

Implementation of a Severity-adjusted Diagnosis-related Groups Payment System in a Large Health Plan

Implications for Pay for Performance

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Abstract: This article describes the implementation of the All Patient Refined Diagnosis Related Group (APR-DRG) inpatient payment system in a large regional commercial payer. The APR-DRG system replaced the Plan's current All-Patient DRG (AP-DRG) payment methodology on December 1, 2006, and is part of a strategic hospital payment redesign that will enable the Plan to control costs, increase pricing transparency for customers and providers, and reward hospital quality and efficiency. On the basis of modeled results using 2005 data, we found that the APR-DRG payment system using cost-based weights will do a better job of linking inpatient severity and use of resources to payments. The transition to the cost-based APR-DRG methodology with enhanced clinical specificity will also support measurement of hospital quality and efficiency in the Plan's performance improvement programs. **Key words:** *APR-DRG, hospital efficiency, hospital quality, pay for performance, performance improvement, severity adjusted inpatient payment*

IMPLEMENTATION of severity adjustment to a hospital payment system is a key component of a large-scale provider payment system redesign that will enable the Plan to achieve a number of strategic objectives. Important goals for the Plan's hospital payment programs include improving control over cost trends, improving the ability for network hospital CFOs and the Plan to predict and model the impact of changes in payment rates, maintaining a competitive pricing advantage over other payers in the market, and incorporating performance improvement programs for hospitals that will reward quality and efficiency. The implementation of APR-DRGs for inpatient services, and a new risk-based outpatient payment system, such as Ambulatory

Patient Groups (APGs) or Ambulatory Payment Classification (APCs), will redefine and align the classification methods for inpatient and outpatient services. Improved classification of services and severity-based approaches to payment will enable the Plan to meet its goal of standardizing hospital pricing, provide the data required to support performance improvement initiatives, and increase transparency of pricing data for their customers.

In 2005, the Plan paid more than 100 hospitals a total of \$483 million for 70,000 cases using an older inpatient classification system (All Patient DRGs or AP-DRGs) together with percent of charge reimbursement, depending on hospital size and characteristics. The urban and rural facilities were paid \$445 million using AP-DRGs, and critical access hospitals (CAHs) were paid \$38 million using percent of charges. Per diem payments were also in place for the AP-DRG hospitals for some mental health/chemical dependency services

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and all rehabilitation and skilled nursing services.

Health Plan senior staff decided to implement the APR-DRG system to address a number of issues that surfaced with the current system and contributed to inpatient cost trends that significantly exceeded performance targets. The original AP-DRG system was implemented in 1999 and updated in 2001, and used charges to create payment weights and to identify and pay for outlier cases. Subsequent to the implementation, Medicare's outlier payment policies also promoted significant charge increases among hospitals. Consequently, the numbers of outlier cases and payments increased dramatically over a few years. In 2005, 6% of total cases were identified as outliers and payments consumed 11% of total inpatient dollars.

The AP-DRG system and its older, charge-based weights did not adequately link payment to the use of resources and did not address the true costs of new technologies in the inpatient setting. The hospital-driven foundation of charges resulted in payment inequities among hospitals and an incentive for them to overcharge for new technology. In response to the growing concerns, Plan staff were forced to consider administratively cumbersome methods for paying hospitals for new technology, such as add-on payments.

Finally, the AP-DRG system was completely detached from and unable to support the Plan's performance improvement strategy for hospitals. The incentives resulting from a payment system built on charges—such as increased outlier cases and overcharging for new technology—created an adverse environment for successful implementation of quality improvement programs. Performance initiatives require greater clinical specificity, and the Medicare Payment Advisory Commission (MedPAC) recommended that hospital outcome measures meet the following criteria:

- Measures should be based on clinical evidence familiar to providers;
- data analysis should not be unduly burdensome; and

- outcome measures should be risk adjusted (Medicare Payment Advisory Commission, 2005).

The severity-based APR-DRG system meets these criteria because it encourages better coding practices by hospitals, which facilitates the measurement and management of quality metrics such as ambulatory care-sensitive conditions and potentially preventable complications. MedPAC reported coding improvements for hospitals in the State of Maryland, which implemented the APR-DRG system in 2005 for all payers: "Maryland's increase in reported patient severity resulted in roughly a 4 percent increase in payments . . . based on APR-DRGs. The Health Services Cost Review Commission attributed most of the change to more complete documentation of patients' medical records resulting in more reported diagnoses per patient, rather than an underlying increase in patient severity" (Medicare Payment Advisory Commission, 2006).

