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Irregular billing patterns: Are they indicative of payment errors?

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Background

Pattern analysis and outlier identification are long-standing analytic techniques whereby measures of variation in key indices over time are used to monitor and evaluate performance. IPRO, the Quality Improvement Organization (QIO) for New York State (NYS), as part of a special Center for Medicare and Medicaid Services (CMS)-funded project, examined the validity of outlier billing patterns as predictors of payment errors. IPRO reviewed a random sample of outlier and non-outlier inpatient claims to detect payment errors of admission necessity/appropriateness and coding/DRG assignment. Study results indicate no significant difference in payment error rates between

hospitals with disproportionate or proportionate billed claims. These findings are in contrast to currently held opinions about the intuitive relationship between outlier status and billing errors. Perhaps there was a type of “Hawthorne effect” in play, where providers whose claim submission tendencies classify them as outliers may have performed better, because of the positive effect of the increased attention and oversight. The findings suggest a need for alternative approaches to payment error prevention that expand beyond billing outliers. It is suggested that additional studies occur with regard to the relationship between disproportional billing patterns and payment errors on Medicare claims.

Introduction

Evaluating performance through pattern analysis is a long-standing technique used by providers and payers of health services. Routine medical data from patient records and medical claims forms for service providers is often analyzed quantitatively and comparisons are made over time, including benchmarks against themselves, other health care providers, or other group designations. Variations in these measures are frequently interpreted as a reflection of performance in the delivery of health care services, and statistical performance outliers identified through such methods are usually targeted for performance improvement interventions.¹

The Agency for Healthcare Research and

Quality (AHRQ) indicators, for example, have been employed in comparative analyses on hospital quality by organizations as diverse as the Texas Health Care Information Council and Anthem Blue Cross Blue Shield of Virginia. The indicators can provide a comprehensive picture of the level and variation of quality over several dimensions of health care quality.² In many instances, performance monitoring has greatly enhanced the ability of the health care industry to evaluate itself and improve services. It has also enabled individual consumers and large purchasers of health care services to make informed decisions among competing providers. One important caveat is that researchers caution that these methods and the implied assumptions about performance must be applied with care, taking into account such mitigating factors as case mix variation, validity and reliability of predictors, and chance variability.^{1,3}

Another type of approach to monitoring and evaluation can be found in commercial business applications, particularly those specializing in financial services. Here, advanced analytic techniques such as neural networks, Bayesian inference, and a variety of statistical and artificial intelligence methods are used to detect unusual patterns and anomalous behavior in events and activities across customers and organizations. While these analytic methods have traditionally been utilized as sentinel systems to detect and respond to potential customer risk and fraud, it is easy to project how they could be extended to the health care industry with regard to monitoring billing patterns, even at the prepayment stage, to identify statistical outliers.^{4,5} Clearly, the current trend in the health care industry is toward evidenced-based methods for monitoring and evaluating key indices of performance.

CMS recently funded a study to begin to evaluate one component of the validity of

billing trends as predictive agents of health care outcomes. Specifically, CMS funded a Hospital Payment Monitoring Program (HPMP) project that looked at proportional billing patterns for specific Diagnosis-Related Groups (DRG). As part of the HPMP ongoing effort to reduce Medicare payment errors, IPRO conducted a special project designed to reduce both inappropriate admissions and occurrences of incorrect coding/DRG assignments associated with the clinically related DRGs 174 (GI Hemorrhage with Complication Comorbidity [CC]) and 182 (Esophagitis, Gastroenteritis and Miscellaneous Digestive Disorders age >17 with CC).

Methodology

DRGs 174 and 182 were chosen based on a history of high payment error rates for both DRG/coding and admission necessity in IPRO's NYS Medicare case review process. Although the primary aim of the project was to reduce payment errors, a major project assumption was that those providers with disproportionate (or uneven) numbers of billed claims for DRG 174 as compared to DRG 182 would submit a higher percentage of claims with payment errors than those providers with claim frequencies that reflect a more even billing proportion between these two DRGs. The legitimacy of evaluating the latter assumption was further strengthened by the results of pattern analysis of paid claims in NYS. The results of the analysis indicated that, in general, DRGs 174 and 182 are billed in an even and consistent manner relative to one another. This suggests that under the currently utilized surveillance design, hospitals that bill one of these DRGs with much greater frequency than the other could well be considered noteworthy and merit further attention.

