
Implementation of Risk Adjustment for Medicare

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The Health Care Financing Administration (HCFA) implemented risk adjustment for Medicare capitated organizations January 2000. The risk adjustment system used, the Principal Inpatient Diagnostic Cost Group (PIPDCG) method, had to be incorporated into the payment structure mandated by the Balanced Budget Act of 1997 (BBA). This article describes how risk adjustment was integrated into the payment system within the rules of the BBA, and how fee-for-service (FFS) and health maintenance organization (HMO) data are collected and used in the determination of payment.

INTRODUCTION

The BBA mandated that HCFA implement risk-adjustment capitated payments for Medicare+Choice organizations (M+COs)¹ in the year 2000. Prior to this, the method for determining payments to capitated health plans was based on a beneficiary's location and was adjusted by demographic factors only. The demographic factors associate a predicted relative costliness with demographic characteristics, e.g., age, sex, and Medicaid eligibility. Starting in 2000, measures of health status were to be added to adjust payments. The first data to be used are diagnoses from inpatient admissions to hospitals.

The use of inpatient data was deemed a feasible beginning in applying risk-adjustment methods to capitated payments.

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Hospital admissions are relatively low in frequency compared with physician visits, making them a good first step in data collection and transmission by health plans. Admissions are also a marker for a group of people that tend to be costly to the Medicare program in the future. Inpatient data could also be used for 2000 because an inpatient-based risk adjustment model was available. The PIPDCG model used is fully described by Pope, et al. (2000). In brief, the model uses beneficiary demographic characteristics and categories of hospitalizations in one year to predict Medicare costs in the next year. The model has been applied to the Medicare beneficiaries eligible because of age or disability, but not, at this time, to the people having end-stage renal disease (ESRD).

The demographic characteristics used are: age, sex, status of Medicaid eligibility, and whether a person over age 65 was originally Medicare eligible due to disability. There are 15 mutually exclusive cost categories into which a hospitalization may be categorized if the stay is in one of the disease groups predictive of future year costs. The principal diagnosis (*International Classification of Diseases, 9th Revision, Clinical Modification*) determines classification in most cases.² For each individual, the stay with the greatest predicted cost

¹ M+COs include HMOs, provider sponsored organizations, preferred provider organizations, private FFS plans, and medical savings accounts.

² Exceptions are: A secondary diagnosis of acquired immunodeficiency syndrome will override a lower cost principal diagnosis. A principal diagnosis of chemotherapy (used in the diagnosis-related group payment system) triggers a search for an underlying cancer in the secondary diagnoses.

implications determines the incremental payment. As described by Pope et al. (2000), some hospitalizations are subsumed into the base payment categories that use only demographics to predict payment. These stays may have principal diagnoses that do not predict increased costs, diagnoses that are vague, or the stays may have been for fewer than 2 days. Each applicable demographic and PIP category is associated with an increment to a person's risk-adjustment factor; the sum of these increments is the final factor for an individual. The article by Pope et al. (2000) describes the model in a table that contains the Medicare incremental factors.

One last factor enters near the end of the payment computation process. Because Medicare's financial liability is reduced when a beneficiary has a primary insurer other than Medicare, a "working aged" adjustment is applied to reduce payment. This factor has been part of the demographic system since 1995. It has been added to the PIPDCG model as a multiplicative factor of 0.21. The risk-adjusted payment is multiplied by the working aged factor if an enrollee is reported to have coverage by another primary payer in a given month.

Risk-adjustment models are usually calibrated with total expenditures as the dependent variable of a regression, and the coefficients of the demographic and disease variables estimated as incremental expenditures. The risk-adjustment scores are applied, however, as adjustments to standardized payment rates, rather than as direct predictors of expenditures. The coefficients are converted to relative adjustment factors by dividing them by the national mean predicted per capita expenditure for the FFS Medicare population. To

implement the system it is necessary to compute the appropriate standardized payment rates and the national mean.

The following discussion addresses these and other aspects of HCFA's implementation of the PIPDCG system: the integration of a demographic module for newly eligible persons, computation of the national mean, derivation of the standardized rates (the risk-adjustment ratebook), the data flow for HMO encounter data, and the transition schedule for implementation.