DEVELOPMENT OF RELATIVE WEIGHTS

The Plan elected to develop its own set of relative weights using state-specific hospital and cost report data and presented analysis results to participating hospitals throughout the process. By creating indigenous weights and taking a transparent approach to communications and data sharing with hospitals, the Plan fostered early acceptance of the new system and encouraged them to clarify or improve their discharge and cost report data. Statewide hospital data for commercial cases were used, with costs assigned to all cases based on 2004 Medicare Cost Reports or the most recent reports available. Cost estimates were tailored to inpatient cases specifically, by mapping Medicare ratios of costs to charges by cost center to corresponding state hospital inpatient revenue center charges. Cases were grouped into APR-DRGs, and transfer and outlier cases were removed from the data set. Outliers were identified on the basis of an established interquartile range for each APR-DRG using the calculated cost per admission.

Exhibit 1. AP-DRG and APR-DRG payment comparison. APR-DRG 221, major small and large bowel procedures

APR-DRG severity level	Cases	AP-DRG payment		APR-DRG payment			
		Total, \$	Per case, \$	Relative weight	Total, \$	Per case, \$	APR variance per case, %
Minor	15	200,137	13,342	1.675	182,331	12,155	-8.9
Moderate	27	428,523	15,871	2.201	431,388	15,977	0.7
Major	10	212,396	21,240	3.052	221,543	22,154	4.3
Extreme	3	81,444	27,148	4.006	87,238	29,079	7.1
<i>Total</i>	55	922,500	16,773	2.311	922,500	16,773	0.0

Relative weights were then calculated for each APR-DRG at 4 levels of severity using the trimmed data set. For each APR-DRG, the relative weights assigned to the 4 severity levels were audited for monotonicity, that is, whether the weights were increasing as the severity levels increased from 1 to 4. If results were not monotonic, adjustments were made using hospital databases for other states. Exhibit 1 is an AP-DRG and APR-DRG payment comparison for APR-DRG 221, major small and large bowel procedures.

The relative weights are monotonic, increasing across severity levels for the 55 surgical cases. The AP-DRG payment of \$922,500 reflects actual 2005 payments. APR-DRG payments were modeled on a budget neutral basis for illustration purposes, with a base rate of \$7258 applied to each severity level. Although total payment for the 55 cases is the same, the use of relative weights in the APR-DRG methodology redistributes payment among the severity levels. Payment for minor cases decreases 9%, moderate cases receive a slight payment increase, and major and extreme case payments increase by 4% and 7%, respectively. The APR-DRG system more effectively links payments to levels of resources used and motivates providers to use resources more efficiently. For example, a possible outcome of the scenario in Exhibit 1 would be the providers' review of admitting criteria to identify "soft admissions" or ambulatory care-sensitive conditions. As a result of the review, future lower severity admissions

could be shifted to an outpatient modality of care.

Under the previous AP-DRG payment system, the Plan used per diems to pay for some mental health/chemical dependency (MH/CD) cases and all rehabilitation, skilled nursing, and transfer cases. Treo Solutions and the Plan evaluated the impact of paying for existing per diem services with APR-DRGs, using preliminary base rates, the new relative weights, and 2005 claims data. As a result of these targeted evaluations, it was determined that all of these services would continue to be paid using a per diem methodology, because of significant variation in length of stay and better alignment with the customer's benefits.

PEER GROUPS AND BASE RATE DEVELOPMENT

Before payment system results could be modeled using health Plan claims data, the Plan developed criteria for hospitals' inclusion into the APR-DRG payment system. The guidelines for participation were as follows:

1. hospital is located within a multihospital community; or
2. hospital has more than 400 annual health Plan acute admissions per year;
3. hospital with fewer than 400 annual acute admissions could elect to participate for a 3-year term.

The hospitals meeting the first 2 criteria were broken into 3 peer groups on the basis of shortfalls in government revenue,

Exhibit 2. APR-DRG peer groups

Peer groups	Characteristics
APR Group 1	Transplant providers
APR Group 2	Urban, hospital systems
APR Group 3	Large rural
APR Option Group	Small rural, CAHs

disproportionate share, and levels of services provided—such as transplants and NICU. The characteristics of the final identified groups are summarized in Exhibit 2. Facilities participating in the APR-DRG payment program are eligible to participate in the Plan’s quality initiative program. Hospitals, not paid on APR-DRG, are not eligible to participate in the quality initiatives. Over the next few years, the Plan anticipates moving all participating hospitals toward one peer group as part of its standardized pricing strategy.

Using 2005 inpatient claims for the hospitals, APR-DRG rates were modeled and compared for each of the 4 peer groups. Treo Solutions grouped the Plan’s claims into APR-DRGs, and trimmed zero and low-payment, ungroupable cases, and cases with APR-DRG assignments of 953 or higher. Data were arrayed at the peer group level by hospital, and APR-DRG base rates and payments were modeled for acute, transfer, and outlier cases. Per diem payments were also modeled at the peer group level.