We looked at the validity of using disproportionate billing patterns as an indicator of potential claims payment errors. By compar-

ing groups of hospitals with even and uneven billing patterns for DRGs 174 and 182 on their associated levels of payment errors, we determined the extent of the statistical association between these two measures. Among the hospitals selected for study, an association between billing patterns and payment errors would be thought to validate the use of statistical-outlier identification in selected target areas as a method of monitoring and preventing payment errors on claims. A negative finding, however, would indicate the practicality of considering alternative approaches to monitoring billed claims for indicators of systematic trends in payment errors.

Hypothesis

As part of the analytic plan for the HPMP special project on Reduction of Payment Errors for DRGs 174 and 182, IPRO examined the hypothesis that, for NYS acute care providers, the frequency of payment errors detected on the billed claims for these DRGs during retrospective case review is related to the proportion of Medicare claims billed for one DRG as compared to another. Specifically, it was postulated that those providers with disproportionate numbers of claims for DRG 174 as compared to DRG 182 would submit a higher percentage of claims with payment errors than those providers with claim frequencies that reflect a more even proportion between these two DRGs.

Study design, and sample

A random sample of 600 inpatient claims with DRGs 174 and 182 were selected from

a pool representing all Medicare inpatient claims billed between the first quarter (Q1) through third quarter (Q3) of fiscal year 2006. These claims were stratified equally across two groups, each consisting of 10 short-term acute-care NYS hospitals selected for project participation. The hospitals were assigned to groups based on the proportion of claims they billed for DRG 174 as compared with DRG 182. One group consisted of 10 hospitals with a relatively even proportion of claims (i.e., a ratio of 174 to 182 claims ranging from approximately 1.25 to .79). The other group was represented by 10 hospitals with a more disproportionate mix of claims (i.e., a claims ratio of 174 to 182 ranging from 1.95 to 1.47 and .39 to .27 for either the high or low volume proportions). For the two groups, the percentage of total cases denied, as well as separate percentages for cases denied for admission necessity/appropriateness and for coding/DRG assignment, were compared to determine the existence and degree of any difference associated with the proportion of billed claims for DRGs 174 and 182.

Results

Denial rates overall. As indicated in Table 1 below, for all project cases, baseline review results indicate that there was no significant difference in the payment error rate between hospitals with a disproportionate or proportionate number of claims billed to DRG 174 and DRG 182.

To clarify our findings, we analyzed data for each DRG independently. That is, for

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Table 1. Fischer's exact results for proportional analyses

Denial Rates Overall				
Measure	Total Cases	Even Proportion Group	Disproportionate Group	P value
All Cases	11.67	12.67	10.67	0.53
DRG 174 Alone	7.3	8.0	6.67	0.82
DRG 182 Alone	16.0	17.33	14.67	0.64

the same grouping of hospitals based on proportion of DRG 174 to 182 claims, we compared payment error rates for DRG 174 and DRG 182 independently. Again, Table 1 indicates no significant difference between disproportionate and even-proportion billing hospitals when payment error rates are determined separately for each of the two DRGs. In fact, in all comparisons, the even-proportion group had a higher overall percentage of cases denied than the disproportionate group, albeit a non-significant greater percentage.

analysis, hospitals were grouped according to the proportion of claims billed for DRG 182 to DRG 183, its non-CC counterpart, and denial percentages. These were examined for the sample cases considered relevant as far as expected impact (i.e., DRG 182 case reviews). As indicated in Table 3, all payment error percentage comparisons between the even and disproportionate groups based on DRG 182 to 183 claims proportions yielded non-significant results. Again, the non-significant trend points to greater errors in the even-proportion group.

payment errors is not supported. In fact, in many of the comparisons examined, although the differences were not statistically significant, it was the hospital in the even-proportion group that had noticeably higher denial percentages. This finding of non-significance for unevenly billed proportional hospitals seems to hold through comparisons based on billing of DRG 182 to its CC companion DRG 183 and DRG 174 with its CC companion DRG 175.