New-Enrollee Module

The PIPDCG model does not produce risk factors for some classes of Medicare beneficiaries. Those beneficiaries designated as having ESRD were excluded from the modeling and will continue to be capitated using current ESRD rates and demographic factors. ESRD beneficiaries will probably be included in a future risk-adjustment system. The largest group not covered by the model are the beneficiaries new to Medicare, for whom HCFA does not have sufficient data for risk adjustment. These beneficiaries may be of any age—ranging from new young disabled eligible persons, to some who start their Part B Medicare benefits when considerably older than age 65. Because the PIPDCG model is being implemented only for people with a full year of diagnosis data available, some of the new enrollees can not be risk adjusted for 2 years.

HCFA is using a modification of the purely demographic model for new enrollees. Factors were developed based on age, sex and Medicaid status (Table 1). Because most of the enrollees with insufficient eligibility time are age 65 through 67, the 65-69 age group, which is usually

Table 1
HCFA Demographic Model Adjunct to
PIPDCG Model, Factors for People
with Short Eligibility

Age	Base Factor	Add-On Factor Medicaid
Male		
0-34 Years	0.512	0.223
35-44 Years	0.559	0.386
45-54 Years	0.649	0.464
55-59 Years	0.810	0.499
60-64 Years	0.959	0.506
65 Years	0.525	0.653
66 Years	0.573	0.646
67 Years	0.620	0.640
68 Years	0.667	0.634
69 Years	0.715	0.628
70-74 Years	0.847	0.594
75-79 Years	1.086	0.616
80-84 Years	1.307	0.612
85-89 Years	1.518	0.609
90-94 Years	1.666	0.386
95 Years or Over	1.668	0.354
Female		
0-34 Years	0.535	0.261
34-44 Years	0.579	0.423
45-54 Years	0.696	0.426
55-59 Years	0.840	0.542
60-64 Years	1.110	0.451
65 Years	0.446	0.603
66 Years	0.484	0.603
67 Years	0.522	0.603
68 Years	0.559	0.602
69 Years	0.597	0.602
70-74 Years	0.703	0.577
75-79 Years	0.899	0.594
80-84 Years	1.111	0.589
85-89 Years	1.328	0.424
90-94 Years	1.429	0.328
95 Years or Over	1.381	0.180

Medicare Population Mean = 1.
Working Aged Multiplicative Factor = 0.21.

NOTES: HCFA is Health Care Financing Administration. PIPDCG is Principal Inpatient Diagnostic Cost Group. This table is used for people for whom the data collection period is too short to derive a valid risk adjustment factor. HCFA uses this table when 12 months of data are not available. Medicare beneficiaries under age 65 are eligible because of disability and have higher factors than older non-disabled persons.

SOURCE: Health Care Financing Administration, Office of Strategic Planning, Research and Evaluation Group, 1999.

averaged, was split into single-year groups. Most older persons in this 5-year age group will be paid under the risk model, not the new enrollee module. Including their higher expenditures in computing the mean for new enrollees in the age group would have overestimated payments.

Using claims for the standard 5 percent sample of Medicare beneficiaries, average expenditures were computed for all

age/sex groups, with and without Medicaid status. To derive factors for the 65 through 69 single-year age/sex groups, the first step was to compute average expenditures for beneficiaries age 66 through 79. Using a regression model, a best-fitting line was estimated and projected for beneficiaries age 65 through 69. The data were quite linear, so simple regression could be used. This was done separately for the Medicaid and non-Medicaid beneficiaries so that a Medicaid increment could be computed. The resulting demographic model has been incorporated as a module in the PIPDCG software distributed by HCFA.

Ratebooks

With all the aged and disabled beneficiaries covered by the system, risk adjustment was ready to be integrated into HCFA's payment system. The PIPDCG model could have been implemented as an adjuster to a national capitation rate, however, HCFA has traditionally used the county as the area for which base rates are computed. The BBA did not change this, but provided some flexibility.³ Prior to the BBA, using the adjusted average per capita cost (AAPCC) method, a standardized payment rate was assigned to each county. This rate was equal to 95 percent of the projected per capita FFS costs in the county, divided by the average demographic factor for the county FFS population.⁴ As previously discussed, the demographic factor is a measure of a person's expected expenditures, predicted from demographic characteristics, relative to the national average. Each resulting county rate is the

³ BBA allowed State governors to request that larger geographic regions be used. None had done so as of January 2000.