The impact of teaching payments made in 2005 and hospital costs and margins were also factored into the analysis. To support the evaluation of hospital margins, Treo Solutions and

the Plan also asked all facilities in early 2006 to respond to a survey that requested 2005 charge and revenue data for government, self-pay, and all payers. A total of 66% of the contracted facilities responded.

The goal of the payment model was to achieve payment neutrality at the peer group level for APR Groups 1, 2, and 3—that is, the final base rates and per diems generated payments equal to total payments made under the old payment system for 2005. Once the 2005 budget-neutral base rates and per diems were established, the Plan applied its internal inflation factors to all rates to trend them forward to the 2007 payment year. The differential in between the lowest and highest acute care base rates in the peer groups was 22%—a variance the Plan plans to reduce in the coming years as it moves its APR-DRG system toward a single peer group with uniform prices.

Exhibit 3 compares 2005 payment model results for the hospitals in APR-DRG Groups 1-3 under the old AP-DRG system and the new APR-DRG system. The most compelling change in the transition to the APR-DRG payment system is the identification and payment of outlier cases. The transition from the former charge-based method of identifying outliers to the new cost-based methodology, combined with the severity adjustment features of the APR-DRG system, reduced the number of cases classified as outliers from 6.0% to 1.1%. The reclassification of outliers explains most of the additional 7.6% of payments in the acute payment category. Expenditures on outliers under the APR-DRG system will fall from 11.6% to 3.6% of total payments.

Exhibit 3. AP-DRG and APR-DRG payment comparisons by discharge type, 2005

Discharge type	AP-DRG system		APR-DRG system	
	Cases, %	Payments, %	Cases, %	Payments, %
Acute cases	84.4	82.3	89.3	89.9
Outliers	6.0	11.6	1.1	3.6
Transfers	1.4	1.2	1.4	1.1
Per diem services	8.2	4.9	8.2	5.5

Exhibit 4. Reclassification of outliers and APR-CMIs Plan, 2005

Outliers and reclassifications	No. of cases	APR-CMI
AP-DRG outliers	3608	1.48
AP-DRG outlier → APR-DRG acute	3256	1.44
AP-DRG outlier → APR-DRG outlier	352	1.80
AP-DRG acute → APR-DRG outlier	282	1.94
Total APR-DRG outliers	634	1.86

The Plan is also allocating more dollars to per diem services, which account for 8.2% of cases, based on cost and margin analyses conducted at the peer group and hospital level.

Exhibit 4 illustrates the outlier transition further, showing the impact of APR-DRG case-mix indices (CMIs), or relative weights, for cases considered to be outliers under the AP-DRG system and those qualifying as outliers under the new payment system. Lower severity cases are appropriately reclassified and paid as acute cases while higher severity cases receive enhanced payment as outliers. Under the AP-DRG system, there were 3608 outliers with an average APR-CMI of 1.48. A total of 3256 or 90% of these cases with an average CMI of 1.44 were reclassified and paid as acute cases in the APR-DRG system. Ten percent of the cases, or 352, qualified as APR-DRG outliers with an average CMI that was significantly higher at 1.80. In addition, 252 cases that were paid as acute cases in the AP-DRG system became outliers under APR-DRGs, with an average CMI of 1.94 that reflects higher severity.

Results modeled for 2005 acute and outlier payments proved that the new APR-DRG system will do a better job of linking inpatient severity and use of resources to payments. Additional savings will also be generated over time by paying for transfer cases using the per diem methodology that is based on hospital costs rather than on charges. The use

of cost-based weighting and APR-DRG risk adjustment led to immediate benefits in the management of outliers for the Plan, and represent significant first steps on the road to standardized inpatient pricing for all peer groups.

HOSPITAL COMMUNICATIONS

One of the biggest challenges in the implementation of the new APR-DRG payment system was how best to communicate the new information to the contracted hospitals. From the onset, the Plan maintained a strong desire to keep the payment redesign process transparent. This meant that

- the communications describing methodologies used to calculate rates had to be clear, comprehensive, and easily accessible;
- decisions made throughout the project had to be documented and universally distributed; and
- an open channel of communications between the Plan, Treo Solutions, and the Hospital CFOs needed to be maintained where ideas could be easily shared and discussed.

In the Fall of 2005, over a year prior to the December 1, 2006, implementation date, the Plan began holding monthly meetings with a voluntary CFO workgroup composed of hospital finance executives from leading facilities. Most of the hospital participants were from larger organizations, but the Plan made extra efforts to reach out to smaller rural and critical access hospitals. As implementation neared in the spring and summer of 2006, the dialog was expanded to invite representatives from all hospitals in the Plan's service area.

To support the meeting process, we created a collaborative, Web-based environment for publishing documents, tracking issues and posting other communications. Shared document folders in the site were used to publish meeting minutes, draft and final payment policy documents, and projection models.

