

WORKING P A P E R

Evaluation of Alternative Methods to Establish DRG Relative Weights

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WR 560-CMS

April 2008

Prepared for the Centers for Medicare and Medicaid Services

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SUMMARY

Under the Medicare prospective payment system for acute care hospital services (IPPS), each inpatient discharge is assigned to a diagnosis-related group (DRG) that includes patients expected to have similar resource use and clinical patterns of care. Medicare's payment for the stay is based on a standard payment rate adjusted for the DRG relative weight and facility-level characteristics. The relative weight represents the average cost of caring for discharges in a specific DRG relative to the average cost for all Medicare discharges.

This working paper evaluates six different methods to establish the relative weights used in the Medicare IPPS. The questions that we examine are:

- How do the relative weights differ across the alternative methodologies?
- How well does each relative weight methodology explain variation in costs?
- How accurate are payments using each relative weight methodology and current facility-level adjustments?
- What are the payment impacts of alternatives to the current methodology for establishing relative weights?

Our baseline for comparison is RELWGT1, the cost-based relative weight methodology that CMS recently adopted. Under this method, the cost for each Medicare discharge is estimated by applying national cost-to-charge ratios (CCRs) for 15 cost center groupings to corresponding charges on the Medicare record for each inpatient stay. The estimated cost is then standardized for systematic differences in cost across hospitals. To standardize, estimated discharge-level costs are divided by a factor that reflects the operating and capital IPPS payment adjustments for geographic differences in hospital wage levels and cost of living, teaching activities, and serving a disproportionate share of low-income patients. The relative weight is the ratio of the average standardized cost for discharges assigned to a given DRG to the average standardized cost for all Medicare discharges.

Each alternative relative weight methodology also uses cost-based relative weights, but the method for estimating cost is different. The alternative methods use either:

- national CCRs for 19 cost center groupings, or
- hospital-specific CCRs for 15 cost center groupings.

The expansion to 19 cost center groupings is intended to reduce bias in the relative weights introduced by combining services with different CCRs into a single cost center for purposes of estimating cost. The hospital-specific CCRs are intended to account for differences in overall charging practices across hospitals.

We examine two alternative standardization methods to account for systematic cost differences across hospitals. The current "hospital payment factor" (HPF) method does not account for any sources of cost variation except those captured by the payment adjustment factors described earlier. The alternative methods eliminate all cost variation across hospitals not accounted for by case mix differences:

- The hospital-specific relative value (HSRV) method standardizes the cost for a given discharge by the hospital's own costliness rather than by the effect of the systematic cost differences across groups of hospitals. The cost for each discharge from a given hospital is divided by the average cost per discharge for that hospital. The resulting ratio is then standardized for differences in case mix. The national relative weight for a given DRG equals the average case-mix standardized relative weight for the discharges assigned to the DRG.
- The HSRVcc method removes hospital-level cost variation by calculating hospital-specific charge-based relative values for each DRG at the cost center level and standardizing them for differences in case mix. A national average charge-based relative weight is calculated for each cost center. It is converted to cost using a national CCR and adjusted to reflect the proportion of total costs accounted for by that cost center. The national relative weight for each DRG is based on the sum of the adjusted average cost center relative weights for discharges assigned to that DRG.

We combined the alternative methods of estimating cost and standardizing for systematic cost differences among hospitals to produce five sets of alternative relative weights (see Table ES-1 for a summary of the relative weight methods).

The analyses in this working paper rely on quantitative methods to evaluate the five relative weight methodologies. We conducted two different types of analyses at both the discharge-level and the hospital-level. One type compares each of the five alternative sets of relative weights to the relative weights constructed using the CMS current relative weight method (RELWGT1). To assess the payment implications, we compared average payment using each relative weight alternative to average payment across hospital groupings using fully phased-in MS-DRG cost weights. These analyses imply no explicit judgments that one set of relative weights is "better" than another; they simply report how the weights or payments would differ under alternative methods.

The other type of analyses examines the relative payment accuracy of alternative relative weight methods. We needed a measure of cost for the comparisons in these analyses. For this purpose, we used the cost for each discharge determined using 15 hospital-specific CCRs. Although we believe that our choice of this cost measure is appropriate, it may affect the results and conclusions of our analyses. For example, the relative weight methods that use hospital-specific CCRs may be assessed more favorably than would have been the case had we used a different cost measure. Similarly, the use of 15 rather than 19 cost center CCRs may favor the relative weight methods that do not account for charge compression.

The cost analyses include regression analyses to a) compare the performance of the relative weight methodologies in explaining variation in costs and b) assess how well payments using each relative weight methodology and current facility-level adjustments match the costs of the discharge. We also examined payment-to-cost ratios across hospital groupings and classes of MS-DRGs.