⁴ The AAPCC, as implemented, has separate rates and factors for Part A and Part B covered services for both aged and disabled persons. Part A includes inpatient and some home health care; Part B includes ambulatory care, durable medical equipment, etc.

Medicare per capita payment as it would be for the national average Medicare beneficiary, given the county's price and utilization patterns. The set of rates is referred to as the ratebook. HMOs were paid each enrollee's county rate adjusted for the individual's factors, based on age, sex, Medicaid status, etc., the AAPCC.

For implementation, standardized county rates must be computed for risk adjustment as well. The rates computed using risk-adjustment factors are not necessarily the same as those computed using the demographic factors. The average county risk factors can be quite different numerically from the purely demographic factors. This results in a different set of standardized rates. Such a risk ratebook could have been computed for each year in parallel with the AAPCC demographic ratebook, but the BBA mandated changes in the way both the demographic and risk ratebooks would be computed for 1998 and beyond.

The BBA ratebook changes are intended to reduce the variation in rates over time and across counties, and to encourage M+COs to expand into counties without capitated plans. The new demographic ratebooks are based on the AAPCC rates in effect in 1997 and follow a specified algorithm projecting forward. Starting in 1998, the new county rate would be the greatest of: a 2-percent increase over the prior year rate; a minimum or "floor" amount; or a blend of a national rate with an area-specific or "local" county rate.⁵ Which of these applies depends finally upon comparing total projected payments under this "greatest of" rule to projected payments under the local rates alone. If projected payments exceed those using the local rate method, the excess is reduced (eliminated if possible) by dimin-

⁵ The weight on the national portion is 10 percent in 1998 and rises annually by 8 percentage points; it is 50 percent for 2003 and thereafter. The national portion is input-price adjusted before averaging.

ishing or eliminating the blend rates till one of the other "greatest of" targets is reached for each county. This comparison of two simulated total payment amounts is the budget neutrality referred to in BBA. Payments can and do exceed the "budget neutral" amounts because the floor and 2 percent minimum increase provisions limit the ability to match the local rate payments.

For purposes of the rate calculation, the local rate is the 1997 AAPCC rate trended forward by the national M+C growth rate projected to the payment year. The national M+C growth rate is the growth in the U.S. per capita cost adjusted downward (till 2003) by a fraction of a percentage point.⁶ The national capitation rate for the blend calculation is computed in two steps. First a standardized mean payment is computed: the sum of payments resulting if all Medicare beneficiaries were enrolled in capitated entities, divided by the sum of the beneficiaries adjustment factors. The payments for each person are the product of the local standardized rates and the appropriate adjustment factor. This standardized rate is then adjusted for input price levels for each local area before being blended with the local rate. Applying the BBA method, there were no counties with blend rates in 1998 or 1999. Many counties were assigned blend rates in 2000.

Other BBA rate changes are: subtraction of the portion of per capita costs related to paying teaching hospitals for medical education; shifting of a portion of home health expenditures to the Part B per capita amount from Part A; and using a national average split, rather than county-specific proportions of expenditures that are allocated to Part A and Part B. The portion of the rates associated with graduate medical education payments is phased out

⁶ The percentage point reductions are: 1998, 0.8 percent; 1999-2001, 0.5 percent; 2002, 0.3 percent. The 2002 reduction was modified by the Balanced Budget Refinement Act of 1999, Public Law 106-113.

in 20 percentage point increments starting in 1998; 100 percent in 2002. Hospitals are now paid for graduate medical education directly for Medicare M+CO stays.

Ratebook Rescaling

Health status risk adjustment based on hospital inpatient data was mandated to start in 2000 and had to incorporate the BBA ratebook requirements. The law was interpreted to require that the demographic BBA ratebook should continue to be published each year, even if risk adjustment was in effect. Because the BBA demographic ratebook would not be the appropriate base to be multiplied by PIPDCG factors, a process of rescaling it to the risk ratebook was required.

