, hospital cost by \$418 million, and excess hospital days equaling 68,669 days.

This analysis represents the first comprehensive description of the concept of DRG migration and therefore it is impossible to make a judgment about what the rate of 14.4% represents to stakeholders. However, this assessment does provide an analysis of the common drivers for migration and suggests opportunities for providers to re-evaluate their care plans. DRG migration using the DRG 149/148 system as an assessment of the different patterns of DRG 148 assignment for laparoscopic versus open colectomy.² This method showed that laparoscopic colectomy had a 3-fold higher assignment rate due to pre-admission CC's and a 22% versus 42% rate of assignment due only to admission related CC's compared to open. This same risk of inefficient intraoperative care was suggested by Scheetz, et al.³ who recently reported that the economic and quality benefits related to laparoscopic colectomy were more likely to accrue for experienced high volume minimally invasive surgeons. While we did not explore the impact of operative approach, we were able to define the primary CC drivers, which accounted for the majority of DRG migration. Some examples are provided as each CC has a potential prevention strategy, which could be assessed for cost efficiency. The most frequent CC identified was POI and accounted for 27% of all postoperative complications in our cohort. Postoperative ileus increased both patient payment and hospital cost two-fold and doubled hospital LOS, consistent with the reported financial burden of approximately \$750 million/year to \$1.3 billion/year for US hospitals.^{4, 5} This is disconcerting as there have been established benefits associated with laparoscopy, narcotic sparing analgesia and prophylaxis using alvimopan.⁶ Operative blood loss and accidental perforation, though potentially related to individualized patient factors not captured by the MS-DRG system, are both opportunities for critical assessment of intraoperative care and may be similar to the contention made by Scheetz, et al.³ related to

laparoscopic colectomy. Therefore, individual providers could assess their own drivers of DRG migration to streamline their enhanced recovery programs.

Although there have been many attempts to use administrative data sets to define surgical quality and economic efficiency, both the Hospital stay, Readmission, and Mortality rates (HARM) score and the concept of “inefficient/ineffective” care represent simple, yet effective, models utilizing readily available data. The HARM score combines increased LOS (frequently caused by post-admission complications), the number of readmissions, and mortality into a reliable quantifiable measure of an institution’s health care quality. This simple score allows for an effective means of comparing hospitals outcomes using accessible administrative data, however it is limited by the absence of risk adjustment which could be accounted for by supplementing with DRG migration analysis.⁷ Similarly, Fry, et al.⁸ defined four categories of inefficient care. The authors determined that costs of care were similar with or without CCs if the patients were not postoperative LOS outliers. Our work extends their analysis by not simply relying upon LOS (which was also increased for our migrated patients) but rather addressing specific and potentially modifiable areas for process improvement.

This analysis also suggests that DRG migration also negatively affects the cost of care to the provider and hospital. Our study permits the ability to analyze components of the enhanced recovery program at individual hospitals, and further assesses the cost of specific mitigation strategies for a given CC. For example, a hospital with a high rate of POI could assess the potential benefit of adopting Alvimopan into their order set, and further analyze its influence on postoperative outcomes. Further strengthening this perspective is the discovery by Fry et al.,¹ which demonstrated that excess spending by institutions is not necessarily the result of complicated patients, but more so the result of inefficient spending throughout the organization.

There are several limitations of this study. In terms of evaluating health care quality and distinguishing poor care delivery, DRG coding is based on postoperative admission (POA) input and human error is not uncommon. Further, meticulous coding among high cost hospitals could be foreseen as an incentive for greater payments,⁹ leading to a higher migration rate. However, with the high adverse event rate of colectomy,¹⁰ neither upcoding by hospitals or inefficient coding fully explain our findings. In addition, the increased costs and LOS experienced by hospitals for migrated patients suggests that any potential “upcoding” is actually identifying patients for whom increased reimbursement may not be sufficiently robust to represent a positive balance sheet. Moreover, the lack of complexity to account for the numerous variables contributing to patient outcome not captured by the CC/MCC diagnoses, such as re-operative colectomy may limit the effectiveness of DRG migration to identify inefficient care.¹¹

CONCLUSION

Value based purchasing will inevitably become an important aspect of reimbursement for both hospitals and surgeons as the US health care system is revised. DRG migration offers a relatively easy methodology to allow providers to assess opportunities for care plans, while

utilizing only widely accessible data that permits transparency between institutions. The data suggest that DRG migration results in increased costs to CMS and hospitals, as well as significant consumption of additional bed days (increased length of stay) for colectomy patients. Therefore, it may represent a simplified economic definition of inefficient surgical care as part of a holistic assessment of value-based care of surgical patients.

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Summary Sentence

DRG migration is an economic concept for defining inefficient surgical care. It is associated with increased length of stay, hospital costs, and CMS payments.

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Figure 1. DRG Migration increases the median Length of Stay (A), Total Hospital Charge (B), and CMS Payments (C)

x-axis = DRG 331 (purple box), DRG 330 with 1 CC, DRG 330 with 2 CC, ... 5+ CC (blue box)

y-axis = outcomes

Table 1

Top five complications and associated outcomes for DRG 330 patients.

Complications	Length of Stay	Total Charges	Medicare Payments
Paralytic ileus	8.4 ± 4.8	63829.9 ± 47111.0	11518.51 ± 7920.6
Other digestive system complications	8.9 ± 5.3	67734.0 ± 44696.3	11942.8 ± 7970.1
Acute posthemorrhagic anemia	7.3 ± 4.0	66058.6 ± 47655.9	10803.6 ± 7817.3
Accidental puncture or laceration during a procedure, not elsewhere classified	6.8 ± 3.7	53658.3 ± 29160.1	10820.8 ± 7879.6
Pulmonary collapse	7.4 ± 4.7	66218.5 ± 40561.4	10823.2 ± 7928.1