HOW DO THE RELATIVE WEIGHTS DIFFER ACROSS THE ALTERNATIVE METHODOLOGIES?

Table ES.1
Summary of Differences in Relative Weight Methods

Method	Methodology Used to		Key Differences in Weights
	Estimate Cost	Standardize	
RELWGT1	Nat. CCRs; 15 cost centers	HPF	Baseline
RELWGT2	Nat. CCRs; 19 cost centers	HPF	Increases values for a limited set of DRGs, primarily higher weighted DRGs in MDC 5 and 8, that account for 30% of discharges Average relative weight for surgical DRGs is higher than under other methods Nearly 50% of discharges have at least a 2.5% change in relative weight
RELWGT3	HSP CCRs; 15 cost centers	HPF	Increases values of lower weighted DRGs Involves the least change: 31.5% of discharges have at least a 2.5% change in relative weight
RELWGT4	Nat. CCRs; 15 cost centers	HSRVcc	Increases values of lower weighted DRGs 43% of discharges have at least a 2.5% change in relative weight
RELWGT5	Nat. CCRs; 19 cost centers	HSRVcc	No clear pattern of changes across cost deciles Tends to moderate change resulting from combining 19 national CCRs with HPF Nearly 50% of discharges have at least a 2.5% change in relative weight and 3.3 percent change at least 10 percent
RELWGT6	HSP CCRs; 15 cost centers	HSRV	HSRV tends to amplify change resulting from combining HSP CCRs with HPF (RELWGT3) Average relative weight for medical DRGs is higher than under other methods Involves the most change: 52.9% of discharges have at least a 2.5% change in relative weight

Table ES-1 provides a synopsis of each relative weight method and how each alternative differs from RELWGT1. Key findings are:

- All relative weight alternatives result in significant changes in the relative weights assigned to a substantial percentage of discharges. The methods that change both the way costs are estimated and how they are standardized produce the most change (RELWGT5 and RELWGT6). The method that uses hospital-specific CCRs to estimate cost while retaining the HPF standardization method has the least change.
- Accounting for differential markups for services within the same cost center by using 19 national CCRs concentrates the increases in 30 percent of discharges primarily in higher weighted cardiac and orthopedic surgical DRGs. As a result, the average relative weight for surgical cases is higher under RELWGT2 than the other methods.
- The weights for lower weighted medical DRGs tend to increase using hospital-specific CCRs. The HSRV method also tends to increase the weights for lower weighted DRGs, so that RELWGT6, which combines hospital-specific CCRs with HSRV, results in higher average relative weights for medical cases than the other methods. There is not a clear pattern in the changes under the HSRVcc methods.

HOW WELL DOES EACH RELATIVE WEIGHT METHODOLOGY EXPLAIN VARIATION IN COSTS?

We used regression analysis to assess how well each relative weight methodology explained variation in cost and to investigate whether there is weight compression at the discharge-level and/or CMI compression at the hospital-level. Ideally, the relative weight should increase in proportion to cost after controlling for systematic cost differences that are accounted for in the payment system. The weights are compressed if cost increases more rapidly than the relative weights. When this occurs, discharges with high relative weights are undervalued and discharges with low relative weights are overvalued. Similarly, if the CMI is compressed, hospitals that tend to serve more costly patients are underpaid relative to those caring for less expensive patients.

We performed a set of regressions that examined whether payment under each relative weight system is proportionate to cost. Key findings are:

- The differences in the ability of the different relative weight methods to explain variation in either discharge-level or hospital-level costs are minimal.
- After controlling for the hospital payment factors, both the relative weight in the discharge-level regression and the CMI in the hospital-level regression are compressed.
- The hospital payment factors increase more rapidly than cost. For every 10 percent increase in the hospital payment factors, cost increases about 5.6 percent under RELWGT1 in the discharge level regression. The relationship is similar for the other methods and in the hospital-level regressions examining CMI compression.
- When the relative weights are combined with the payment factors and total payment compared to cost, the payment factors more than offset the weight/CMI compression so that total payment also increases more rapidly than cost at both the discharge-level and the hospital-level. Under RELWGT1, cost increases 9.3 percent for every 10 percent increase in payment. Under the other methods, cost increases from 9.2 percent (RELWGT2) to 9.5 percent (RELWGT6) for every 10 percent increase in payment.

HOW ACCURATE ARE PAYMENTS USING EACH RELATIVE WEIGHT METHODOLOGY AND CURRENT FACILITY-LEVEL ADJUSTMENTS?