As the ratebooks follow a complicated path over time, the rescaling factors are not constant. The risk ratebook process started with the computation of a risk ratebook for the BBA base year, 1997. The average risk factor for the FFS beneficiaries in each county was computed using the PIPDCG model using the new-enrollee module where appropriate. The original models expressed the predicted values in 1996 dollars rather than relative factors. Each county average expenditure prediction was divided by the national mean predicted expenditure to produce an average risk factor for the county. Three years of base year data, 1994, 1995, and 1996, were used to compute three sets of factors. Variation across years was small in almost all cases and the mean factor was used by HCFA's actuaries for most counties. For the numerators of the rates, the actuaries computed the per capita costs for each county, aggregating the Part A and Part B expenditures for aged persons and disabled persons. They divided 95 percent of the per capita

costs by the county average risk factors to standardized them, and produce the 1997 base risk ratebook.

The base risk ratebook was then projected forward following the same BBA rules governing the demographic ratebook. With both ratebooks prepared for each year, rescaling factors, which convert the demographic rates to the risk rates, could then be computed. They are the ratios of the county risk rates to the county demographic rates. In March 1999, HCFA published for 2000 the BBA demographic ratebook and the rescaling factors for risk adjustment. There are two sets of rescaling factors published, however. The risk-adjustment system incorporates both aged and disabled beneficiaries' total expenditures in a unified system, with factors relative to the mean for the whole group. The demographic method maintains four sets of factors and rates, for Part A and Part B expenditures for aged persons and disabled persons. In order to rescale the aged rates, the county aged rescaling factor is set to the ratio of the risk rate for the county to the sum of the aged Part A and Part B demographic rates. A second, similar, rescaling factor is computed for disabled persons.

If the BBA process were linear, without the "greatest of" provision, a simpler rescaling could have been done. However, because a given county can be, for example, at the floor or blend in one ratebook and at the rate reflecting a 2-percent increase in the other, it is necessary to compute the rescaling factor after the rates have been computed for both ratebooks.

M+CO Data

The process thus far described has emphasized the use of FFS data in computing factors for beneficiaries to set the rate-

book. However, data from HMOs do play a part in the computation of the national rate and the budget neutrality calculation in the BBA ratebook process. For the national rate, they are needed because both FFS and managed care populations are used to calculate the mean payment for all beneficiaries. For budget neutrality, payments for the capitated population must be estimated. This is in addition to the primary role of the data in determining factors and payments for individual enrollees. With all beneficiaries being potential managed care enrollees, complete data are needed on each person. By combining data from both FFS and M+COs, risk factors can be computed for all the aged and disabled persons without ESRD. This was done for the implementation year starting January 2000.

To facilitate data flow, three modes of data submission were permitted in the first year of data collection. These data were used to estimate impacts and aid in ratebook determination. HMOs could elect to have their participating hospitals submit standard billing form UB-92 bills to HCFA fiscal intermediaries⁷; plans could themselves submit standard UB-92s; or plans could submit an abbreviated UB-92 with fewer elements and fewer fiscal intermediary edits. During the second data year, only the latter two methods were allowed. The abbreviated record requires elements sufficient to determine eligibility and compute an amount that would have been paid under standard Medicare pricing. Priced encounter records can be used along with FFS information in future recalibrations of risk-adjustment models.

The implementation data collection year is not a calendar year. In consultation with the industry, it was decided to collect data

⁷ The UB-92 is the industry uniform billing form for institutional claims, adopted in 1992. It is also designated the HCFA-1450 form.

from July through June to be used to compute factors for use in the following calendar year. For payments in 2000, bills and encounter records with discharge dates from July 1998 through June 1999 were used. The 6 months following allow data flow after the June service date, and time for computation of factors for all beneficiaries. This method was chosen over the alternative: collection of data January-December, paying based on interim factors, and reconciliation when a final set of factors becomes available midyear. Much of the industry preferred knowing the final factor at the start of the year. Since that determination, however, as a startup modification, it has been decided to let lagging July through June data continue to flow into HCFA and to reconcile final factors after the payment year. This should not be necessary after HMOs have had more experience with the process.