It could be argued that this finding is the result of a lack of consistency over time with regard to a hospital's degree of proportionality of claims among related DRGs. Additional analysis designed to clarify this issue, however, did not support the argument for a dramatic impact based on changes in billed claims proportions over time. When project hospitals were re-grouped according to their proportion of claims for DRG 174 to DRG 182 for an administrative claims period extended back through fiscal year 2005 (i.e., Q1 fiscal year 2005–Q3 fiscal year 2006), comparison of payment error rates for the revised disproportionate and even-proportion hospital groups continued to result in non-significant findings. It appears that billing proportions are not indicative of greater or fewer payment errors

Table 2. Error-type breakout for grouped DRGs 174 and 182

All Cases				
Measure	Total Cases	Even Proportion Group	Disproportionate Group	P value
Adm Denial Rate	7.2	7.3	7.0	1.0
DRG Denial Rate	4.8	5.3	4.3	0.7

Admission and coding/DRG denial rates.

The counterintuitive findings described above necessitated a further breakdown of payment errors by type (i.e., DRG/coding or admission necessity) to evaluate the extent and depth of our findings. Table 2 again points to the findings that overall for the even-proportion group, the percentage of cases denied specifically for coding/DRG assignment and for admission necessity/appropriateness were higher than the corresponding denial percentages for the disproportionate group. However, the differences were not statistically significant. Further, analyzing each DRG separately did not lead to significant differences between DRGs or type of payment error.

Similarly, a subsequent analysis grouped providers according to their billed claims proportion for DRG 174 to its non-CC counterpart, DRG 175. The overall disproportionate group percentage was slightly higher than that of the even proportion hospitals, but the percentage comparisons did not yield statistically significant results (see Table 4).

Review results based on alternative groupings.

One might reasonably argue that groupings based on billed claims proportions other than DRG 174 to 182 are more appropriate. For example, one might conceivably assume that disproportionate billing in the complication comorbidity (CC) companion DRG may lead to a different finding. IPRO tested this theory through post-hoc alternate groupings. In one

Table 3. DRG 182-183 proportional billing analyses

Denial Rates Based on Disproportionate Billing for DRG 182 to DRG 183			
DRG 182 Cases Alone			
Measure	Even Proportion Group	Disproportionate Group	P value
Adm Denial Rate	14.8	9.7	.21
DRG Denial Rate	5.2	4.2	.79
Total	19.26	13.33	.20

Discussion

Baseline review results indicate that there is no significant difference in payment errors between disproportionate and proportionate (i.e., even) billing hospitals. Thus, the hypothesis of disproportionate billing as an indicator of increased

for the DRGs reviewed in this project.

One explanation for these findings may be found in the expectations and level of attention and resources that have been applied to each hospital's outlier status. Specifically, there are

Table 4. DRG 174-175 proportional billing analyses

Denial Rates Based on Disproportionate Billing for DRG 174 to DRG 175			
DRG 174 Cases Alone			
Measure	Even Proportion Group	Disproportionate Group	P value
Adm Denial Rate	3.1	.95	.43
DRG Denial Rate	4.1	6.7	.41
Total	7.2	7.6	1.0

ongoing initiatives that identify hospitals whose claims submission patterns classify them as outliers. Outlier hospitals are encouraged to investigate these outlier claim-submission patterns, and to identify and remediate potential sources of payment errors on billed claims. Perhaps the level of attention and resources devoted to these outlier providers in comparison to those providers with claims submission tendencies more consistent with statewide numbers, resulted in a kind of “Hawthorne effect” in which the attention offered to the outlier hospitals itself created a positive group climate and motivation, which then resulted in improved performance. Conversely, those providers who were more in line with statewide claims submission patterns may have regressed in their efforts to manage payment errors, because of a sense of satisfaction with the status quo and a perceived decrease in the level of external performance monitoring from CMS and/or its designated agencies.

It is worth noting that the intuitive concept of outlier status and billing errors is one that has existed for some time. As mentioned previously, it is used commercially in both performance monitoring and as the basis of some existing fraud programs and recovery audit efforts. This method can retrieve dollars paid in error, but this study implies that there may in fact be greater errors in areas that are not a focus of attention. Alternative approaches may be needed to supplement approaches that primarily focus on billing outliers. The relationship between proportional billing distributions among claims and payment error rates should

be further examined. Replicating our findings with additional target areas would assist in our understanding of associations between billing patterns and higher payment error rates. ■

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