The regressions discussed above are one way to measure payment accuracy. We also examined payment-to-cost (PTC) ratios to examine DRG relative profitability. Key findings are:

- Under RELWGT1, 71.4 percent of discharges are assigned to DRGs with a PTC ratio between .95 and 1.05. RELWGT3 and RELWGT6 increase the percentage of discharges with these ratios. RELWGT2 and RELWGT5 have the lowest percentage of discharges assigned to DRGs with these ratios.

- RELWGT1 has 1.7 percent of discharges assigned to highly profitable DRGs with PTC ratios > 1.1 . These tend to be low volume, resource-intensive cases that are predominately treated at large teaching hospitals. RELWGT2 has 2.2 percent compared to 0.9 percent under RELWGT3. The HSRVcc methods (RELWGT 4 and RELWGT5) have about twice as many discharges assigned to high PTC ratio DRGs.
- RELWGT 1 has 0.5 percent of discharges assigned to highly unprofitable DRGs with PTC ratios $< .90$. RELWGT2 and RELWGT5 have substantially more discharges assigned to DRGs with these ratios (4.5 percent and 1.6 percent respectively). RELWGT3 and RELWGT6 have no DRGs with PTC ratios $< .90$.

Hospital-level PTC ratios can be used to measure payment equity across groups of hospitals. Under RELWGT1, the PTC ratios by geographic location are similar. Large urban hospitals have a PTC ratio of 1.0; other urban hospitals have a slightly lower than average PTC ratio (0.99) and rural hospitals having a slightly higher than average PTC ratio (1.01). In general, there are not substantial differences in the PTC ratios across the alternative relative weight methods for a given group of hospitals. The greatest variation occurs for rural hospitals, where the change under RELWGT2 is -0.6 percent compared to a 1.1 percent increase under RELWGT6. This is consistent with the increases in higher weighted surgical DRGs under RELWGT2 and increases in lower weighted medical DRGs under RELWGT6.

Without regard to the relative weight method, the PTC ratios vary considerably across classes of hospitals and reflect the impact of the IME and DSH payment adjustments. While the average PTC for urban hospitals is about 1.0, the average PTC for hospitals receiving both DSH and IME payments is 1.05 compared to 0.88 for urban hospitals that receive no IME or DSH payments. While the average PTC under RELWGT1 was 1.01 for rural hospitals, it is 0.90 for hospitals that receive no DSH, 0.98 for SCH hospitals receiving DSH (before consideration of the special payment policies), and 1.04 for rural referral centers receiving DSH payments.

WHAT ARE THE PAYMENT IMPACTS OF ALTERNATIVES TO THE CURRENT METHODOLOGY FOR ESTABLISHING RELATIVE WEIGHTS?

While there are relatively modest changes in average payment across hospital classes, there are significant redistributions that occur within hospital groupings. Under RELWGT2 (19 nat. CCRs; HPF), 50 percent of hospitals lose at least \$100 per discharge while 10 percent of hospitals gain at least \$377. Less redistribution occurs with RELWGT3 (HSP CCRs; HPF) than the other alternatives. Ten percent of hospitals have substantially higher losses under the HSRVcc and HSRV methods than under other alternatives to RELWGT1.

DISCUSSION

There are substantial differences in the weights for particular DRGs across the alternative methods and large redistributions across hospitals. However, none of the alternative weight methodologies represent a marked improvement over the current system. Our regression results show little difference across the methods in their ability to predict cost at either the discharge-level or the hospital level. Given these results, we believe it may be premature to consider further refinements in the relative weight methodology until data from FY08 or later can be evaluated that reflect coding improvement and other behavioral changes that are likely to occur as hospitals respond to the incentives of the MS-DRGs.

In the future, we believe that RELWGT3 warrants consideration as an improvement over RELWGT1. Although the method does not account for charge compression within cost centers, it does account for systematic differences across hospitals in overall charging practices that affect payment accuracy. Using the national CCRs, lower weighted DRGs that are provided in smaller non-teaching hospitals are undervalued relative to higher weighted DRGs that are disproportionately provided in larger urban teaching hospitals. Using PTC ratios as a measure of payment equity, RELWGT3 increases the percentage of discharges that are assigned to DRGs with average PTC ratios between 0.90 and 1.05 and reduces the percentage of discharges assigned to highly profitable or unprofitable DRGs. A second issue for future consideration is revision of the current HPF standardization method, which we found has larger

implications for DRG relative profitability and payment-to-cost ratios than the choice of relative weight methodology. Our results do not indicate that the HSRV or HSRVcc standardization methods are clearly preferable to the HPF method. However, our results reveal some significant limitations of the current HPF method. Traditionally, the Medicare program has viewed the IME and DSH payment adjustments as compensating hospitals for higher costs of care attributable to teaching activities and serving low-income patients. Consistent with this viewpoint, the payment factors should increase proportionately with cost. Instead, we found that the current factors increase more rapidly than cost and reduce payment accuracy.