The process of collecting the data required setting up communications between plans and fiscal intermediaries; training sessions were organized and much intensive consultation was needed by some plans. On the HCFA side, modifications had to be made to claims processing systems to allow processing the new claim types without confusion with FFS claims.

Payment and Transition

The first year of data collection, service period July 1997-June 1998, was used to estimate the impact of the fully implemented PIPDCG system on M+COs. The best estimate at that time indicated an aggregate payment reduction compared with a purely demographic method of 7 percent. (This is not necessarily a decrease in payment from one year to the next. Payments actually rise in both systems.) Refinement of the estimate was done after collection of the second year's data. Although the profile of inpatient

stays was similar to year 1, the estimated impact was smaller because final values of some parameters in the system became available after the earliest estimate for the first year. The current impact estimate of a fully phased-in PIPDCG model is a aggregate payment reduction between 5 and 6 percent relative to the demographic system. Most estimated plan level impacts were negative, but there were a few plans that would receive increases based on their adverse selection detected by the PIPDCG model.

To soften the impact and mitigate concerns about data problems at some HMOs, a decision was made to phase-in the risk adjustment system. A weighted average (or transition blend) of the demographic and risk adjustment system payments is to be paid. Congress mandated the following weights on the risk-adjusted part of the average: in 2000, 10 percent; in 2001, 10 percent; in 2002, not more than 20 percent.⁸ As it is HCFA's goal to move to a more comprehensive system, using additional diagnoses from ambulatory settings, in 2004, it has not been determined what, if any, transition will occur at that time.

To compute and report to M+COs the payments using a blend of two systems, HCFA had to develop a new payment and M+CO reporting system. The new payment system computes payments under the demographic and risk systems separately and computes the weighted average of the final numbers. Monthly enrollment reports are sent to M+COs, as they have been, but they have gotten more complex because the characteristics needed to determine adjustment factors for each system differ. The report now includes the characteristics for both systems, including the PIPDCG group to which the person is assigned.

The system all came together during fall 1999. Bill and encounter data from all sources were compiled and merged with

demographic data to produce relative risk factors for all Medicare beneficiaries. The ratebooks for 2000 had been published the previous March, as directed by BBA. In December, January enrollments were determined and the payments for both parts of the transition blend were computed and averaged. Enrollment reports went out to the M+COs and payments were made on schedule for January 2000.

CONCLUSION

HCFA and the HMO industry have shown that a prospective risk-adjusted capitation system can be implemented on a large scale, even in the complex environment created by the BBA. Risk-adjustment factors have been computed, not only for the more than 6 million Medicare HMO enrollees, but for nearly all the approximately 40 million Medicare beneficiaries. The accuracy of payments for M+COs is improved over demographic methods even when only 10-12 percent of enrollees are distinguished by disease-based measures, as in the PIPDCG model. For the future, HCFA has sponsored much research into more comprehensive models that use ambulatory data, and has found them even more accurate at the individual and group level. With the cooperation of the industry a robust comprehensive model and successful implementation will be possible.

The primary goal of risk adjustment has been to make payments that match the projected needs of enrollees. There are many health insurance systems that face the problem of making proper payments for enrollee groups with atypical health status. In some States, the Medicaid insurance systems are introducing forms of risk adjustment, for example. The decreasing cost of electronic data processing and communications has made encounter-based risk-adjustment systems feasible.

⁸ The transition weights were set in the Balanced Budget Refinement Act of 1999, Public Law 106-113.

The data flows used for risk adjustment, particularly from ambulatory care, have other important uses, however. Capitated entities will have the data needed for better management of patients and for better management of costs. In addition, the data allow the development of many of the quality measures being used by industry today. Special data collection efforts to determine the rates of screenings, immunizations, tests and procedures can be substantially reduced. The implementation of Medicare's first health-status based system for capitated payment indicates the

feasibility of further improved payment systems and collection of data for outcomes and quality studies.

REFERENCES

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