In the summer of 2006, we circulated 2005 and 2007 APR-DRG payment impact reports for the contracted hospitals so CFOs could evaluate the financial impact of the new

payment system on their hospitals. Reports were generated that compared payments under the previous AP-DRG system and the APR-DRG system. A set of reports was also generated for hospitals paid on a percent of charge basis to compare 2007 percent of charge revenues to APR-DRG-based revenues. Details were provided to all facilities at the discharge type and APR-DRG level. The documents were published in PDF format and circulated confidentially to each facility by Plan staff. In addition, we developed a projection model for the APR-DRG hospitals where they could model payments prospectively for 2007 and update their case-mix assumptions beyond the 2005 baseline data to provide a better revenue forecast for the upcoming year.

In the fall of 2006, the Plan set up a series of meetings with hospitals that would incur losses under the APR-DRG system. Treo Solutions provided 2005 case-level detail and payment analysis to Plan staff to assist them in meetings with these hospitals that were concerned about revenue decreases under the new payment system. Claims detail reports were also provided to any facility that requested them after impact reports were reviewed. The hospital CFOs' response to the impact reports and the overall transparency of the process were very favorable, and 25 of the APR Option Group hospitals opted to participate in the new payment system. In the coming months, we will be using a similar process to implement a prospective, clinically based outpatient payment system.

INCORPORATING HOSPITAL PERFORMANCE IMPROVEMENT PROGRAMS

The use of APR-DRGs as a methodology for reporting hospital performance information is not new. However, in this implementation, APR-DRGs form the construct of a cost-based hospital payment system. This enables the Plan to tie payment to the same classification system used to report on hospital indicators of quality and efficiency. These are briefly described below.

Length of stay efficiency

Statewide all payer claims data were grouped into APR-DRGs. Observed length of stay (LOS) was calculated on the basis of admission and discharge dates. Expected LOS was calculated for each DRG and severity level using indirect standardization. Risk adjusted efficiency based on LOS was calculated on the basis of ratio of observed-to-expected LOS for a given DRG. This information was rolled up to a hospital level but also available for specific service lines.

Readmission efficiency

We are examining recently developed clinical algorithms to classify readmission pairs into potentially preventable readmissions. The methodology evaluates diagnosis and severity of illness criteria determined from APR-DRGs to identify hospital readmission pairs in which the combination of diagnosis and severity level indicates a high probability that the readmission could be prevented by following evidence-based medicine. We applied this methodology to the Plan claims data and calculated the readmission rate, relative to the number of index hospitalizations for each network hospital. In the future, this system could be used to adjust payment for hospitals based on rates of potentially avoidable readmissions.

Cost efficiency

Hospital department-level cost-to-charge ratios were collected from all network hospitals. Using submitted charges and cost-to-charge ratios, costs were estimated for each admission. Using methods outlined in the LOS efficiency section above, expected and observed costs were determined using APR-DRGs and indirect standardization. This information is made available at various levels for all participating hospitals.

Rates of admissions for ambulatory care sensitive conditions

For certain medical conditions, the presence of admissions for patients of low severity is an indicator of poor care in the ambulatory

setting. To the extent adherence to evidence-based guidelines in ambulatory care settings avoids the need for certain high-cost hospitalizations, ACSC rates reflect efficient systems of care. Treo Solutions has incorporated ACSC admissions with APR-DRGs to stratify admissions for ACSC based on patient severity levels 1–4. It is believed that ACSC admissions with low levels of patient severity (APR-DRG levels 1 and 2) have greater sensitivity and specificity to indicate avoidable admissions than ACSC alone. The Share point services platform described above provides network hospitals with a breakdown of ACSC admissions by severity level and condition within the same web-based reporting system outlined above. In the future, hospital ACSC rates can be linked to ambulatory care practice patterns in inpatient service areas to report on combined inpatient/ambulatory systems of care at an episode level.

Since payments are set on the basis of system costs, hospitals that deliver efficient care or improve efficiency will be rewarded with

better financial returns. Intuitively, the cost required to deliver efficient care should be influenced by patient severity of illness. In other words, it stands to reason that more severely ill patients may require more resources for a given DRG. During relative weight development, Treo Solutions evaluated this relationship. As demonstrated in Exhibit 1, as patient severity increased within a DRG, costs also increased. However, the magnitude of the difference varied by DRG, underscoring the need to define severity levels based upon specific clinical characteristics for a given DRG. On the basis of this evidence, it would be inappropriate and unfair for hospitals to describe efficiency in a way that fails to recognize patient severity of illness. In the future, hospitals will submit “present on admission” information. This will enable the Plan to differentially classify patient comorbidities from complications and align with national inpatient quality and safety standards such as National Quality Forum and the Institute for Healthcare Improvement.

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